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Original Article

Advantage of Early Tangential Necrectomy in Extensive Pediatric Burns.

Kenan Karavdić [1]

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Abstract

Background: An extensive burn is one of the most serious injuries. The conventional methods of local therapy, especially in extensive and deep burns, cannot prevent infection. The fact is that the necrotic burn tissue always gives rise to infection and must therefore be excised. Tangential excision is a diagnostic procedure as well as a surgical preparation of a recipient bed for skin graft.
Aim of research: The aim of our research was to demonstrate the efficacy of early tangential necrectomy in the treatment of extensive burns in children as well as in preventing the burn diseases.
Material and methods: Clinical parameters of sixty extensively burned children have been evaluated, divided into two groups (surgically and non-surgically treated) and in four subgroups (under and over the 25% TBSA). The following criteria have been used to compare the results: pain, fever, body weight, duration of the hospital stay, wound infection, laboratory values.
Results: The boys comprised 58.3% of the respondents and the girls were 41,7% of the respondents. The most common cause was the hot liquid of 73.3%, open flame 23.3% and the contact with hot metal 3.3%. The body temperature was significantly higher in control group compared to the examined group ($p < 0.001$) significantly lower hematocrit values in the control group compared to the examined group ($p = 0.002$). The results show that hospitalization lasted considerably longer in patients in the control group than in the examined group ($p = 0.003$).
The incidence of bacterial infection of the burns is significantly higher in control compared to the examined group of patients ($p = 0.007$). The most commonly isolated bacteria in the study group was Staphylococcus aureus (15/30 or 50% of all subjects). Acinetobacter spp. was isolated in 9 patients (30% of respondents). Serratia spp. And Enterococcus Foecalis were isolated in 6 patients (20%). Pseudomonas aeruginosa was isolated in 3 patients (10%). Three patients (10%) did not isolate any bacteria during hospitalization
Conclusions*:* The method of early tangential necrectomy of extensively burned children significantly reduce morbidity and mortality (it improves the general condition of the patient, improves clinical and laboratory parameters, reduces the possibility of infection of the wound, reduces the possibility of sepsis, reduces the length of hospitalization).The most optimal time to perform an early tangential necrectomy is the period between the 4th and the 6th day after the injury. In extensively burned children over 30% of the total body surface, an early tangential necrectomy should be performed on an area of about 20% of the total body surface as a prevention of blood loss due to necrectomy and autotransplantation. With extensively burned children over 40% of the total body surface, taking homotransplants from parents or close relatives reduces morbidity and mortality.
Keywords: pediatric, burns, extensive

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Full Text

Introduction

Extensive burns are especially important in trauma because of their common lethal outcome and physical, sensory and aesthetic sequelae. The most common causes of burns are fire, hot water, hot vapors, flammable liquids and gases. Recent statistics show that mortality rate in United States is 57.1 per 1000000 and in Canada 29.7 per 1000000 population (1).

The heat effect on the cell depends of the temperature and the period or temperature is acting. Moritz and Henriquez were among the first to create a weather-temperature relationship for thermal injuries. Exposure to temperatures between 40 and 44 C leads to weakening of function and early protein denaturation (2). Damage to the membrane is also impaired by cellular function, resulting in high intracellular concentration and subsequent edema. When the temperature is 44C or higher, damage is overridden by the insertion cell repair mechanism, the exposure time is long enough that the significant modified plasma membrane is sufficient to cause the necrosis. The damage that occurs is characterized by the participation of free radical oxygen, highly reactive molecules capable of promoting the future abnormalities of the cell membrane, leading to the death of the cell.

Further growth of temperature increases the protein destruction. Early protein denaturation destroys all levels of protein architecture and new aberrant links are formed, creating macromolecules that do not resemble the original structures. Necrosis of cells is complete, usually initiated on the skin surface where the heat energy is most directly received, extending deeper.

Coagulation is a zone of necrosis and is the first of three zones described by Jackson (3), which includes the initial bladder eschara.

- The zone of stasis lies deeper and more peripheral than the coagulation zone and represents a minor area. The development of ischemia in this zone may devastate already compromised cells, in some cases it can turn the entire zone into a dead eschara. Blood flow damage begins with microvascular events including platelet microtrombosis, adhesion of neutrophils to the walls, fibrin retention, and vasoconstriction (4.5). In optimal conditions, the zone of stasis can be reversible with cells which heal within one week. During the period of healing, the tissues are very fragile and suppressive to additional insults.

Zone of hyperemia is peripheral, characterized by minimal cell injury but with prominent vasodilation, with increased blood flow during which vasoactive mediators were produced as part of the inflammatory response. This zone usually prefers complete cellular healing except complications such as infection or trauma.

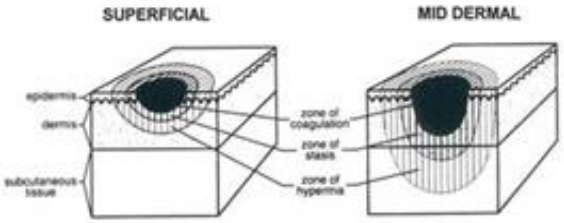


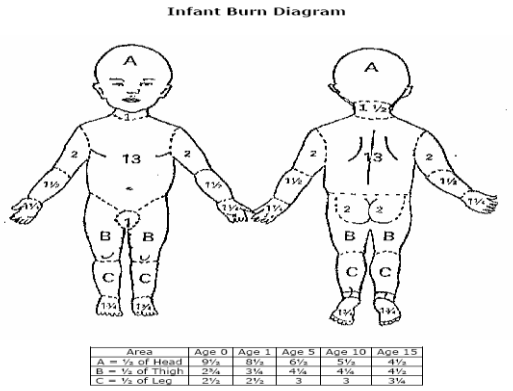
Figure 1: *Zone of coagulation*

Eschara represents an open wound where the protective role of the skin is lost. In the beginning, the eschara shortly helps the barrier: mechanical, immunological, and antibacterial, in fact, allows the environment to increase bacteria (6,7). This problem may be greater by taking water or targeted aplicated drugs from the surrounding tissue by the eschara. The ability of the skin to prevent loss of liquidity, electrolyte, and plasma components has disappeared and the eschara has therefore a high degree of permeability. It has been shown that high levels of loss of protein through the eschara even after the decrease of capillary permeability (8). The loss of complement and immunoglobulin components is increased by burn-induced immune suppression, while protein loss generally damages nitrogen balance and wound healing. Eschara may play a role in the hemostasis damage (platelets, fibrinogen) over time. The thermoregulatory role provided by normal skin also disappeared into the eschara. Even the eschara tissue is metabolically dead and contains heat derivatives and toxins that are diffuse to circulation, causing dysfunction of distant organs and other problems.

The loss of intravascular fluid and protein is caused by heat-damaged capillaries. There is great permeability between endothelial cells, which even allows macromolecules, such as fibrinogen, to pass through the interstitium.

By definition, edema develops when the value by which the liquidity is filtered out of the microsurgies exceeds the flow in the lymph nodes by draining the tissue mass. Edema formation appears bi-phasic. In the first few hours after the injury, a sudden increase in fluid flow of the ingested tissue occurs. The second and much larger increase in fluid loss and unprotected tissue is followed in the first 12 to 24 hours after the injury to maintain a high level of 48-72 hours. The size of edema of the cut skin depends on the type and extent of the burn and the time when the restitution fluid is given.

The degree of burn injury depends on the following factors (1) depth, and location; (2) patient age; (3) the etiology of the agent causing it; (4) the presence of inhalation injuries; and (5) associating with persistent illness. The American Burn Association has used these parameters in determining the guide to the classification of burn weight. Classification has created 3 categories of burn injuries (large-extensive, medium, small) and defined the optimal framework for each bladder treatment. Determination of the percentage of the cleaved surface is done after primary treatment using a Lund-Browder Modified Child Modification for Children, which was accepted in the International Classification of Burns.



Area	Age 0	Age 1	Age 5	Age 10	Age 15
A = ½ of Head	9½	8½	6½	5½	4½
B = ½ of Thigh	2¾	3¼	4¼	4¼	4½
C = ½ of Leg	2½	2½	3	3	3¼

Figure 2: *Lund-Brower-diagram*

Burn disease (infection of burns and sepsis)

Extensive burns have a higher risk of infection. Infection can lead to generalized disease (burn toxemia) by absorbing toxic products produced by the development of bacteria, leading to the cause and represents the most common and most serious complication of extensive burns. The area of the swelling wound is sterile immediately after the burn, but in the first 48 h it encounters gram positive organisms from hair follicles, skin adnex and the environment. Much more virulent gram-negative organisms replace gram-positive organisms after 5-7 days. Gram-negative organisms have greater mobility, possess many mechanisms of resistance to antibiotics, and have the ability to capture collagenases, proteases, lipases and elatases, enabling them to penetrate the sub-area. If the defense is inadequate, the invasion of vital tissue continues. When the number of bacteria is > 10*5 / g risk of early infection is large. If the number of bacteria is less than 10*3 / g, the bacteria is usually non-invasive. The most common and most dangerous bacteria that cause burn infections are Pseudomonas, Proteus and Staphylococcus aureus *("The Devil's Trio").* Usually it is resistant to all antibiotics and chemotherapy.

Sepsis is usually clinically manifested by bronchopneumonia, pyelonephritis, thrombophlebitis or invasive infection of the wound. The burn wound is an ideal substrate for bacterial growth and allows a large gateway to bacterial invasion. Microbiotic colonization of open burn wounds, a primary endogenous source, was established by the end of the first week. Infection is enabled by the loss of epithelial barriers induced by malnutrition as a hypermetabolic response to burn injury and generalized post-ophthalmic immunosuppression by releasing immunoreactive agents from the burn-on wound.

The burn wound causes suppression of almost all aspects of the immune response. Post-burn levels of immunoglobulin, fibronectin, and level of complement are reduced. Hemotaxis, phagocytosis, the role of neutrophils, monocytes and macrophages are damaged. Granulocytopenia is common in burns. The cellular immune response, recorded in the late reaction to the alograft, was damaged by lymphocyte mitogenesis. The burn results in a reduction in interleukin-2 (II-2) production, cytotoxic T-cell and NK cells, and helps T-cell (HSR) suppression. During the whole process of demarcation of dermal burns, there are severe symptoms of the disease and "burning illness" in the patient. Septic symptoms are the reflection of an

inflammatory reaction that develops in a large portion of dermal tissue rich in vascular network.
"Primary pain" caused by direct nausea is followed by a "secondary pain" resulting from intradermal pressure increase. Poor general condition, high temperature, anorexia and severe pain are present in patients as well as rapid fall in blood protein levels and hemoglobin.

Reanimation and initial treatment of the acquired

Burn shock is also a hypovolemic and cellular shock and is characterized by specific hemodynamic changes, including heart rate reduction, extracellular plasma and oliguria. As with other forms of shock therapy, the primary goal is to maintain tissue perfusion and prevent tissue ischemia. In case of burning shock, reanimation is complicated due to mandatory bladder edema.
The first studies by Frank P.Underhill, made 100 years ago, were investigated by fire victims at Rialto Theater in 1921 (9). His concept of burning shock due to the loss of intravascular fluid was further illuminated by Moor who added to the major Coconut Grove patients 1942 (10). They developed the concept of burning edema and presented a body weight formula for reanimating fluid-trained patients. In 1952, Artz and Moncrief developed a surface-to-weight bladder formula for fluid resuscitation, which became the first resuscitation formula for resuscitation of acquired patients (11). Evans' formula was introduced in 1952, and the Brooke Army Medical Center modified the original Evans formula, which became standard for the next 15 years.
Reanimation with crystalline, especially Ringer lactate solute with 130mEq / l sodium, is the most popular reanimation fluid. The authors only use of the resilience crystalline solution have revealed that other liquids, especially colloids, are not better and much more expensive than crystalloids (12). The most common reason given for the lack of colloid is that even large proteins pass through the capillaries after a thermal injury. The amount of crystalloid needed depends on the parameters of reanimation monitoring. The Perkland formula recommends 4ml / kg / % of the cleaved surface in the first 24 hours, with the half administered in the first 8 hours (13). Modified Brooke formula recommends the beginning of reanimation with 2ml / kg / % in the first 24 hours.
Reanimation by hypertonic NaCl, first published by Monafo, is the treatment of burn victims with saline solution 240-300 mEq / l, resulting in lower edema due to minor needs (14). The Burn Children Institute in Cincinnati uses a modified hypertonic solution for large burns of over 40%. Reanimation fluid contained 180 mEqNa (Ringer lactate + 50 mEq NaHCO3). The solution was used while metabolic acidosis occurred, usually 8 hours after burns. The volume was initially administered by the amount calculated for the Perkland formula (4ml / kg / % burn), volume shifted to diuretic 30-50 ml / h. The hypertensive formula can be used in neonates without the risk of hypernatriemia (15).

Reanimation with colloids

Evans 1952, uses 1 ml / kg /% of burns and for colloids and Ringer lactate over the first 24 hours, and Brooke formula uses 0.5 ml / kg /% of Colombo bladder and 1.5 ml / kg / lactate. There are three schools and opinions for the use of proteins in reanimation formulas:

1) Protein solutions should not be given for the first 24 hours because during this period they are not very effective while salt water maintains the intravascular volume.

2) Proteins, especially albumin, should be given from the beginning of reanimation along with the crystalloids, they are usually added to salt water.

3) Proteins should be given between 8 and 12 hours after burns using strict crystalloids in the first 8 to 12 hours due to massive fluid loss in that period.

Demling experimentally demonstrates that plasma protein maintenance is not effective for the first 8 hours after burns (16).

In young patients with large burns, recurrence of colitis often occurs because of the sudden drop in the concentration of serum proteins in burn shock.

The volume required to compensate patient depends on the type of injury, age, physiological status and related injuries. Consequently, the volume is predisposed to the substitution formula with the most commonly modified individual response to therapy. Using useful properties of hypertonic solutions, crystalloids and colloids at different times after burns, will reduce the amount of edema. The level of administration of the compensated fluid should be maintained by diuretics of 30-50ml in adults and 1-2ml / kg in children. When the weight of children is 30-50kg, diuresis should be maintained at the adult level. Serial Serum Concentration is not the only route of dehydration diagnosis but is the best guide to planning and tracking successful fluid replenishment. Other laboratory useful hydration indicators and guides include: Weight change, Sodium levels in serum and urine (concentration), Sugar (concentration in serum and urine), Input and Output, and Clinical Trials. Permanent colloid remission may be necessary to maintain colloidal oncotic pressure in very large burns and children patients. The maintenance of serum albumin levels of about 40g / dl is desirable. Electrolyte Ca, Mg and P can also be monitored. Requires 0.3-6.5 ml / kg

Children have limited physiological reserves. The Shriner Burns Institute has demonstrated that children with burns need more fluids for the reanimation then adults (the need for fluids for children is 5.8 ml / kg /% of the treated area) (17). Children usually need intravenous replacement for relatively small burns of 10-20% of the body surface. Baxter publised similar needs for a pediatric age group (35/Graves and association demonstrated that children received 6.3 + -2 ml / kg /% of burns (18). The Shriners Burns Institute, Cincinnati Unit, uses a Parkland formula with an addition of 4ml / kg /% burn in 24h + 1500ml / m2.

Local treatment of burns

The aim of local burn wound treatment is the prevention of vital tissue

involvement and bacterial control. The burn wound covered with serum exudate is the ideal surface for uncontrolled growth of bacteria. Infection is the most important cause of so-called "burning toxemia". The most common and most dangerous bacteria that cause burn infection are: Pseudomonas, Proteus and Staphylococcus aureus are usually resistant to all antibiotics and chemotherapy.
Local treatment consists of local hemoprophylaxis (antiseptic methods) and systemic use of antibiotics against colonizing colonies. Antimicrobial agents and biological bands are applied locally.
-Silver nitrate 0.5% is effective for Pseudomonas aeruginosa and Proteus, less effective on Staphylococcus aureus.
-Silver sulfadiazine is the most commonly used local antimicrobial agent for burns. It covers gram positive and most gram negative bacteria. Unlike Silver Nitrate, it does not prevent epithelialization and prevents fibroblast contraction.

Specifity of pediatric extensive burns :
- The body surface area in children compared to the body surface is much higher than in adults.
- The blood pool is smaller in children than in adults.
- Underdeveloped kidneys and livers can not withstand an increased burden of excretion and adequate nutritional needs and support. Differences in renal function between infants and adults may have important therapeutic implications in the treatment of premature infants. The degree of glomerular filtration does not reach the level of adults up to 9-12 months due to unbalance in tubular and glomerular function maturation. During this period, newborn babies have at most half the osmolar capacity of the adult.
- Insufficiently developed immune system increases the possibility of infection.

Early tangential necrotomy

Reverdin first introduced the epidermal graft and Thiersch in 1874 used more extensively skin parts. Wolf used a free full graft to reconstruct the lower eyelid defect. In 1891 Lustgarten described the technique of early excision and covering the graft of minor burns. Alografts have also been used for many years in the treatment of burns. Brown from St.Louis has established practical aspects of biological coverage as a treatment of extensive burns.
However, the first serious investigations of the surgical scarring treatment was in 1929 when Blair stated that the burning necrosis should be excreted and covered as soon as possible with the graft. The first results in that heroic surgery were described in 1960 by D.Jackson, B.G.MacMillan and W.Altemeir, who presented a small advantage over surgical conservative treatment. Soon after, R.MacCormack modified this procedure by separating the excision and covering the graft in a few days. S.R.Lewis has published experience with a series of patients where time-telling and graft coverage were not before 24th day after burns. The method of tangential necrectomy was introduced by D.M.Jackson and Z.Janžekovič separately as the right time for operative

treatment, is the period of the 3rd to the 5th day after the injury, and introduces the term "wound" for the first time.

The term tangential excision implies excision of the necrotic surface of the burn by repeated parallel slices using a skin graft knife. This method contradicts the earlier method of exfoliation of fatty tissue or deep fasciation by scalpel, exfoliating skin and subcutaneous tissue together. The procedure involves tangential excision and grafting. The goal of the procedure is to apply early closure of extensive burns. This surgical method treats deep dermal burns. By this method, the possibility of damage to undetected dermis is smaller in relation to the previously applied excision method of necrotic mass. Tangential necrectomy, correctly performed, can not transform partial into the entire skin thickness because the deepest quarter of the skin does not excel with the glands of the stinging. Tangential excision is a good diagnostic procedure. The first task is to determine Blair's knife depth of scarring with careful and gradual horizontal excision, after which the island of devitalized tissue is removed by repeated excision in regions where the burn is deeper. Fields showing blood thrombosis are considered potentially necrotic and are therefore completely excreted. Profuse bleeding is a real indicator of skin vitality

The excision of the necrotizing surface is best to start from the center of the burn where it is most likely to be the deepest. The first goal is to find out whether the subdermal veins are thrombosed where the burn is the deepest. If they are present, they will be easily visible after the first bruising layer tangentially excised. If no vein is visible, the case corresponds to tangential necrectomy and covers the vulnerable surface of the grafts. If thrombotic veins are present, the excision should be at the edge of the analgesic region, showing how many of the thrombosed veins and dead fatty tissues are involved, then thrombosed veins and dead fatty tissue can be excised with the scalpel.

The area of hyperemia, located on the red edge of the burn, should not be excreted and it is cured within 7 days of the initiated treatment.

Successively removing the slices from the same region of necrotic tissue should be represented until a pink derm has multiple bloody spots. When the region is noticed as pink and bloody, excision is interrupted even though a few minutes later it looks quite white and avascular. If the small pieces of yellow-brown dermis remain in the center of the pink dermis when the bleeding is stopped, it means that the excision was inadequate and that another layer had to be removed to release the vital substrate. The presence of black, thrombosed subdermal veins shows that fatty tissue is affected and that more tissue has to be excreted. Burning depth is demonstrated and confirmed by consecutive layers of white or pink necrotic skin that has been removed.

Leading skin graft knives such as Braithwaite, Watson or Cobbett modified Humby and Blair knife are recommended for exfoliation. If a knife is satisfactorily fitted, 4 or 5 slices of cut skin can be taken in the area where the skin is thicker. Powerfully powered electric dermatitis, useful for skin grafts,

is not such a good tool for finding the right dermis thickness.



Figure 3: *Humby and Blair knives*

The burn wound is the source of all ill effects, local and systemic. Eschara is essentially an open wound and a major cause of wound healing. It is also a remarkable environment for the development of bacteria, fluid loss, electrolyte and serum proteins. Eschara plays a role in hemostasis (platelets and fibrinogen) damage. Thrombosis that affects the blood vessels in the pathway compromises the already damaged tissue vitality and causes further damage and development of the infection. Necrosis gradually penetrates into the deeper layers of the skin, forming microabscess that represents the demarcation between vital and necrotic tissue. The infection destroys follicles of hair and a large number of sebaceous glands and sweat glands. Such a necrotizing enviroment is suitable for the development of infection. The next effect of the infection is the destruction of the deep dermis layer and the transformation of dermal burns into the bruising of the stage III. (20) In the case of extensive burns, there is a higher risk of infection. The tissue eschara is metabolically dead and contains heat derivatives and toxins that are diffuse to the circulation causing distal organs dysfunction. (21) Absorption of toxic products produced by the development of bacteria can lead to generalized disease (bovine toxemia) leading to the disease and is one of the major causes of mortality of extensively burnt patients. The most common cause of Pseudomonas aeruginosa and other grams can be represented (Staphylococcus aureus and Streptococcus pyogenes). (22,23,24)

Local conservative treatment is based on the treatment of infections and by means of preventative preventive measures (first line of defense) and the means that protect tissue and blood components from bacterial invasion. In the first line of defense we include the use of local hemoprophylaxis or antiseptic methods. The use of 0.5% of silver nitrate, which shares bactericidal and non-hybridisation, is efficiently removed in case of extensive bacterial bruising such as Pseudomonas aeruginosa and Proteus, while Staphylococcus is less efficiently controlled and on different coliform bacilli weak or ineffective. (23)

Surgical treatment of extensive burns (deep or level III) involves removing the wound (avascular lesion) and converting it to the uncovered untreated surgical wound and then covering that region with some of the grafts. This eliminates necrotic lactate-rich tissue, improves collagen synthesis, reduces the activity of inflammatory mediators and their contribution to microcirculation and permeability of blood vessels, reduces protein loss, and reduces the risk of dysthymia. All this leads to improvement of the general condition of

the patient and reduction of hospital stay. (20,25,26).

The authors of D.M.Jackson and Z.Janžekovič believe that the demarcation between vital and ireversibly destroyed (necrotic) tissues becomes apparent after the first phase of burn-out shock characterized by coagulant necrosis, dilated capillaries and increased blood vessel permeability. In the second stage, the organism reacts to the necrosis of the inflammatory reaction that may cause secondary necrosis of the deeper, vital layers of the dermis with microtrombosis. Taking into account that during this period (first 3 days) the resuscitation was completed, the reanimation carried out, the tissue of the diseased tissue, the authors considered that the period from the 3rd to the 5th day after the injury was the most ideal for carrying out the operative procedure.

Aim of study

The aim of our research was to demonstrate the efficacy of early tangential necrectomy in the treatment of extensive burns in children as well as in preventing the burns diseases.

Material and methods

In accordance with the objectives of the study, a homogeneous sample of respondents was chosen to reduce the polyciability of observed parameters.

The group consisted 30 children ages 6 months to 14 years, with extensive burns treated with surgical, early tangential necrectomy with mash autograft at the KCU Sarajevo Children's Clinic.

The control group consisted of 30 children ages 6 months to 14 years, with extensive burns treated with a conservative treatment method and children treated with surgical, delayed tangential necrectomy at the KCU Sarajevo Children's Clinic.

In order to analyze the impact of the body surface area on the length of the treatment, the subjects were divided into 2 subgroups, where the first subgroup consisted of children up to 25% and the other children over 25% of the body surface.

The study was conducted on the basis of a common approach to a patient, an anamnesis and a clinical examination. The pediatric surgeons have completed questionnaires that contain general information about the child (name, surname, full date of birth etc.), previous disease data, injury data that includes the agent of injury, time and place of injury, transport, first aid ... Clinical overview included the determination of the total area of burn, classification of burns according to the American Society for Burns with categorization. Thereafter, a reanimation with Perkland's formula was performed recommended by Shriners Burns Institute Cincinnati Unit, following clinical parameters (body weight, temperature, diuresis) and laboratory findings (hemogram, proteinogram). Patients were conservatively treated, and on the 3rd and 7th day after the injury, if identified by clinical examination of necrotic changes, it was applied early tangential excision with mash-autograft coverage. After the performed procedure, the

clinical and laboratory follow-up of the patient continued. Certainly, the survival and duration of treatment in the hospital was also monitored.
Patients with previous metabolic and hematological diseases and patients with death were excluded from the study.

Operative procedure

Early tangential necrectomy with autotransplantation of mash-graft in all subjects was performed at the Clinic for Child Surgery of the Clinical Center of the University of Sarajevo by a team of pediatric surgeons. The surgical procedure was performed after the diagnosis of dermatitis (clinical examination revealed necrotic changes) from the 3rd to the 7th day after the injuries.
The surgical procedure was performed after previous reanimation in general anesthesia. We used the Hamby knife to perform tangential necrectomy and electric dermatitis for car and homografts.



Figure 4: *Extensively burnt child by electricity over the 40%TBCA*

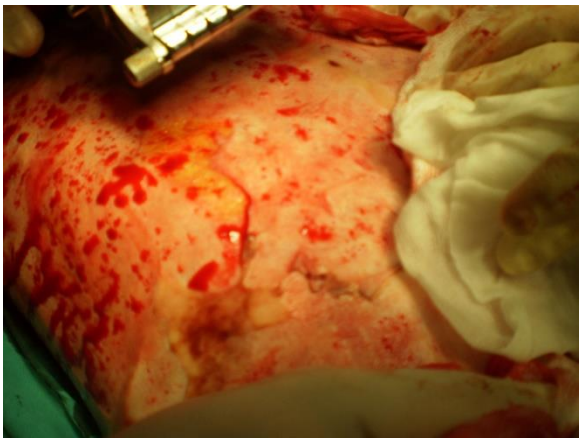


Figure 5: *Method of tangential necrectomy*



Figure 6: *Covering by autotransplantation Thiersch mesh-graft 1:3*



Figure 7: *Extensive burns with performed fasciotomy*



Figure 8: *Covering by autotransplantation Thiersch mesh-graft 1:3 after tangential necrectomy*

Results

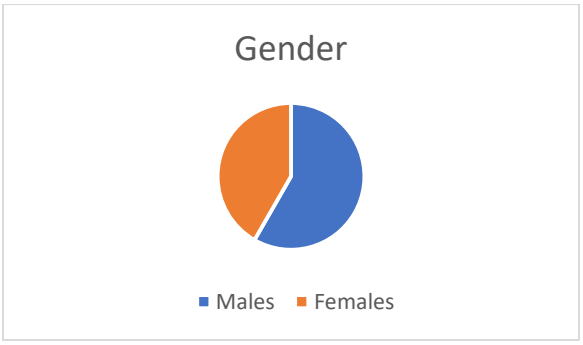
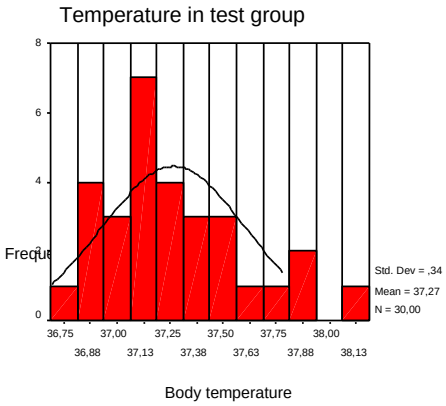


Diagram 1: *The gender structure of respondents*

Diagram 1 shows the gender distribution of subjects. The boys comprised 58.3% of the respondents and the girls were 41,7% of the respondents.

The results presented in Diagram 2 at 3 show that the body temperature was significantly higher in control compared to the test group (p <0.001).



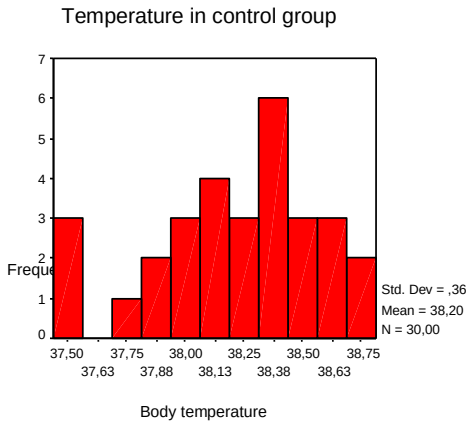


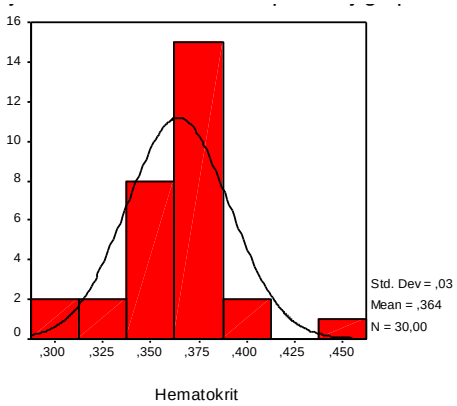
Diagram 2 & 3: *Statistical analysis of the parameters physical axillary temperature.*

The mean values (X + SEM) of the body temperature of the examined and the control group were presented:
- the study group (N = 30)
- control group (N = 30)

The results presented show that the body temperature was significantly

higher in control compared to the patient group (p <0.001).

The values shown in Diagram 4.and 5. show significantly lower hematocrit values in the control group compared to the study group (p = 0.002).



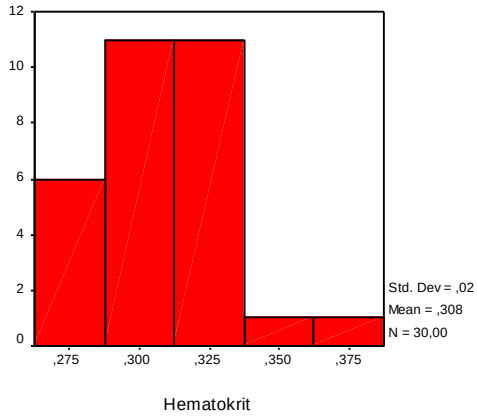
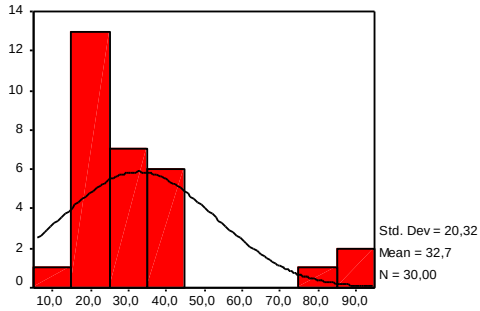


Diagram 4 & 5: *Comparison of hematocrit values from the control and study group.*

The values of the hospitalization length in the observed groups are shown in Diagram 6 and 7. The results in show that hospitalization lasted considerably longer in patients in the control group than in the examined group (p = 0.003).



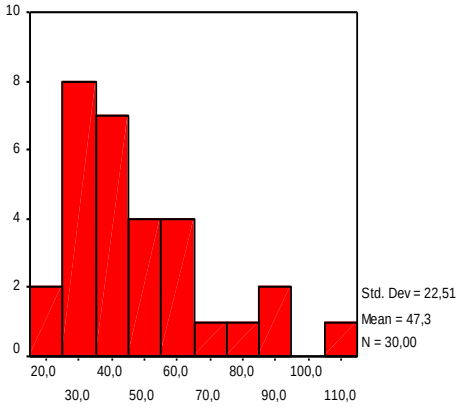


Diagram 6 & 7: *Comparison of the duration of hospitalization between the control and the examined group.*

The results of the presence of bacterial infection in the swelling of the burn wound in the observed groups are shown in Table 1.

Number of isolated bacteria					Total	
		0	≤2 bacteria	≥3 bacteria		
Groups	Examined group	5	18	7	30	
	Control group	3	8	19	30	
Total		8	26	26	60	

Table 1: *Statistical analysis of the presence of bacteria in the abrasion of the burns of the investigated groups.*

Statistical analysis of the microbiological swabs of the early-examined and control group was presented.

- patients in the examined group (N = 30)
- control group patients (N = 30)
- p <probability

The results presented in Table 17 show that the incidence of bacterial infection of the burns is significantly higher in control compared to the examined group of patients (p = 0.007).

Number of isolated bacteria within the examined group of patient

The most commonly isolated bacteria in the study group was Staphylococcus aureus (15/30 or 50% of all subjects). Acinetobacter spp. was isolated in 9 patients (30% of respondents). Serratia spp. and Enterococcus Foecalis were isolated in 6 patients (20%). Pseudomonas aeruginosa was isolated in 3 patients (10%). Three patients (10%) did not isolate any bacteria during hospitalization. In most patients in the study group two or more bacteria were isolated (13/30 or 43.3%) during hospitalization. Associated (polymicrobial) infections with three or more microbes were detected in 10 patients (33%).

2/30 (6.6%) of patients in the control group did not have a burn infection during hospitalization. The most commonly isolated bacterium was Staphylococcus aureus (18/30 or 60%). Pseudomonas aeruginosa was isolated in 10 patients (33.3%). Acinetobacter spp. was isolated in 9 patients (30%). In 10/30 patients (33.3%), three different microbes were isolated during hospitalization. In the 7/30 patients (23.3%), four different microbes were isolated during hospitalization.

The table 2 shows values of body weight loss of the examined groups.

		Category	N	Observed Prop.	Test Prop.	significance (two-tailed)	
Body weight on admission	Group 1	<27 kg	35	,59	,50	**0,193**	
	Group 2	>27 kg	24	,41			
Total			59	1,00			
Body weight at discharge	Group 1	<25 kg	33	,55	,50	**0,519**	
	Group 2	>25 kg	27	,45			
	Total		60	1,00			

Table 2: *Binomijal test*

McNemar's test. There is no significant difference in the body weight of admittance and discharge between the examined and the control group of the patients.

The ***ANOVA*** test did not show any significant differences within the investigated groups and categories.

Discusion

Most of the pediatric burns were caused by hot liquids (64.4%), hot oil (14.8%), flame (12.4%), electrical current (4, 4%) and contact (3.2%) (27). The largest

number of children was between 2-3 years (42%). Brogowski K. et al. investigated the effect of the cause of the burn on the length of the hospitalization and concluded that the depth of the burn and therefore the length of the hospitalization depends on the cause.

Our research has shown also the following percentages: hot liquids as a cause 73.3%, flammable 23.3% and contact burns 3.3%. Also, our research has shown a significant association between burns and hospitalization length ($p = 0.04$), hot liquid as a causative agent was significantly more frequent in patients who were shorter hospitalized (<33 days) and flame significantly more frequently appeared as a cause in patients who were longer hospitalized (> 33 days). Further statistical analysis of the mentioned data, ie post-hoc analysis, concluded that there was a significant difference in the length of hospitalization due to the cause of the burn (the flame as the causer causes longer hospitalization). These results can be explained by earlier findings that coagulant necrosis is formed at temperature between 44 and 51 C, and above that the protein extraction doubled for each step and that the temperature of the blasted metal and the open flame is over 70 C. Also, in our research we concluded that hot liquids significantly more frequently appear as causative agents in patients under 3 years of age while open flame is significantly more frequent in patients older than 3 years ($p = 0.04$).

Z. Janžekovič et al. concluded in their research that the absorption of toxic products produced by the development of bacteria can lead to generalized disease (burn toxemia), leading to the disease and constituting one of the major causes of the mortality of extensively burned patients. By applying careful, gradual, tangential excision, it is possible to eliminate the smallest of the particles of devitalized tissue. The authors have found that profuse bleeding of the vulnerable surface is the best indicator of the vitality of the layer as well as the caliber of blood vessels that make possible a diagnosis of deep dermatitis (28).

Shanin et al. concluded in their research that the morbidity and length of hospitalization was drastically reduced in patients treated with early tangential necrectomy in comparison to patients who were conservatively treated and whose defects were covered only when granulations were advanced (29).

Barrett et al. have revealed that they have achieved remarkable results in survival and reduction of morbidity by performing the tangential necrectomy early in the first 24 hours and at the same time taking full skin biopsy for the epidermal autografted culture technique. The authors have shown that by the method of tangential necrectomy in the first 24 hours, and by covering autograft and taking epidermal culture biopsy, they achieved remarkable results in the prevention of multiplicity and organ response, significantly reduced the duration of treatment and significantly reduced morbidity and mortality (30).

Matthew B. Klein et al. have found in their research the benefits of timely surgical treatment for extensively trained patients. In their works, the authors compared the patients in whom the eschara was left intact over the burning surface. Authors believe that proteolytic

enzymes produced by migrating neutrophils and bacteria within the contaminated eschara cause natural separation of the eschara from the wound bed. After falling of the eschara, wound granulations would serve as a substrate for the graft. The authors argued that surgical treatment was delayed by allowing time to determine which wound he could spontaneously swallow and which required skin graft coverage. The authors have found that in cases of extensive burns, postponement of treatment may lead to more extensive bacterial colonization, increasing the possibility of multiple, organic response and eventually death (31).

Heimbah D. has proved with colleagues that early excision of burns and closure improves survival, reduces infection rate, and reduces length of hospitalization. It also reduces the onset of SIRS (systemic inflammatory syndrome) and the disease. The authors started with surgery on the 3rd day and continued at 2-3 days intervals until all eschara was removed (32). Authors believe that early burn excision and coverage, show improvement in survival, decrease in infection rate, and decrease in hospitalization length. Early deep scarring excretion also shows a reduction in the formation of a hypertrophic scarring. Covering the burn wound is the ultimate goal of treatment of burns. Coverage may be presented by spontaneous epithelization or by covering with the grafts. Sorensen and authors analyzed the Burns Unit Copenhagen series in 1962-1971 (2,460 acute burn victims) and in the period 1972-1975 (660 patients with acute burns), the exposed method of burning best results in cases of superficial burns, and the same method gives the best results in cases of deep burns on the 14th day after the burn. A study by Sorensen et al. shows that surgical excision is desirable in the earliest possible time after a burn incident (during the shock phase) and in small and extensive burns. In cases of deep burns, best cosmetic results are achieved by tangential excision. The authors pose a dilemma when surgical interventions are to be made, whether in shock or 14 days after burns. The authors have achieved the best results in length of hospitalization, reduction of mortality and morbidity and the best cosmetic results in a group of patients operated after 14 days after injury (33).

Our study investigated the influence of early tangential necrectomy on the general state of the patient and showed significantly lower serum protein values in patients who were not surgically treated for the first seven days ($p < 0.001$). However, we did not find any significant differences between mean body weight gains at admission and postponement of patients treated with two different methods.

Research by Demling R.H et al. has shown that during the first week there is a profound hyper-metabolism that is characterized by an increase in metabolic levels and which in case of severe burns is twice as large as normal. The authors concluded in their research that due to hypermetabolism the regulation of body temperature was changed and resulted in subfebrilation (22).

Edlich et al. have suggested in their research that extensive burns can double the level of metabolism. Body

temperature reaches values over 38.5 ° C 5 to 15 days after burns and at over 60% the central temperature was increased up to 2 months due to direct stimulation of hypothalamus with inflammatory mediators and cytokines. Edlich et al have concluded that coverage of the cleaved surfaces reduced by significantly body temperature values due to lowering metabolism and suppressing the delivery of inflammatory mediators to the hypothalamus (34).

Our study compared patients who were surgically treated with the early tangential necrotomy method in the first seven days with patients who were conservatively treated. Body temperature values were significantly higher in patients treated conservatively and postponed surgically than patients treated with early tangential necrotomy ($p < 0.001$). Most authors reported similar results, explaining them by lowering the basal metabolism value as well as by removing the negative effect of eschara as an excellent basis for bacterial infection. Further, our research shows that patients with a higher number of isolated bacteria had significantly higher body temperature ($p = 0.003$) Our research has shown that the incidence of bacterial infections of burns is significantly higher in patients who were extensively infected, who were not surgicaly treated in the first seven days ($p = 0.007$) compared to patients treated surgically for the first seven days. Further statistical analysis showed that there is a significant association between the length of hospitalization and the number of isolated bacteria from burns ($p = 0.002$),. The aim of our further research was to investigate the correlation between the number of bacteria isolated from the burning scorch and the serum hemoglobin values. We have found, in the results, that there is an inverse correlation between the number of bacteria isolated from the burning scorch and the serum values of hemoglobin. ($rs = -0.436$), ie increasing the value of the bacteria in the burn-out of the burn decreases the serum hemoglobin value. In addition to the hemoglobin values, we have established a correlation between the number of isolated bacteria and serum hematocrit values and found that there is a negative association between these values ($p = 0.007$), ie increasing the value of the bacterium reduces the serum hematocrit value.

Lari A.R et al. studying a series of heavily trained patients have shown that Pseudomonas, especially Pseudomonas aeruginosa, is the most dangerous and most pathogenic microorganism. In further research, the authors have suggested that the pre-selection of gram positive bacteria present at an early stage goes into the pre-selection of gram negative bacteria 4-10 days after the injury. In further research, Cremer, Lowbury et al. show a high level of resistance to Pseudomonas aeruginosa to the most commonly used antibiotics. In the investigations of the authors mentioned, the second most commonly isolated microorganism is S. Aureus (35,36).

In the series of patients, the most commonly isolated bacteria were: Staphylococcus aureus, Pseudomonas aeruginosa, Enterobacter cloacae, Klebsiella pneumonia, Enterococcus

faecalis, Acinetobacter baumannii, Aspergillus species, Candida albicans.
Our results show more frequent Staphylococcus aureus (50%) while Pseudomonas aeruginosa in the second place is 10% in the examined and 33.3% in the control group. There was no significant difference in the presence of bacteria between the control and the examined group.

Numerous studies have shown that extensively burned patient presents a severe disruption of homeostasis. Studies of Loebl and the author, with radioactive Cr51 and P32, which investigated half-life of erythrocytes in hard-labored patients, showed that after the first phase characterized by increased hematocrit and blood viscosity, rapid erythrocyte decomposition and erythrocyte abnormalities were observed. The authors concluded that severely burned patients become severely anemic 4th day after burn injury. S.F.Wallner in his papers considers that the main cause of anemia in thermal injuries is not thermal erythrocyte damage but that these are microangiopathic mechanisms and plasma erythropoiesis inhibitor that directly divides into erythrocyte cells. Progressive red blood cell deficiency can be followed by the appearance of multiple abnormal erythrocyte forms in peripheral blood. Morphological changes include microspherocytosis, "associated cells," wild cells, and schitocytes (17, 18). Desai et al have shown that early excision significantly reduces intraoperative blood loss and stabilizes the hemogram (37). The results showed that the method of early tangential necrectomy of extensive burned patients also improves the blood image value compared to patients who did not apply this method, serum hemoglobin values were significantly lower in patients who were not surgically treated in the first 7 days ($p < 0.001$). Our results obtained by comparing the values of serum hemoglobin with the length of hospitalization showed significantly lower hemoglobin values in patients who were longer hospitalized ($p < 0.003$). Our research has shown a significant association between body temperature and serum hemoglobin values ($p < 0.001$). Also, by testing hematocrit values, we concluded that pathological values of hematocrit were more common in patients who were not operatively treated for the first 7 days ($p = 0.002$). The results of the study examined the effect of length of hospitalization on hematocrit values and we found that patients with pathologic values of hematocrit had significantly longer hospitalization ($p = 0.002$). Further statistical analysis of data obtained showed a significant positive correlation between hematocrit and hospitalization length ($p = 0.003$ $rs = 0.380$)
Housinger T.A. et al. studied changes in peripheral blood and tried to correlate them with the occurrence of both the survival rate and the degree of survival. The authors compared the group of pediatric survivors and patients who did not survive. They noted that significantly lower platelet counts below 0.1x 10 12 / l were observed in all untreated patients and concluded that the platelet count is a predictor of the sepsis or death outcome (38).

Our results showed that there was no significant difference in the serum values of the platelet count and the control group.

The time of surgical intervention: when to start early tangential necrectomy - is the subject of research by many authors.

In 1966, S.R.Lewis described over 1000 cases by citing as time for necrectomy and covering the graft period before 24 and 25 days. The authors of D.M.Jackson and Z.Janžekovič in separate studies conclude that after the first phase of burn-out shock characterized by coagulant necrosis, dilated capillaries and increased permeability of blood vessels, demarcation between vital and ireversibly destroyed (necrotic) tissue becomes apparent. In the second phase the organism reacts to the necrosis with the inflammatory reaction that can cause micro-thrombosis and secondary necrosis of deeper, vital dermis layers. In this period (the first 3 days) resuscitation is completed, the reanimation carried out, the authors believe that the period from the 3rd to 5th day after the injury is most ideal for the implementation of the operation. The authors explain that after the first phase of burn-out shock characterized by coagulant necrosis, dilated capillaries and increased permeability of blood vessels, the demarcation between vital and ireversibly destroyed (necrotic) tissue becomes apparent. Experiences of Janžekovič et al in the works show that the appearance of the surface (black and brown fields, white, gray-yellow, marbled development of the surrounding erythema, occurrence of ash) and application of pin prick test is sufficient to determine the depth of the burn with great certainty. In the second stage the organism reacts to the necrosis of inflammatory reaction that can cause micro-thrombosis and secondary necrosis of deeper, vital dermis layers (39). To ensure the degree of safety of depth determination and thus the correct indication of operative treatment, recent authors' works demonstrate the advantages of the following procedures in determining the exact depth of the injured wound. Kahn published the experiences with burn biopsy (40), Kalus and Warchel used ultrasound and LDPM (laser doppler perfusion monitoring) (41). Essex et al have published achievements and high accuracy in determining skin involvement with LDI (laser Doppler imaging) (42). While Albsjom was rejuvenated by LDF (laser Doppler flowmetry) (43). The use of fluorescein fluorescence photos was published by Zuckerman et al (44) while Celicioz with methylene blue was able to more accurately determine the depth of burn (45).

Magliacani et al., in their diagnostic studies, also introduced biopsy as a method (33). Histological monitoring of the involvement of tissue infection confirms the effectiveness of targeted antiseptic therapy or suggests alternative techniques. Progressive tissue involvement with infection, associated with increased bacteria, is a clear indication for more energetic target therapy. The authors concluded that the concept of early escharectomy of heavily burned patients must be associated with emergency necrotomy when a bacterial invasion of vital tissue under the eschar is present, and using earlier knowledge

of colonization of bacterial burns authors suggest 4th or 5th day as a timely excision.

Still et al. published experiences with tangential necrectomy performed in the first 48 h after injury compared to patients who were operated after the first 48 h (47). Patients who were operated after the first 24 h after admission had a statistically significant increase in length of stay in hospital compared to patients who were operated in the first 24 h. In their study mortality and morbidity as well as the need for postoperative operations are not significantly different between the two groups.

Further results of our research are not in accordance with the foregoing. Due to the technical limitations and the inability to determine the depth of the burn through modern methods we have been forced to resort to classical methods of determining the depth of the burn. In the first 24-48h we were not able to determine the depth of the burn and thus compare our results with the above-mentioned results. In study on experimental animals, the authors found that the blood flow in the burn early showed a marked increase in the 4th day after the injury, reaching its peak between 5 and 14 days. Further research has shown that the rise in blood flow with paralelically developed inflammation of the wound occurs in vital tissue under the eschara. Significant increase in blood loss should be expected with the excision of the wound after 5-6 days. For these reasons, the authors recommend that excision should be done before day 5 to avoid increased blood loss.

Our research is similar to Janžekovic's and authors' research since we achieved the best results by early tangential excision within 5.-6. postoperative day.Colonization of the wound develops during the first week and manipulation by colonized or infected burns increases the risk of bacteriemia. Pallua N.et al proved that sepsis is the most common cause of mortality in burn injuries. The main source of bacteria that causes sepsis is the burn wound itself. The authors evaluated whether current necrectomy compared to early necrectomy leads to decreased septic complications and post-traumatic lethality. They evaluated pediatric patients extensively digested. Lethality was significantly reduced in the group where the early tangential necrotomy was done in the first 3 days, compared with the group where it was done after the 3rd day ($p < 0.01$). In this study, it is demonstrated that current necrotomy compared to early necrectomy in young patients results in a significant reduction in lethality and lethality in severe thermal burns (48).

The degree of extensibility of burns, the impact of burns on morbidity and mortality was the subject of the research of the following authors. Thompson and colleagues in their studies investigated patients extensively burned, 2nd and 3rd degree (49). Over 30% of patients were treated with early tangential necrosctomy and reported a significant mortality decline, hospitalization lengths were not considered in their series. MacMillan and Artz discussed in 1957 patients with large burns that had been excised and an improvement was found in the length of hospitalization between survivors (50). Herndon et al found no

changes in mortality among adult patients burned over 30% treated with early excision (51). Scott-Conner et al. investigated the wound closure index, found that excision over 20% improved survival (52). Compared to 11 US units, Wolfe et al have shown that faster coverage of deep burns is associated with lower mortality (53). Chicarilli et al published scores of patients burned over 30% of TBSA and showed significant shorter hospital stay and improved survival after aggressive excision (54). Tchervenkov et al. have published improved neutrophil function in experimental animals with early excision (55).

Research by Sheridan et al has shown that children under 2 years do not tolerate thermal injury as older children. Morbidity and mortality in these patients was higher in their studies than in older children. One of the most important reasons is, according to the authors, immature immune systems and increased need to compensate for fluid leading to greater risk of hypovolemic shock and infection with smaller children. S.E.Morrow noted in subsequent studies that there was a significant difference in patients up to 4 years of age compared to older patients in response to thermal injury.

Our research did not show a significant difference in morbidity among patients aged younger than 4 years and older than 4 years ($p = 0.36$).

Maurage C., et al, analyzed 850 children hospitalized for a period of 10 years, with a mean duration of hospitalization of 30.8 days, while for patients over 25% of TBSA the average length of hospitalization was 63.6 days (56) .

Our results showed that the length of hospitalization of patients with extensive lesions that were conservatively treated and postponed surgically in relation to the patients treated for the first seven days was significantly longer ($p = 0.003$). Our research has shown that patients whose size of extensive burns exceeded 25% of the total body surface area were significantly longer hospitalized compared to patients whose burned body surface area was below 25% ($p = 0.016$).

The allowed size of the area that can be removed in one act was the topic of many authors' discussions.

Magistrates et al in their research have concluded that more than 15-20% of necrotic tissue should not be removed in one act (23). The surface area over 25% should be covered with autografts using mesh-graft ½. If over 25% of burns, authors suggest substitutions: biological, biosynthetic and synthetic.

Edlich and Desai et al., concluded in their papers that the gold standard of patients was extensive-burn early excision and graft coverage. The mortality of patients with massive burns was significantly reduced by early tangential excision of complete burn wound. The authors concluded in their papers that these surfaces should be covered by autograft from healthy regions of 1: 1 or 2: 1 for burns less than 30%. In the case of burns larger than 40% TBSA, skin autografts should be 3: 1 or 4: 1 meshes, possibly associated with a cadaver allograft used temporarily to cover the remaining open vulnerable surfaces. In their research, they have found that the cadaver allograft has become valuable to the vulnerable surface and represents a

partial barrier to infection but may also transmit antigen and infectious disease (55). Investigations by Burton.H and Tompkins have shown that the best results are achieved by burns over 30% using mesh-grafts of 1.5: 1 or 2: 1 and in the case of burns over 40% by partial necrectomy (up to 20% every other day) and by covering vulnerable regions with autografts mesh 1.5: 1, 2: 1 or 3: 1 or autografts 3: 1 with alografts or synthetic substitution of the cleaved surface (57,58).

Janežic A., and Herndon published routine use of allografts, xenografts, or artificial coverings with Integra, Dermagraft-TC, and over 40% TBSA (59,60).

In our research, we concluded that, with regard to blood loss, it is possible to perform necrectomy and covering with mesh-graft 1: 1 or 1: 2 to 30% of the burn surface in children. In the case of burns over 40%, we combined auto transplantation with homotransplantation of the skin of parents or close relatives.

Conclusions

The method of early tangential necrectomy of extensively burned children significantly affects morbidity and mortality (improves the general condition of a patient, improves laboratory parameters, reduces the chance of early infection, reduces the length of hospitalization).

For children with burns that take over 30% of the total body surface area, early tangential necrectomy should be applied to a surface of about 20% of the total body surface area as prevention of blood loss due to necrectomy and autotransplants.

For children with burns that take over 40% of the total body surface area, taking homotransplant from parents or close relatives reduces morbidity and mortality.

The most optimal time to perform the early tangential necrectomy is between 4 and 6 days after the injury.

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Original Article

Retrospective Study of Surgical Repair of Gunshot Injuries of Peripheral Nerves.

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Abstract

Background: Shotgun injuries of the peripheral nerves are presented frequently during the last decades at the Service of Neurosurgery of UHC "Mother Theresa" in Tirana. In such cases the surgical repair of brachial plexus and peripheral nerves constitutes a challenge with relation to difficulties related with mechanism of injury, coexistence of other vascular damage, bone, soft tissue and visceral lesions.

Materials and methods: A retrospective study of operated cases with shotgun injuries treated in our Department from 1997 to 2012 was conducted getting information from clinical charts, surgical registries, intraoperative photos and videos of the surgical repair of peripheral nerves. We performed a thorough analysis of the most influencing factors of surgical outcome such as: age, severity of injury, site of injury with relation to the innervated muscles, type of necessary nerve repair, presence of causalgia before operation, concomitant compromise of vascularization and/or locomotor apparatus. Follow-up of the patient was conducted through out-patient visits and phone interviews going back 10 years from surgical repair.

Results: 68 cases operated for shotgun injury of brachial plexus or peripheral nerves were revised. There were different ages and both sexes involved. The type of nerve repair went from interfascicular neurolysis to direct end-to-end microsuture and nerve grafting. Timely repair of the nerve injury proved to be yielding better result than late repair in terms of pain relief and sensory motor improvement of the preoperative neurological deficit. The degree and the quality of improvement after surgery is related to the type of repair (neurolysis improves better and faster than grafting), the distance from site of injury to the effector muscle (the longer the distance more time it takes for the function to recover). The recovery of the brachial plexus was followed up for many years and further surgery proved to be necessary and of further improvement.

Conclusions: From our long term experience dealing with surgical repair of shotgun injury of peripheral nerves we have learnt that early surgical repair is more efficacious in treating pain and gives better results in terms of motor and sensitive recovery than six months after injury as it was usually done. Long term follow-up is necessary to help with further surgery in case of distal decompressive surgery in anatomical tunnels.

Keywords: gunshot injury, peripheral nerve, surgery

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Full Text

Introduction

Shotgun injuries may be devastating to neurovascular bundles in proximal and distal sites of the limbs. Whenever the bullet hit the bone there are usually many fragments after the blast which act like cutting objects for the neurovascular bundle.

Whenever a surgical operation is indicated for vascular or bone repair, the nerve should be explored and repaired as well at the same session.

Neuropathic pain is very often observed in shotgun nerve injuries. The timing of surgery seems to influence the effect on pain relief in our series.

Material and Methods

We have retrospectively recollected operated cases at Service of Neurosurgery, Department of Neurosciences at University Hospital Center "Mother Theresa" in Tirana, for gunshot injuries during the period 1997 – 2012. The clinical files, intraoperative photos and out-patient archive have been revised and all the patients included in the study have been followed up in out-patient clinic or contacted by phone.

68 patients harboring nerve injuries because of shotgun injury were included in this study. 63 male and 3 female, from 7 to 64 years of age with a median of 27 years old. 17 cases were operated for brachial plexus injury, 32 upper extremities and 24 lower extremities. In 3 cases there were pseudo-aneurysms of the artery at the site of injury which was repaired at the same session. 12 cases were operated previously for internal synthesis of bone fracture, before the patient was send to our attention for nerve repair.

The description of the surgical procedure with the details of the type of nerve repair was revised carefully from the clinical charts and intraoperative photos were retrospectively revised to judge the extent of internal neurolysis or length and number of grafts applied.

At the out-patient clinics all 68 patients were filed and the records on neurological recovery were revised for this retrospective study.

The longest follow-up resulted to be 9,5 years from first nerve surgical repair.

Results

17 cases with brachial plexus injuries were explored supraclavicular or infraclavicular and in only one case a combined approach was deemed necessary.

In two cases with axillary lump there were an arterial pseudo aneurysm with thrombus which was primary explored with Doppler ultrasound and consecutively wit DSA (digitally subtracted angiography).

Both cases were operated by a combine staff of vascular and neurosurgeon at the same session. Vein graft in one case and artificial prosthesis in the other were done for the axillary artery, before the nerves were repaired.

In 12 cases that were first operated for bone fracture at the site of shotgun injury the nerves were found in an extensive fibrosis which made the dissection of the nerves difficult. In this cases the nerve

injury was more extensive than those cases which were not associated with bone injury.

In two cases with forearm injury, one of whom 7 years old, there was retraction of the flexor tendons with long-term consequences of growth of the affected limb, which needed further repeated orthopedic operation of tendon transfer.

There were 118 nerve elements that were recorded to have been repaired in 68 operated cases. Only 18 needed a sural graft. The rest of the nerve elements were microsurgically repaired through adherentiolysis, longitudinal epineurotomy, interfascicular neurolysis.

All 17 cases of brachial plexus injuries were on severe pain before surgery which improved gradually. In all operated cases none was referring any pain over 3/10 of VAS (visual analogical scale).

In three cases who were followed in out-patient clinics, there were a gradual Tinel sign accompanying nerve regeneration which stopped at the site of distal tunnels, namely cubital and carpal tunnels. Decompression at these sites under local anesthesia proved to be beneficial to sensitive improvement and some motor benefit.

In 32 operated cases for upper extremities injury there were two elements injured in 24 of them and three nerve elements in 8. All of the cases were studied with Doppler before surgery and ENMG was performed in all cases to confirm the severity of functional compromise of the injured nerves before surgery.

In cases of nerve injuries of lower extremities tibial nerve was interested in 16, peroneal nerve in 18, sciatic nerve in 7, femoral nerve in 3 and saphenous nerve in 2 cases. These records report more than the general number of cases (24 cases with lower extremities injury), reflecting multiple nerve injury in most of the cases, in few of them in more than one site due to multiple bullets. All the nerve elements were operated in the same surgical session.

Peroneal nerve did worse recovery than the tibial nerve. Nerve grafts longer than 6 cm on peroneal nerve did not yield any motor recovery in our operated cases.

All of the patients improved their sole of foot sensation which permitted recovery of infected skin wounds in 7 cases, even years after nerve injury.

Tarsal tunnel distally and proximal tibial and common peroneal nerve at fibular head were opened in cases with clear clinical signs of arrested regeneration after a more proximal nerve injury, which was repaired surgically or not.

60 over 68 operated cases reported pain from 4 to 10 out of 10 in VAS before surgery. The rate of improvement seems to be related to time relapse before surgery and severity of nerve injury and possible surgical repair. The cases operated closely to the time of injury did better recovery from pain then those with chronic neuropathic pain. Patients with more extensive injury of the nerve elements had longer time of recovery from neuropathic pain after surgical repair.

Discussion and conclusion

To our experience with surgical repair of shotgun nerve injury nerve injuries need to be surgically treated whenever there is clinical neurological deficit of the nerves

at the trajectory of the bullet. If there is neuropathic pain the timing for surgery should not be prolonged in order to have better result on pain relief. All cases should be closely followed for their clinical neurological recovery which may be arrested in distal anatomical tunnels for the nerves which result to be modified from the changes in terms of gliding tissue and vegetative changes following nerve injuries (more so with shotgun injuries). We like to call it arrested regeneration since the regeneration seems to stop at these sites, which corresponds to permanent Tinel sign in repeated clinical evaluation. In these cases, decompression surgery has proven to be very beneficial in promoting the regeneration of the affected nerves to continue beyond these anatomical tunnels yielding relief of paresthesia and pain, as well as sensitive recovery in the territory of the affected nerve(s).

Case illustration

21 y.o male sustained gun injury from a near distance at the lower right brachial plexus (*figure 1*). Palsy of all the brachial plexus elements followed (*figure 2*). The patient came to our attention 5 weeks from injury with severe pain distal to the right elbow (8/10 of VAS) Tinel sign at axillary neuro-vascular bundle. No arterial injury was detected at Doppler ultrasound. Surgical exploration at the upper part of brachial and axillary area revealed injury of the median ulnar radial and musculocutaneus nerves. All of them were released from adherences and neurolysis was performed under surgical microscope to the extent that no increased consistency of the fascicles was perceived (*figure 3*). At that time intraoperative nerve action potential was not feasible at our OR, as it is nowadays, so we had to rely of surgeon's experience to decide on type of nerve repair and extend of neurolysis.

The patient did a gradual recovery of the function (*figure 4*) and in two years he had fully recovered his motor and sensitive function of the upper extremity (*figure 5*).



Figure 1: *Shows entry and exit points of the bullet.*



Figure 2: *Complete palsy of the radial, median ulnar and musculocutanues nerves.*

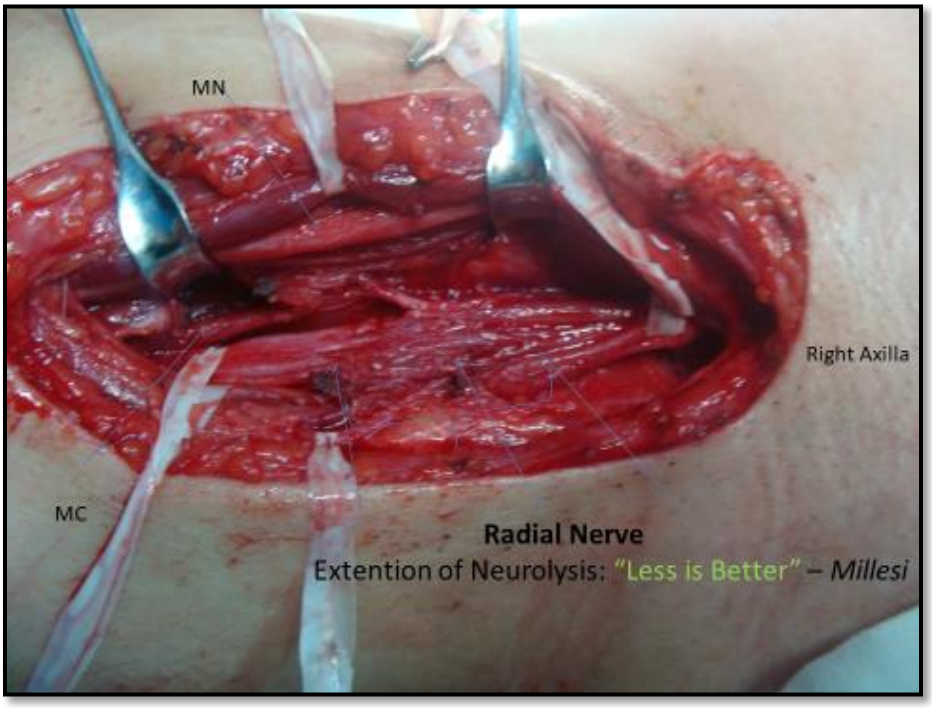


Figure 3: *Intraoperative exploration and dissection of the neurovascular structures with neurolysis of the affected nerves.*



Figure 4: *Two and half months from surgery.*

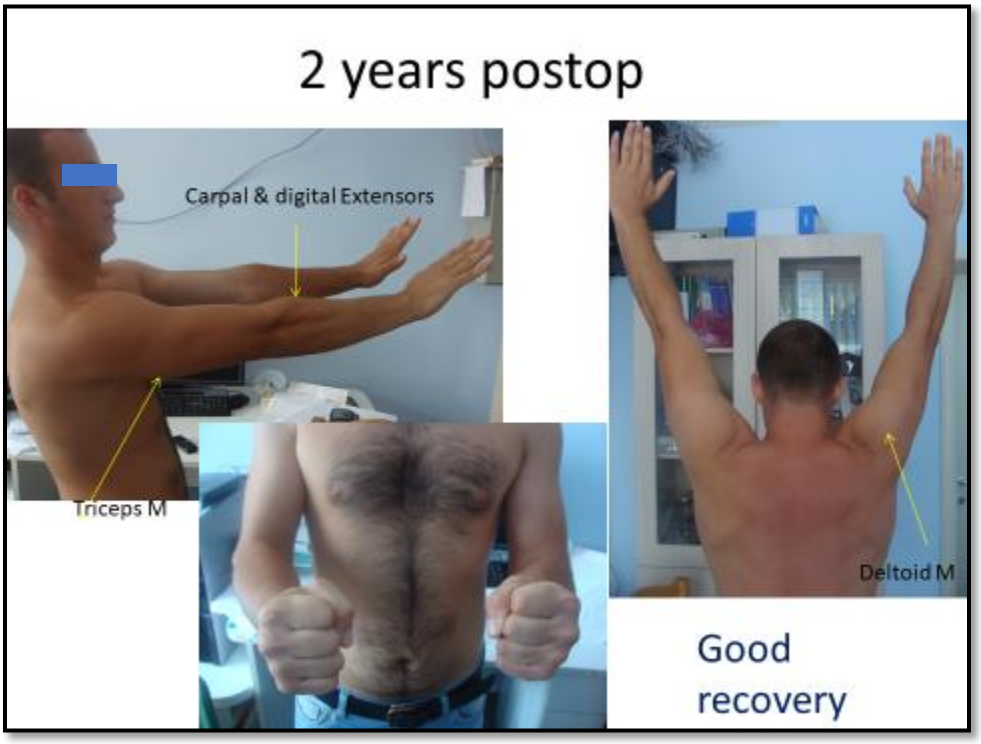


Figure 5: *Two years after surgery full neurological recovery.*

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Original Article

Our Experience in Epidural Analgesia Following Large Abdominal Surgeries.

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Abstract

Background: Epidural analgesia is a gold standard in post-operative pain control in patients undergoing large abdominal interventions. Different studies report a failure ratio of epidural analgesia of 20-32%.

The aim of this study is to analyze the success rate of epidural analgesia and its consequences in patients that have been subject to large abdominal surgeries.

Materials and methods: We have prospectively collected the data of 50 patients that were subject to open abdominal surgeries during a 2 year timeframe (September 2015 – September 2017) at University Clinical Center of Kosovo. Experienced anesthesiologists inserted the epidural catheters. A dedicated team used the Verbal Scale to collect the data regarding post-operative pain during coughing or moving. The success rate of eidural catheter was measured in terms of: the scale of pain, pulmonary post-operative infection and length of hospital stay.

Results: The study group included 33 males and 17 females, most of whom were subject to liver surgery. The secondary liver formations (70%), primary tumours (20%) as well as beningn liver disorders(10%) were an indication for liver resection. Large resections (≥3 segments) were completed in 44% of patients, small liver resections were (≤2 segments) completed in 48% of patients, while 8% of patients were considered inoperative. Epidural analgesia was successful in 46 patients (92%). Bacterial colonisation of the catheter was observed in only one case. There were no neurological complications. 5 (10%) patients showed radiologicalsigns of a pulmonary infection. Three patients (6%) had surgical wound infection. One patient died of hepatic insufficiency after massive right liver resection and cholecystectomy due to gallbladder carcinoma. The average length of hospital stay was 6 days.

Conclusions: Our experience concludes that epidural analgesia is a safe and effective way of pain relief after abdominal surgeries.

Keywords: epidural analgesia, open abdominal surgery, acute pain, prevention.

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Full Text

Introduction

Epidural analgesia provides a regional pain control through neuroaxial blocade. It is estimated that epidural analgesia offers a better pain control (especially pain due to movements) at the beggining of the post-operative period, following large abdominal surgeries in contrast to patient controlled analgesia.

The duration of post-operative intubation, post-operative mechanical ventilation, myocardial infarction, gastric and renal complications are more rare when epidural analgesia is applied. There are several physiological factors that reason the decrease of such complication after using this technique. Epidural analgesia allows adequate early post-operative mobilisation, thus reducing early cardiopulmonary complications.

This is why epidural analgesia is as a gold standard in pain control following large abdominal surgeries. It has gained an important role, especially after the implementation of the rehabilitation programs.

However, some studies have shown that a considerable part of the epidural catheters (20-32%) fail party or in total immediately after the post-operative period, thus resulting in a non adequate pain control.

Liver resection due to benign or malign disorders is a very frequent surgical procedure. Pain folloqing surgery may compromise pulmonary function, epsecially after large incisions near the diafragm. Hepatectomy is very often performed under low venous pressure in order te reduce blood loss from the hepatic veins. Hypotension from neuraxial blockade might be neccessary to provide a low venous pressure.

Bilateral subcostal incision, starting from the median axillary line on the right up to outter border of rectus muscle on the left and xiphoid process superiorly is the classical incision for large abdominal surgeries such as hepatectomy. The central part of the incision represents the weakest point of the abdominal wall, that predisposes for post-operative wound dehiscence and incisional hernia.

Epidural analgesia is considered to the less effective, the higher the incision on the abdominal wall. That is why modified incisions are made, including J incision (excluding the left subcostal component) and bilateral subcostal incision(exluding the superior central part) that are advantageous in reducing pain and hence in less post-operative respiratory consequences.

Some of the neurological adverse effects of epidural analgesia such as epidural hematoma and epidural abscess might have very great neurological conseqeunces, are fortunately very rare. Post-operative coagulopathies may be noticed more frequently after hepatectomy surgeries.

Aim

The aim of our study was to analyze the success rate of epidural analgesia and its consequences in patients that have been subject to large abdominal surgeries (including those performed using bilateral modified subcostal incision).

We aimed as well to find any possible relation among epidural analgesia failure, length of hospital stay, and complications such as: pulmonary infections and wound infections.

Materials and methods

We have prospectively collected the data of 50 patients that were subject to open abdominal surgeries during a 2 year timeframe (September 2015 – September 2017) at University Clinical Center of Kosovo. Epidural catheter was successfully inserted in all of our patients. Our variables included: patient's characteristics, surgical indication, sixe of incision of lives resection, epidural catheter data, results of post-operative pain, complications and length of hospital stay. All of the patients were subject to bilateral subcostal incision without involving the cental line(the superior xiphoid process part). Liver resection was classified as large (≥3 segments) and (≤2 segments). All the patients that underwent large abdominal surgery remained for 24 hours after surgery at instensive care unit. The patients were as well categorized accordinh to their disease: beningn, primary malignant and secondary malignanat (metastases).

Epidural catheter insertion and management

Experienced anesthesiologists inserted the epidural catheters, at T7-T8 intervertbral space levels while the patients were awake. Bupivacaine (0,1%) and Fentanyl (2 μg/mL) were used as infusions. All the patients had the possibility to self administer this infusion injecting 3ml of bolus (up to two boluses in one hour).

First, a continuous infusion of 3-12ml/h was applied. The quantity of the infusion was based on the clinical data regarding the scale of pain. Pain scales were collected and documented by a specializes nurse at specific time intervals. If the patient referred for a strong pain, then the nurse applied a bolus of 5ml for the infusion.

All the patients received Paracetamol (1gr every 6h) as a standard auxilliary analgesic. The pain scale was monitored from our team when the patients were moving or coughing by using the Verbal Scale (0-no pain, 1- low pain, 2- average pain, 3-strong pain). Removal of epidural analgesia and opioid administration to control pain were considered as a failure of epidural analgesia. Epidural analgesia was removed one day after the continuous infusion was stopped, usually the third or the forth post-operative day. The clooting factors were controlled on the day of catheter removal. If the tip of the catheter showed signs of infections it was immediately removed and it was sent for microbiological testing.

The data regarding hepatic insuficiency, pilmonary infections and wound infections were recorded. A pulmonary infections was considered when the clinical signs and radiological signs were present. A wound infection was considered when the clinical signs and positive microbiological results were present. The success rate of eidural catheter was measured in terms of: the

scale of pain, pulmonary post-operative infection and length of hospital stay.
All the data were collected in Excel and were analyzed using the SPSS programme.

Results

The study group included 33 males and 17 females . The mean age was 66 years old (32-84 years old , with an average of 67 and a standard deviation (SD) of 9.2 years). Indications for the intervention were metastases (69 %,n =35), primary tumors (20%, n=10) and benignity (11 %, n=5). From the metastasis , the majority were colorectal 90 % (n=44) and the others derived from carcinoid (n=2) , breast cancer (n=10), anal squamous cells carcinoma (n=1) and bladder cancer (n=1). The primary liver tumors included hepatocellular carcinoma (HCC , n=7) , cholangiocarcinoma (n=3) and cholecysto carcinoma (n=4) . Major and minor interventions were done in respectively 44 % (n =22) and 48 % (n=24) of patients , wheras 8 % (n=4) were inoperable . The patient' s characteristics and the complications are illustrated in the table below (*Table 1*)

Variables		*Major interventions*	*Minor interventions*	*Inoperable*
Number (%)		**22 (44%)**	**24 (48%)**	**4 (8%)**
Age (years)	*Average*	**67**	**69**	**59**
	Minimum-Maximum	**57–81**	**32–84**	**49–77**
Gender	*Males*	**13**	**16**	**1**
	Females	**9**	**8**	**3**
Indications	*Benign*	**2**	**3**	**0**
	Malign	**20**	**21**	**4**
Epidural	*Success*	**21**	**21**	**4**
	Failure	**1**	**3**	**0**
Pulmonary infection		**3**	**1**	**0**
Wound infection		**2**	**1**	**0**
Length of hospital stay	*On average*	**7**	**6**	**5.5**
	Minimum-Maximum	**5–27**	**4–20**	**3–9**

Table 1: *Patient' s characteristics and the complications*

Epidural analgesia resulted successful in 46 patients (92 %) . The failure of epidural analgesia was noticed only in male patients (n=4). The analgesia was not successful in 2 patients due to unilateral block. There was also initially an unilateral block in 3 patients , but the grade of pain was reduced in a low one (grade 1) after redeployment of the epidural catheter (aseptic traction of 1 cm) and bolus administration of the medications by the nurses . These cases

were not included in the group of failures. All the patients that failed with epidural analgesia were given a continuously morphine therapy . The grade of postoperative pain were collected for each patient , every day after the epidural catheterization. It resulted that 16 patients didn't have any kind of pain (lowest pain grade 0) . The most common pain grade was 1 (mild pain) found in 23 patients , than pain grade 2 (moderated pain) in 5 patients and severe pain (grade 3) in 5 patients. The frequency of the pain's grade of successfully catheterized patients , until the 3 day post intervention is illustrated in *Figure 1.*

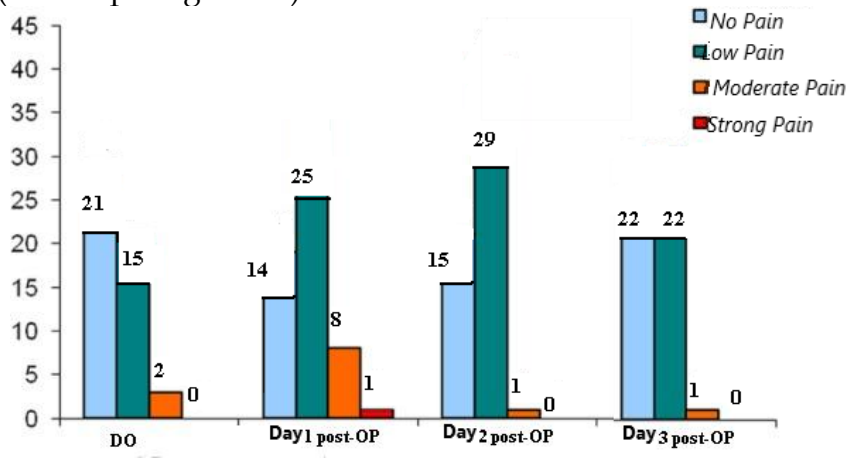


Figure 1: *Grade of pain on post-operative days*

None of the patients developed epidural hematoma or abscess . Bacterial colonization of the catheter was also not found in any of the patients . There weren't any neurological complications . The average time of keeping the epidural catheter after the intervention was 3 days (min 2 days, max 5, average 3.4 with a SD 0.98)

4 Patients (7 %) developed a pulmonary infection which was confirmed by radiology . 4 Patients developed wound infection . A patient died as a result of hepatic failure due to resection of a massive part of the right hepatic lobe and cholecyst because of cholecyst carcinoma . (1.4%).

Patients had a mean hospitalization period of 6 days (varying from 3 to 27 days , SD =4.6). There wasn't any significant difference in the hospitalization time based on the age , sex, main surgery indication or epidural analgesia .The hepatic resection size had an important impact in the hospitalization time , the ones who resected a larger portion stayed more in hospital. Also pulmonary infections played an important role .

Discussions

The majority of operations in our country are realized by a big abdominal incision . In this study all the interventions were done from specialist through a standard bilateral subcostal incision . Even though the epidural thoracic catheter is considered to produce a bilateral sensorial block in the

upper abdominal part , it is seen that the upper the incision is done the less controlled pain is and the greater is the risk of pulmonary complications . The midline incision causes a major abdominal traction and a greater damage of the abdominal wall , that delays the pulmonary recovery . Anyway it should be noticed that this study analyzed the effectiveness of analgesia in standard incisions .

In our study epidural analgesia was productive in treating post operation pain in 92 % of patients . In different studies it has been reported of failure of this analgesia in 20 % of patients who had liver cancer. Our study showed that when the catheter was placed by a trained team with the lead of an anesthetist epidural analgesia was more productive .

Epidural analgesia is considered to be the gold standard post operative analgesia of upper abdominal operations , because it is thought that epidural analgesia is the best option of immediate analgesia .

Hypotension can be very often caused by epidural analgesia , which can be considered a priority when we want to reduce venous pressure to also reduce bleeding during hepatic surgery.

The administration of large amounts of IV fluids is well known in these kind of interventions , but could be easily prevented by a well prepared staff . Even though the grade of pulmonary infections in our study was low (7%), this complication was a very important factor that prolonged the days of hospitalization . Due to the reduction of opioids when we use epidural analgesia there is a better function of gastrointestinal tract , pulmonary tract and an easier recovery after operation.

Neurological complications such as hematoma, abscess which can be life threatening and to worry about were very rare . Even though there was a patient with epidural contamination , there was no evidence of infection and no neurological complications

The well trained staff and the use of modern catheters was of a great help. The mean hospitalization period in this study was 6 days , prolonged by the size of liver resection .

The weakness of our study is still the standardization of the surgical incision , the operation technic , and the prospective collection of the data . Some limitations in our study could be the reduced number of patients and the fact that the stud was only conducted in one hospital center.

Conlcusions

Our experience concludes that epidural analgesia is a safe and effective way of pain relief after abdominal surgeries. We have reache a 92% success rate in patients that were subject to large abdominal surgeries (standard subcostal incision excluding the central superior xiphoi process line). Neurological adverse effects might have great consequences, but since they are very rare, we have not encountered such complications in our study, neither have found these ones in similar studies.

The epidural catheter is very effective when it is inserted routinely from experienced anesthesiologists and it is managed by teams that are traind in pain control.

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Original Article

Anastomotic Leak after Colorectal Surgery. Our Experience in three Years.

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Abstract

Background: One of the most severe complication after intestinal resection, often with catastrophic consequence for the patient is leakage from the anastomosis. The severity of complications after anastomotic leak may range from a small localized peritonitis or abscess formation without sepsis, to a development of a four quadrant peritonitis with septic shock. Until now despite the seriousness of this complications, the cause of anastomotic leakage are not yet definitively clear.
Aim: The aim of this study is to submit our experience in treatment of patients with anastomotic leakage after intestinal resection and their outcome.
Materials and Methods: The study included 63 patients with colorectal cancer operated in the Department of Surgery at the Clinical Hospital of Tetova. In all patients intestinal resection with end to end anastomosis was performed.
Conclusions: Anastomotic leak after large bowel resection is a very serious complication with a great impact on patient's morbidity and mortality. Multiple risk factors are associated with occurrence of this complication whereas the more suspected are: preoperative anaemia, hypoalbuminemia, emergent surgery without adequate preparation of patient, intraoperative blood loss and blood transfusion during surgery etc. Early detection of AL is very important and helpful to improve the outcome of patients and to minimize postoperative rate of morbidity and mortality.
Keywords: anastomotic leaks, colorectal surgery, risk factors

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Full Text

Introduction

Recently, intestinal resection is a common procedure performed in surgery, not only as an elective procedure but even as an emergency intervention for the benign and malignant diseases of the GI tract.

One of the most severe complication after intestinal resection, often with catastrophic consequence for the patient is leakage from the anastomosis. The severity of complications after anastomotic leak may range from a small localized peritonitis or abscess formation without sepsis, to a development of a four quadrant peritonitis with septic shock. Until now despite the seriousness of this complications, the cause of anastomotic leakage are not yet definitively clear. Some of the causes are a result of a faulty surgical technique such as intestinal ischemia at the suture line, tension across the anastomotic line, presence of local inflammatory process, and the obstruction or difficult passage distal to the anastomosis[2, 5]. Other causes are related to the patient's state of the health such as age, coexisting disease (diabetes, systemic inflammatory disease, cardio – respiratory insufficiency, malignoma etc.), treatment with high doses of corticosteroids before surgery, chemo or radiotherapy, anaemia, malnutrition, alcohol, smoking, obesity etc[8, 9]. Some of this risk factors are modifiable but most of them are permanent and can't be changed before surgery. Emergency operations are associated with a higher percentage of complications (including intestinal leakage) compared to elective ones[5].

Anastomotic leakage is associated with abrupt clinical signs such as severe abdominal pain, fever, abdominal rigidity, tachycardia, hemodynamic instability etc. Radiological examination such as native abdominal radiography and CT are very important to clarify the diagnosis, especially in cases when it is uncertain.

Aim of the study

The aim of this study is to submit our experience in treatment of patients with anastomotic leakage after intestinal resection and their outcomes.

Material and methods

During 2016 – 2019 timeframe, 63 patients who had any kind of colorectal resection either elective or emergency, at the Clinical Hospital of Tetova – Department of Surgery were included in the study. We have excluded patients in whom the distal verge of tumor was been less than 15 cm from dental line. Important data for this study were: age, sex, chronic disease, past surgical intervention, blood count before surgery, albumin, blood urea nitrogen, serum creatinine, liver function tests and bowel preparation.

Other relevant data were duration of the operation, blood loss during surgery and intraoperative blood transfusion, and the segment of the colon in which anastomosis was performed. The anastomotic leakage was defined as leak of bowel content and of pus from the wound or through the drain. The anastomotic leakage

was confirmed by the imaging examinations such as native abdominal radiology examination, abdominal CT with contrast and ultrasonography.

Results

The study included 63 patients with colorectal cancer operated in the Department of Surgery at the Clinical Hospital of Tetova. From 63 patients which were the subject of our study 58.7 % (37) were males and 41.3 % (27) females, with the average age of 64.5 years (49 - 81). Four patients (6.3 %) were insulin dependent diabetics, eight others (12.7%) had ischemic heart disease as a comorbidity, four patients (6.3 %) suffered from chronic pulmonary disease, 21 of them (33.3 %) were smokers, whereas five patients had undergone previous abdominal surgery. The haemoglobin level below the 12 gm/dL was registered in 19 (30.15 %) of patients, whereas albumin level under 2.5 gm/dL was registered in 16 (25.4 %) of the patients.

Eight patients were treated with blood transfusion before surgery, whereas three of them have received blood transfusions during surgery. Regarding the tumour localization in 16 patients (25.4 %) the tumour was localized at a right colon, in 5 patients (8 %) at the transverse colon, in 12 patients (19%) in the left colon and in 30 patients (47.6 %) in sigma and rectum (*Figure 1*).

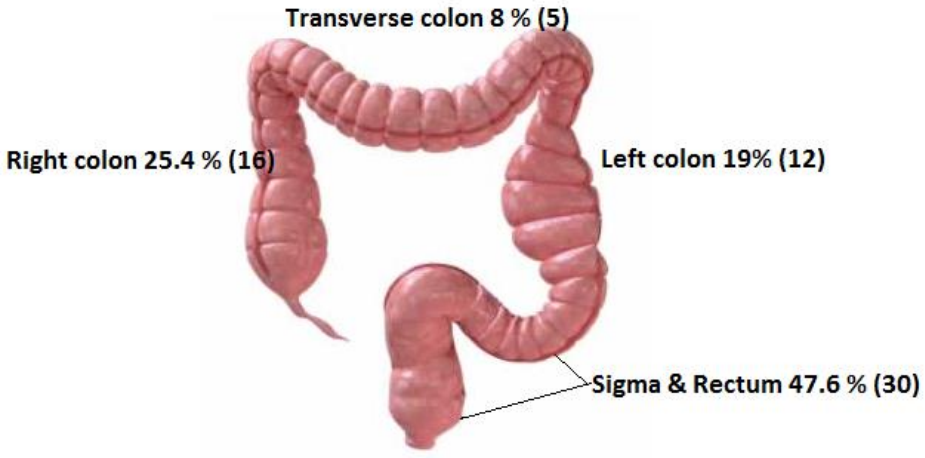


Figure 1: *Localisation of tumour*

In all patients intestinal resection with end to end anastomosis was performed.

Overall morbidity rate in this group of patients was 22.2 % (14 patients), respectively the wound infection was registered in 10 patients (15.9 %) whereas the anastomotic leakage in 4 of them (6.3 %).

According to our study, result that the most common risk factors for anastomotic leakage are:

hypoalbuminemia, anaemia, blood transfusion during surgery and the type of surgery - elective vs urgent. At the same time, men appear to be at greater risk of intestinal leakage than women (*Table 1*).

Condition	Totally	No leakage	Leakage
Ischemic heart disease	*8*	*6 (75%)*	*2 (25 %)*
Pulmonary obstructive disease	*4*	*3 (75%)*	*1 (25%)*
Insulin -dependent diabetes	*5*	*3 (60%)*	*2 (40 %)*
Smokers	*21*	*19 (90.4%)*	*2 (9.6%)*
Gender	*Male 36*	*33*	*3 (9%)*
	Female 27	*26*	*1 (3.8%)*
Previous abdominal surgery	*5*	*4 (80%)*	*1 (20%)*
Hypoalbuminemia	*12*	*9 (75%)*	*3 (25 %)*
Anaemia	*15*	*12 (80%)*	*3 (20 %)*
Type of surgery (urgent vs elective)	*Elective - 45*	*43*	*2*
	Urgent - 18	*16*	*2*
Blood transfusions during surgery	*5*	*3 (60%)*	*2 (40 %)*

Table 1: *Risk factor for anastomosis leakage*

The length of hospitalization varied from seven days in uncomplicated cases to up to twenty days in cases of anastomotic leakage.

Discussion

Anastomotic leakage is the most serious complication during colorectal surgery. Clinical features of this conditions may vary from a small leak with localized circumferential peritonitis to a four quadrant generalized peritonitis with septic shock. Anastomotic leakage increases significantly the post-operative morbidity and mortality of the patients[2, 3].

Regardless of the gravity of this complications until now only a few data are available about the factors that induce the occurrence of this complication.

The prevalence of this complication according to many studies ranges from 2% to 20 %[5], whereas the most accepted definition about anastomotic leakage was: "A leak of luminal contents from a surgical join between two hollow viscera" [6, 7]. The factors that can lead to this complications may be modifiable or non-modifiable. Among the modifiable factors most common are smoking, obesity, some medications, hypoalbuminemia and malnutrition, mechanical bowel preparations etc. [8,9,10]

In many studies it is estimated that malnutrition and hypoalbuminemia are a serious risk factors of AL[11, 12]. Therefore serious efforts must be made

to correct these disorders before surgery. Many studies show that hypoalbuminemia alone does not increase the risk for AL but other factors such as metabolic disorders that lead to systemic inflammation and increased capillary permeability[12, 13]. The lack of essential amino acids in patients with hypoalbuminemia may impair the synthesis of collagen and can be another factor that can affect anastomotic healing after intestinal resection[12, 14]. In patients in whom it is not possible to correct hypoalbuminemia is better to avoid anastomosis and to perform colostomy.

Anemia causes a fall in the supply of the intestinal submucosa with oxygen. That may cause the dehiscence and leak of the anastomosis[7]. Even in our study hypoalbuminemia and anemia results to be a risk factor for AL.

Blood transfusion especially during surgery increase the formation of micro thrombosis in small vessels which in anastomotic area may lead to dehiscence and anastomotic leak[7].

In this study, emergency surgery is associated with increased risk of AL. Similar data have been reported by Mc Dermott and Bakker in their studies[13, 15].

Conclusions

Anastomotic leak after large bowel resection is a very serious complication with a great impact on patient's morbidity and mortality. Multiple risk factors are associated with occurrence of this complication whereas the more suspected are: preoperative anaemia, hypoalbuminemia, emergent surgery without adequate preparation of patient, intraoperative blood loss and blood transfusion during surgery etc. The clinical features of AL vary from small pelvic abscess to the severe generalized peritonitis with the leak of pus and bowel content through the drain or the wound.

Early detection of AL is very important and helpful to improve the outcome of patients and to minimize postoperative rate of morbidity and mortality.

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Original Article

Percutaneous Cholecystostomy as an Alternative to Cholecystectomy in High-Risk Patients with Acute Cholecystitis.

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Abstract

***Background*:** Cholecystectomy is the standard treatment for patients with acute cholecystitis. On the other hand, percutaneous cholecystostomy (PC) is an alternative for patients at high-risk for surgery. The aim of this study was to evaluate the clinical outcomes of PC.

***Methods*:** Surgically high-risk patients with acute cholecystits having undergone PC at our institution between January 2014 – January 2017 were evaluated. Data including the indications for PC, route of insertion, technical success, clinical improvement, length of hospital stay, mortality rates, procedure related complications, subsequent admissions and performance of interval cholecystectomy were recorded and analyzed.

Results: The study group consisted of 30 patients with a mean age of 75.3 (range: 49–99) years. The indications for PC were acute calculous cholecystitis in 28 (93.3%) and acalculous cholecystitis in 2 (6.7%) patients. All procedures were performed via the transhepatic route. Twenty-five PCs (84.4%) resulted in clinical improvement within five days. A repeated PC was performed in two (6.7%) patients. Seven (23.3%) patients underwent a subsequent cholecystectomy after 6 weeks. An emergent cholecystectomy was performed in one (3.3%) patient. Five (16.7%) patients died from underlying comorbid diseases, unrelated to the biliary system, during the follow-up.

***Conclusions*:** Patients with acute cholecystitis were promptly relieved from their symptoms following PC. There were only minor complications following the procedure and an interval cholecystectomy was necessary in only 23.3% of the patients. PC is a safe alternative to choecystectomy in high-risk patients with acute cholecystitis with satisfactory results.

Keywords: *Cholecystostomy, cholecystitis, general surgery*

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Full Text

Introduction

Acute cholecystitis is a commonly encountered disease in surgical departments and the number of treated patients is increasing as the population ages. The first cholecystotomy was performed by Bobbs in 1867 and the first cholecystectomy by Langenbuch in 1874 [1]. Standard treatment for acute cholecystitis has for many years been laparoscopic cholecystectomy (LC) in the acute phase. Cholecystectomy remains the reference standard for treating acute cholecystitis, but the perioperative mortality rates in the elderly or critically ill population are reported to be as high as 19%. Therefore, cholecystostomy is regarded as a safe alternative with a good therapeutic response, especially in surgically high-risk populations [2].

The scientific evidence for advocating any specific therapy for acute calculous cholecystitis is sparse. Even the Tokyo guidelines for acute cholecystitis are mainly based on opinions among well-known surgeons and not on high-quality scientific evidence [3]. Some researchers have also questioned the necessity for surgery in acute cholecystitis, even in the long term. Conservative treatment with antibiotics and percutaneous drainage are reported as an adequate alternative to surgery, although most authors recommend delayed cholecystectomy in these cases [4].

The first ultrasound guided percutaneous cholecystostomy (PC) was performed in a jaundiced patient in 1979 by Elyaderani and Gabriele. In 1982 Radder, followed a year later by Elyaderani et al, attempted the procedure in patients with acute cholecystitis [5]. The method was further developed by Shaver et al, and became established as a minimally invasive alternative in patients not considered fit for cholecystectomy. PC can be used as a treatment for acute cholecystitis in the elderly or critically ill patients, allowing subsequent elective cholecystectomy with minimal mortality. Additionally, in some cases, PC may be the definitive treatment for gallstone disease [6].

The purpose of this study was to evaluate the clinical outcomes and possible benefits of PC in high-risk patients with acute cholecystitis.

Methods

The medical records of surgically high-risk patients with either calculous, or acalculous acute cholecystitis having undergone PC (the **PC group**) between January 2014 and January 2017 at our institution were reviewed retrospectively. Data including age, sex, indications for cholecystostomy, route of insertion, technical success, clinical improvement, mortality rate, complications, subsequent admissions and performance of interval cholecystectomy were evaluated.

PC was performed under fluoroscopic and ultrasonographic guidance in the Department of Interventional Radiology. The transhepatic route was preferred in order to reduce the risk of bile leakage and to facilitate rapid tract maturation. Lidocaine was injected as

a local anesthetic to the application area. The Seldinger tecnique was used to access the gallbladder. An 18-gauge needle was introduced through the gallbladder lumen under ultrasonographic guidance. Several millilitres of diluted contrast agent was injected to opacify the gallbladder lumen under fluoroscopy in order to confirm intraluminal position and patency of the cystic duct. A 0.035 inch 75 cm Amplatz super-stiff guidewire was inserted through the needle. Dilatation of the tract was performed with 6F and 8F dilators respectively. An 8F pigtail catheter (Flexima®, Boston Scientific, USA) was inserted into the gallbladder. If purulent bile was aspirated, a 10F dilator was added to tract dilatation followed by the insertion of a 10F pigtail catheter. The catheter was fixed to the abdominal wall skin, placed on gravity drainage for decompression of the infected hydropic gallbladder, and was rinsed daily with 5 ml of sterile saline to ensure the patency of its lumen.

Post-procedural evaluations were performed by cholecystography and tractography after one week of the intervention and before catheter removal. Following a tractography at the end of the fourth week a 0.035 inch guidewire was placed through the catheter needle and the catheter was removed. Over the wire an 8F introducer sheath was placed to tract through the skin. A diluted contast agent of 10 ml was injected to check tract maturation. The tract was considered matured in the absence of any contrast leakage to the abdominal cavity. Then the introducer sheath and the guidewire were withdrawn. If there was a contrast leakage, a new catheter of the same diameter was placed into the tract. Tractographic evalution was performed weekly until the maturity of the tract was established (*Figure 1*).



Figure 1: *Control tractographic evaluation (After the injection of dilute contrast medium, opacification of the cystic duct, intrahepatic bile ducts, hepatic duct, common bile duct and*

the duedonum without any evidence of contrast leakage through the full length of the cholecystostomy tract demonstrates tract maturity).

Results

During the three-years time period of our study, 508 patients were admitted to our emergency surgery department with the diagnosis of acute cholecystitis based on the Tokyo guidelines, and initially treated according to the protocol. Conservative treatment was successful in 320 (63%) patients as they were discharged, and referred for elective surgery. Among the remaining 188 (37%) cases, 158 (31.1%) patients underwent emergency surgery while PC was performed in 30 (5.9%) patients.

Of the 30 patients having undergone PC, 22 (73.3%) were women, whereas 8 (26.7%) were men. The mean age was 75.3 (range: 49–99) years. A technically successful PC of the gall bladder via the transhepatic route was performed in all (100%) patients under ultrasound guidance. In the PC group; 28 (93.3%) patients were diagnosed with calculous cholecystitits, while 2 (6.7%) patients possessed acalculous disease.

Five (16.7%) patients died from underlying diseases, unrelated to the biliary system, during the follow-up period. Twenty-five (83.3%) patients were followed-up. In the PC group, 7 (23.3%) patients underwent a subsequent cholecystectomy after 6 weeks, whereas an emergent cholecystectomy was indicated and performed in one (3.3%) patient. Two patients (6.7%) developed recurrent acute cholecystitis, and were treated with repeated PC without surgery.

Discussion

Laparoscopic cholecystectomy is considered as the gold standard treatment for patients with symptomatic gallbladder disease. Nevertheless, in an aging subpopulation with medical comorbidities, immediate definitive surgery may not be possible. PC remains to be an alternative method of management for patients with high-risk for being treated with an emergency surgical intervention [7,8].

The ultrasonography guided PC has been confirmed as a safe and successful management method in a number of publications [9]. This minimally invasive procedure has become the preferred initial treatment of choice in high-risk patients who are deemed unsuitable for urgent cholecystectomy. The rationale for PC is based on the principle that initial drainage of the gallbladder palliates acute cholecystitis by permitting acute decompression of the biliary system and subsequent resolution of gallbladder inflammation[10].

Technically successful placement of the PC was achieved in all (100%) of our patients in the PC group. We did not observe any bleeding during insertion although this complication has been documented previously in association with insertion through the transhepatic route [11]. It has also been suggested that there is an increased risk of pneumothorax and empyema when the transhepatic route is used, yet this

complication was not encountered in our patients, either [12,13].

For both acute acalculous and calculous cholecystitis, PC is an effective treatment modality with low rates of recurrent disease [14]. When further repeated cholecystitis attacks occur in high risk patients, PC can be repeated as well. In the PC group of our study, two (6.7%) patients developed recurrent disease and underwent repeated PCs which were performed successfully without any complications. There are studies that report recurrence rates ranging from 4% to 22% after a PC procedure [7,9,15,16.] In contrast, the recurrence rate of the PC group was calculated to be 6.7% in our study, which was relatively low when compared to the aforementioned studies.

There are studies suggesting that PC may be a definitive therapy for acute acalculous cholecystitis with no need for subsequent elective cholecystectomy [17]. It appears safe to avoid interval cholecystectomy in patients who recover from acalculous cholecystitis, as they are typically high-risk surgical candidates [18]. In the present study, two (6.7%) patients were diagnosed with acalculous cholecystitis and PC was performed succesfully.

The disadvantage of a PC is that, although the acute inflammatory events will probably settle, the causative gallbladder stones remain and the patient is at risk of future repeated attacks of cholecystitis. For this reason, elective cholecystectomy is recommended whenever possible [19]. Subsequent to the management via PC in this study, 8 (26.7%) patients in the PC group underwent a laparoscopic cholecystectomy.

Conclusions

PC is considered to be a emergency treatment option when conservative treatment of acute cholecystitis fails in the elderly and critically ill patients. PC is a safe approach in surgically high-risk patients with acute cholecystitis and can provide satisfactory long-term results when cholecystectomy is not possible. When further repeated cholecystitis attacks occur, PC can also be repeated in high-risk patients. Tailored surgery should be performed when the patients comorbidities can be optimized.

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EFIKASITET SIGURI CILËSI

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Original Article

Polytrauma Management and Links to EMS.

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Abstract

***Background*:** Multiple injuries are the second leading cause of morbidity, invalidity and mortality in developed and developing countries in children, young people and the elderly. The most frequent causes are: road traffic accidents, falling from heights, firearms, vehicles, colds and explosive devices. The incidence and prevalence of polytrauma differs from region to region and the largest number of deaths from multiple injuries or polytraumatis occur within the first trauma time, often defined as the "golden hour of trauma".

Aim: Provide medical care at all stages of managing the injured with politrauma with basic and advanced support in order to reduce: morbidity, disability and mortality.

Materials and methods: The research material was obtained from UCCK Emergency Clinic archive. The research is retrospective, descriptive, qualitative, for the period January-December 2018 In the research only injured with: injuries, sex, type of pathologies, causes, road traffic, firearms, cold vehicles, tools explosives as well as crashes.

Results: In 42.16% or 78 cases, problems were also reported in Phase VI because no department was willing to take responsibility for accepting the injured, but was obliged for the injured to stay in the emergency department for several days without any active treatment.

Discussion and Conclusions: This research highlights the limitations in the various steps of managing the injured with politrauma and the absence, delays in specialties in standard procedures of operational interventions to manage these injuries. All medical care professionals should be the primary and secondary tertiary and tertiary education and training of emergency medical staff with continuous trending, communication, RKP BLS - AED & PATLS, ALS, ATLS, ACLS and the creation of the national trauma center.

Keywords: wounded, politrauma. EMS, medical care, BLS - AED, PATLS, ALS, ATLS

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Full Text

Introduction

Multiple injury is the second major cause of morbidity, invalidity and mortality in developed and developing countries in children and young people. The term is generic, however, and has been in use for a long time for any case involving multiple traumata.The most frequent causes are: road traffic accidents, falling from heights, firearms, vehicles, colds and explosive devices. In civil life, polytrauma is often associated with motor vehicle accidents. In politrauma they represent the ultimate challenge but it is a major focus of research and optimization in their clinical care. The incidence and prevalence of many fatalities. Worldwide, around 16,000 people die every day as a result of injuries (5.8 million deaths per year), and the 2020 projections show an estimated 8.4 million deaths a year. Multiple infections are the second cause: morbidity, invalidity and death after other pathologies. The incidence and prevalence of polytrauma varies from region to region. The largest number of deaths from multiple injuries or polytrauma occur within the first trauma time, often defined as the "golden hour of trauma".

In the emergency clinic every day on average injured with multiple injuries occur 1-3 cases within 24 h. Of these injured, some of them come directly and some of them refer to EMS by regional hospitals. Who are the victims. But mostly are young victims, and especially men, the primary victims of road traffic accidents as the main etiologic factor or other injuries. Injuries involving more than 2 systems cause many problems in managing the injured. EMS medical staff should follow medical procedures and actions to monitor, observe, diagnose, treat, and accommodate the injured with multiple injuries and continue to follow the other steps. All medical care professionals should be the primary and secondary tertiary and tertiary education and training of emergency medical staff with continuous trending, communication***, RKP BLS - AED & PATLS, ALS, ATLS, ACLS*** and the creation of a national trauma center with protocols, alogrites and clinical guidelines for better and more effective management with multiple injuries.

The Goal

Provide medical care at all stages of managing the injured with politrauma with basic and advanced support in order to reduce***: morbidity, validity and mortality***.

Materials and Methods

The research material was obtained from UCCK Emergency Clinic archive. The research is retrospective, descriptive, qualitative, for the period January-December 2018 In the research only injured with: injuries, sex, type of pathologies, causes, road traffic, firearms, cold vehicles, tools explosives as well as crashes.

Results

The research material was obtained from ***UCCK Emergency Clinic archive***. The research is retrospective, descriptive, qualitative. In the survey, only those injured with road ***traffic injuries, firearms, cold vehicles and crashes for the period January-December 2018*** (*Table 1*).

Patology	***No. of cases***	***%***
Diseases	52770	89.32
Injuries	5639	10.68
Total	58409	100

Table 1: *Patology according to diseases and injuries.*

Hurt by other means	*No. 0f cases*	*%*
Injuried in road accidents	4791	84.98
Dead in accidents	14	0.24
Wounded by gunfire	63	1.11
Dead by gunfire	6	0.10
Injuried by other cold tools	202	3.58
Dead by other cold tools	2	0.03
Beaten	561	9.98
Totali	5639	100

Table 2: *Injuried by other means*

Types of injuries based on systems	***No.of cases***	***%***
Polytrauma	185	3.39
Non polytrauma	5454	96.61
Total	5639	100

Table 3: *Types of injuries based on systems*

Gender	***No. of cases***	***%***
Men	158	85.40
Female	27	14.60
Total	185	100

Table 4: *Number of injured with polytrauma by sex.*

Injured with polytrauma divided by sex and age	***Age***
Men	3-75 age
Female	- 67 age

Table 5: *Injured with polytrauma divided by sex and age.*

The middle ages were 25 to 32 years. Most of the injured with polytrauma were age groups: from 15 to 32 years, followed by 33 to 45 years**.**

Causes of polytrauma	***No. of cases***	***%***
Road accidents	142	77.75
Firearms	13	7.02
Cold tools	7	3,78
Fallen from hights	19	10. 27
Explosive tools	1	0.54
Railroad accidents	3	1.62
Total	185	100

Table 6: *Number of causes of injuries with polytrauma.*

Referral for Counsultancy	***No. of cases***	***%***
Neurosurgery	35	18.91 %
Orthopedy	42	22.70 %
General Surgery	43	23.24 %
Thoracal surgery	14	7. 56 %
Plastic surgery	11	5. 94 %
Vascular surgery	7	3.78 %
Maxilofacial surgery	5	2. 70 %
Spinal surgery	10	5.40 %
Anesthesiology	10	5.40 %
Urologyc surgery	8	4.32 %
Total	185	100

Table 7: *Referral to specialized medical consultancy*

Problems in different management stages	***No. of cases***	***%***
Phase III	40	21. 62 %
Phase IV	27	14.59 %
Phase VI	78	42.16 %
Other phases	40	21. 62 %
Total	185	100

Table 8: *Problems in different management stages*

Referrals from regional public and private hospitals	***No of cases***	***%***
Regional Hospitals	102	55.13
Private Hospitals	23	12.43
Total	185	100

Table 9: *Referrals from regional public and private hospitals*

Discussion and Conclusions

Emergency teams during the initial management of injuries with multiple injuries should preserve health, stabilize the injured by determining the degree of injury and develop an initial treatment plan for hospitalization. All communications related to treatment should be made through the team doctor to avoid confusion. Proper data management by the team manager is a necessity. In the event of a problem, the physician or team manager should

decide on a department that has to arrange the injured if required.
The exit from each member of the medical emergency team and other specialties may lead to the death of the injured. In order to avoid any delays and to have better management in the initial trauma examination, the creation of triad areas is important, based on the treatment needs and the resources available to ensure adequate treatment.
The results of our study were similar and comparable to those of a study conducted in a Germany hospital (Current Traumatic Trauma Register of the German Trauma Society), where most of the polytracheally injured were in the age group between 17 and 35 years. From our research we found that men were more often affected than women (17: 1) by road traffic accidents was a prevalent etiologic factor followed by falling elevations.
References to specialties other than those originally planned, being handled at the Emergency Clinic by consulting by putting interactions into consultations with other specialties as well as placement or settlement.
he ultimate responsibility / whose property belongs sick pacient with politraume? ? ? . This research highlights the limitations in the various steps of managing the injured with politrauma and the absence, delays in specialties in standard procedures of operational interventions to manage these injuries. The results of our study showed that the problems were manifested in various steps during the management of injured with polytrauma, and they noted the lack of prostheses, diganostics, triad areas, specialist consultants and their system.
The lack of co-ordination of actions is the main cause of delays in the management of injured politrayers and this affects the long-standing attitude of the injured in the ED. Creation of trauma teams in the management team of polythene management permanently composed emergency physician general surgeon, anesthesiologist, orthopedic surgeon, neurosurgeon, cardiothoracal surgeon (other specialties as needed), nurses and other paramedical staff and support staff. When waiting for the injured, a proper triaging system must be established, according to the predetermined criteria of the triad system and after triage, the emergency doctor should be an important part by establishing the treatment plan accordingly and with other specialist specialties.
The emergency team manager should be responsible for informing all relevant specialties and also to record the time of the information sent to the register together with the time at which the call was followed by the respective specialty. In 42.16% or 78 cases, problems were also reported in Phase VI because no department was willing to take responsibility for accepting the injured but was obliged for the injured person to stay in the emergency department for more days without any active treatment. However, no problems were noticed in Phase II and Phase V. Differences in different steps in the treatment of injured with politrauma ED, in addition to the above problems, are also noted other problems in managing the injured with politrauma. First, there was a lack of a triad system and the lack of availability of a special area for the management of

injured with politrauma ED, resulting in the mixing of injured with politrauma with the sick of other specialties. Lack of special areas for the implementation of CPR measures for management of injured with politrauma; inappropriate information, followed by different specialties and lack of coordination between the various specialties in managing the injured with politrauma. The injured were hospitalized at 79.7% in ICU, 6 days of ICU treatment and stayed in the hospital for 19 days. The observed complications were organ failure (lungs 24.0%, circulation 21.7%, liver 9.6%, kidney 3.1%) and sepsis (11.6%).

Extended prolonged rescue time, early intubation, and good para-clinical treatment lead to reduced intracellular complications. All medical care professionals are continually educated and trained emergency medical staff with ongoing Triggering, Communication, ***RKP - AED & First Aid, BLS, ACLS, PALS, ats. triage*** at primary, secondary and tertiary level is imediate as well as the creation of the National Center for trauma with protocols, alogritmev and clinical guidelines for better and more manageable management with multiple injuries.

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Original Article

Considerations and Evaluations on Abdominal Trauma in Pediatric Age.

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Abstract

Background: Trauma is the leading cause of morbidity and mortality in pediatric age. Abdominal trauma is the third most frequent cause of trauma injuries in children.

The purpose of our study is to discuss BATp epidemiology and its relationship with polytrauma, , to recognize and describe the mechanisms of blunt abdominal trauma in pediatric age and to identify the signs and symptoms that associate it.

Material and methods: In this retrospective study we reviewed all patients with blunt abdominal trauma in pediatric age who presented in Emergency Department at the University Hospital of Trauma in Tirana, Albania in the period between December 1-st 2017 and June 24-th 2018. The sample in the study was taken randomly. The Injury Severity Score, Revised Trauma Score were used as important points to evaluate gravity of injuries, and method of treatment.

The data was introduced in absolute and percentage values and Kendal's tau b correlation coefficient and the regression analysis was used to analyze and to find out any association among the dependent versus independent variable. The type of study is case control with two components; descriptive and analytical.

Results: In the time period that we studied, about 25200 patients were presented in Emergency department and 6.68% of these cases were hospitalized. Most frequent causes were motor vehicle accidents (35.4%) and abdominal trauma comprised 25.8% of cases, whereas in children it comprised 13.7% of total pediatric trauma. We have found correlation between the injury severity score and complications rate ($r = 0.254$, $n = 49$, $p < 0.001$), and injury severity score with length of hospital stay ($r = 0279$, $n = 49$, $p < 0.001$).

Conclusions: Blunt Abdominal Trauma in pediatric age is a serious threat to the health of the children. Their treatment should be carried out not only in tertiary trauma centers but in every regional hospital. The trauma score is very valuable to determine the gravity of the injury, method of treatment and is a predictive tool in trauma outcomes.

Keywords: Blunt Abdominal Trauma, pediatric, abdominal injuries, trauma score, trauma assessment.

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Full Text

Introduction

Traumatic injuries are the most frequent cause of mortality and morbidity in children worldwide and are considered the major cause of deaths in developed countries [1, 3].

Trauma is the leading cause of mortality and morbidity in pediatric age, where the mortality rate reaches 8.5% [4]. Pediatric Trauma causes about 40% of deaths in children aged 1-4 years old and 70% of deaths for children 5-9 years old [2].

The most common injuries in children are the result of craniocerebral trauma (CCT), followed by locomotor trauma (LMT) and abdominal trauma (AT) [7]. The mechanism of injury is almost the same as in adult trauma, but it has its own specifications for each age group. The main causes of death in children by age group are: ***a - Minors*** - child abuse, asphyxia, motor vehicle accidents (MVA), fires; ***b - Preschool*** - fires, drowning in water, MVA; ***c - School age*** - bicycle accidents, pedestrian accidents; ***d - Teens*** - MVA, murders, suicides [9].

The cause of death comes as a result of respiratory compromise, hypovolemic shock, traumatic brain injury (TBI), all injuries that give metabolic hypoxia progressive and acidosis [11]. Distribution of injuries by age showed that greater damages were under the age of 6-7 years old [11].

Evaluation of causes of pediatric Blunt Abdominal Trauma (***BATp***) is a major point of discussion for activation of the trauma system. ***MVA*** are more favored in relation to pedestrian accidents, fall from heights (***FfH***) and being hit by solid objects (***HsO***) to cause intraabdominal injuries. [13, 14]

In some studies, it is concluded that the trauma from bicycle handlebars is responsible for and has a risk for intraabdominal injuries, especially pancreatic injuries. [17, 18]

Aim

Our aim is to achieve a comprehensive study on BATp cases in our hospital, to discuss BATp epidemiology and its relationship with polytrauma, to recognize and to describe the mechanisms that cause BATp, and to identify the assessment criteria for TP in the primary, secondary and tertiary evaluations. Our intention is to impart our clinical experience regarding primary, secondary and tertiary assessments, and our assessment of NOM or OM for traumatic injuries.

Objectives

The objective is to evaluate the pre-hospital management elements associated with the time of the accident, the mode of transport (ambulance, private car, or air transport), and the time of arrival at the ED, and their impact on the success of treatment.

The assessment of the patient-based hemodynamic status (HdSt) in the ED was done using the Allgower formula.

The centre of attention is on estimating the gravity of the injury and the prognosis of injuries, by using available formulas such as: *Abbreviated Injury Score* (AIS), *Injury Severity Score* (ISS), *Revised Trauma Score* (RTS) and *Trauma Injury Severity Score* (TRISS).

We also plan to evaluate the definite criteria for non-operative management (NOM) or operative management (OM) in relation to the ISS and to to identify BATp treatment strategies in order to make implementation easier on the surgeon given the urgency of polytrauma.

We will describe the ratio of solid organ injuries (SOI) to hollow visceral organ injury (HVI) in BATp, the success of BATp treatment depending on the time of presentation to the ED, and the success of BATp treatment depending on the presence of extra-abdominal injury (EAI) in polytrauma.

Furthermore, the success of BATp treatment will be examined with regards to the time of surgery, complications, the mechanism of trauma, HdSt, the mode of transport, the time of presentation to the ED, the ISS value, M&M associated with BATp and the correlation between them with the mechanism of injury, the time of arrival at the ED, the diagnostic level, the ISS, RTS, and TRISS scores, and the treatment strategy.

Materials and methods

This is a retrospective study that includes all children with BAT who presented to ED at the UHT in Tirana, Albania by 01/12/2017 - 24/06/2018.

The sample in the study was taken randomly.

Exclusion criteria

In our study we did not included patients that had TBI with GCS < 8 points, who didn't have intraabdominal injuries and children with the extremities fractures without intraabdominal injuries.

Data collection

For each trauma patient (TP), a previously approved study tip card was completed.

Study variables obtained from the clinical records included ***sex*** (*M, F*), ***age*** (*0-16 years old*), ***mechanism of injury*** (*a - MVA, b - FfH, c - HsO*), ***mode of transport*** (*a - private car, b - ambulance, c - helicopter*); ***time of presentation to the ED*** (a - immediately, b - after 6 h, c - more than 24 h), and the assessment of the patient's situation in the ED using the Allgower formula (FC/TA) in determining ***HdSt*** *(a - HdSt normal [(FC/TA) = 0.5], b - possible HdSt [(FC/TA) = 1], c - HdInSt [(FC/TA) = 1.5])*. Data from the ***AIS, ISS, RTS and TRISS*** scores were analysed online at www.traumaorg.com. In our study, ***the ISS value*** was divided into three groups (*a - ISS < 15, b - ISS 15-25, c - ISS > 25).* Laboratory examinations were classified as routine or as a trauma evaluation (*complete blood count, haematocrit, complete urinalysis, liver and pancreatic enzymes, uraemia and creatine).* [9]

Special examinations: *FAST, CT scan, diagnostic peritoneal lavage (DPL), abdominal X-ray, chest X-ray, pelvic X-ray, LPD, cystography*.

Type of BATp (*a - pure, b - combined*): BATp combined with polytrauma, chest trauma (ChT), CCT, fracture of the extremities, pelvic fracture and vertebral fracture.

Mode of management (*non-operative and operative*): ***Treatment of BATp according to the time of surgery*** (*a - within 2 h, b - 2-6 h, c - 6-24 h, d – more than 24 h).*

Injured organs: Solid organ injuries (*spleen, liver, pancreas, and kidney*), Hollow viscus injuries (*stomach, intestine, urinary bladder*), retroperitoneal haematoma (*RPH*), Extra abdominal injuries (*ribs, thoracic-abdominal wall contusion, extremities fractures, pelvic fractures, vertebral fractures, major vessel injury*).
Type of operation performed: *spleen removal (splenectomy), liver suture, perihepatic packing, intestinal resection and anastomosis; colostomy, nephrectomy/suture of the kidney, diaphragm suture, chest drain.*
Length of stay (LOS) in hospital: *a - 0-1 days, b - 1-7 days, c - more than 7 days*.
Complication rate: a - early *(bleeding),* b - late (*sepsis, late bleeding, abscesses, pleural effusion, haemopneumothorax, subcapsular hematoma of the liver, acute respiratory failure (ARF), abdominal eventration, ileus, biliary fistula, acute renal failure(ARF), multiple organ dysfunction syndrome (MODS)).*
Time of death: a - early (*preoperative and perioperative period*), b - late (*postoperative period within 24 h, 24-72h, or more than 72 h*).
Cause of death: *acute irreversible shock, fibrinolysis, disseminated intravascular coagulation (DIC), traumatic brain injury (TBI), acute pulmonary thromboembolism (APT), MODS.*
All data were coded and analyzed by a computer.

Analysis

The discrete data (variables) are shown as absolute and percentage values.
Kendal's tau-b correlation coefficient was used to show connections between two variables.
Regression analysis was used to analyse the dependence of the dependent variable on the independent variables.
The magnitudes with central tendency are reported for numerical variables (arithmetic average, median and mode).
The respective frequencies and percentages are reported for categorical variables.
The data are presented in tables and graphs of different types.
Statistical significance was considered for p-values <0.05 (or 5%).
The statistical package SPSS (Statistical Package for Social Sciences, version 10.0) was used for all statistical analysis of the data.

Results

In the period under study, there were 25200 patients presented in ED and 1685 (6.68%) hospitalized patients, with the following causes of trauma: *a - MVA 598 (35.4%); b - FfH 452 (26.8%); c - HsO 593 (35.1%); d – (gunshot wounds) GSW 42 (2.4%).*
Regarding the sex distribution, 378 (22.4%) cases were female and 1307 (77.6%) of cases were male.
The distribution by age group for all hospitalized patients was: *a - 0-16 years old 231 (13.7%), b - 15-30 years old 547 (32.4%); c - over 30 years old 867 (51.4%).*
The mortality rate was 26 (3.7%), a satisfactory number under these conditions.
We had the following distribution regarding the hospitalized cases; *a- isolated or combined TBI with 583 (34.6%); b - LMT with 556 (33%); c – AT439 (25.8%); d - ENT with 107 (6.4%) of cases.*

Pediatric patients comprised 231 (13.7%) of total cases presenting in hospital. 70 pediatric patients were hospitalized and after the exclusion criteria only 49 patients were involved in the study.

The distribution of patients by age group is as following: *10-12 years old 8(16%) cases; 14 years old 6(12%) cases; 7 years old 4(8%) cases; 5, 6, 8, 12, 13, 15, 16 years old 3(6%); 11 years old 2(4%); 4 & 9 years old 1(2%) of cases.*

The mechanisms of BATp injury were: *a - MVA 27 (55%) cases, b - FfH 16 (33%) cases, c - HsO 6 (12%).*

Regarding the time of ED presentation: *a - immediately in 41 (82%), b - after 6 h in 5 (10%); c – greater than 24 h in 3 (8%) of cases.*

In our study, the mode of transport distribution was*: a – by private car in 26 (52%), b – by ambulance in 18 (36%); c - by helicopter in 5 (12%) cases.*

It was very important for us to evaluate the patient's situation in the ED using the Allgower formula (FC/TA) to determine the HdSt for this age group: *a - HdSt [(FC/TA) = 0.5] in 20 (40%); b – possible HdSt [(FC/TA) = 1] in 24(48%); c - HdInSt [(FC/TA) = 1.5] in 5 (10%) cases (see Table 1).*

The time of admission in ED	Nr of cases (%)	Mode of transport	Nr of cases (%)	*HdCo* ALLGÖWER Formula *(HR/SBP)*	Nr of cases (%)	*Isolated BATp* - 14(28%)		*Combine BATp* - 35(72%)	
						Mechanism of injury	Nr of cases (%)	*Polytrauma*	*ChT*
Directly	*41 (82%)*	*private car*	*26 (52%)*	*0.5*	*20 (40%)*	*FfH*	*5 (10%)*	*6 (12%);*	*4 (10%);*
after 6 h	*5 (10%)*	*ambulance*	*18 (36%)*	*1.0*	*24(48%)*	*MVA +BA*	*3(6%) +4 (8%)*	*12 (26%);*	*6 (12%);*
after 24 h	*3 (8%)*	*helicopter*	*5 (12%)*	*1.5*	*5 (12%)*	*HsO*	*2 (4%)*	*5 (10%)*	*2 (4%)*
Total	*49(100%)*		*49(100%)*		*49(100%)*		*14(28%);*	*23(48%)*	*12 (24%)*

MVA - Motor vehicle accident; FfH - Fall from Height; HsO - Hit with strong objects; HdCo - Hemodynamic Condition; BA – Bicycle accident; ED-Emergency Department; HR- Heart Rate; SBP - Systolic Blood Pressure; ChT- Chest trauma; BATp - Blunt Abdominal Trauma pediatrics age

Table 1: *Distribution of data for Trauma patient in ED*

Kendal's correlation coefficient showed that there was a statistically significant connection between the mode of transport and HdSt (r = 0.199, n = 49, p = 0.001), which means that appropriate transportation saves lives (see Table 2).

Transport mode	***Koefficient of Correlation of Kendal's tau b***	***P value***	***Nr. of cases***
HdCo in ED	***0,199***	***0,001***	***49***

HdSt - Hemodynamic Condition; ED-Emergency Department

Table 2: *Connections between the mode of transport and HdCo.*

In these pediatric patients, *a - pure BATp* was found in 14 (28%) cases while *b - combined BATp* was found in 35 (72%) cases.

The combined BATp distribution was: *a - combined with polytrauma in 24 (48%) cases and b - combined with TT in 11 (24%) cases.*
The mechanism of trauma in *pure BATp*, comprising 14 (28%) cases, was *FfH in 5 (10%) cases, bike accident (BA) in 4 (8%) cases, and MVA in 3 (6%) cases (each patient showed evidence of wearing a safety belt) and 4 - HsO in 2 (4%) cases.*
The mechanism of trauma in *combined BATp*, comprising 35 (72%) cases with polytrauma ***(1)*** *was MVA in 12 (26%) cases, FfH in 6 (12%) cases, and HsO with 5 (10%) cases.*
The mechanism of trauma in *pure BATp* cases with TT ***(2)*** have this distribution according to the damage mechanism was *MVA in 6 (12%) cases, FfH in 4 (10%) cases, and HsO in 2 (4%) cases.*

In our study, one important element was the use of laboratory examinations in NOM/OM cases including complete blood analysis (CBA) in 100% of all cases of our study and complete urine analysis in 85% of cases, particularly those with urinary tract trauma (UTT).
Skull x-ray (S-xr) was performed in 26 (15%) cases with polytrauma, particularly those with CCT. Chest x-ray (Ch-xr) was performed in 95 (74%) cases with TT.
Abdominal x-ray (A-xr) was performed in 78 (70%) cases with pure or combined BATp with a mechanism of injury suggesting the possibility of damaging cavitary organs (CO) or the possibility of fracture of the spinal column.
Pelvic x-ray (P-xr) was conducted in 22 (29%) cases where the clinical data or the damage mechanism supported it.
FAST was performed in 100 (96%) cases as it is an easy and rapid diagnostic method that has a high degree of sensitivity to trauma.
DPL (0/16%) was performed only in cases where it was impossible to perform other examinations. CT scans (70/50%) were performed depending on the HdSt and clinical and laboratory data.

Regarding the treatment strategy for this age group, *non-operative management (NOM)* was used in the same proportion as *operative management* (OM) ***(48% : 52%).***
A very important element in our study was the use of formulas such as *AIS, ISS, RTS and TRISS* in the assessment of the gravity of injury and the prognosis of injuries depending on the treatment strategy used, which we observed following OM and NOM.
In cases with NOM, when the ISS was over 15, the RTS score was proportional, while the TRISS score was inversely proportional.

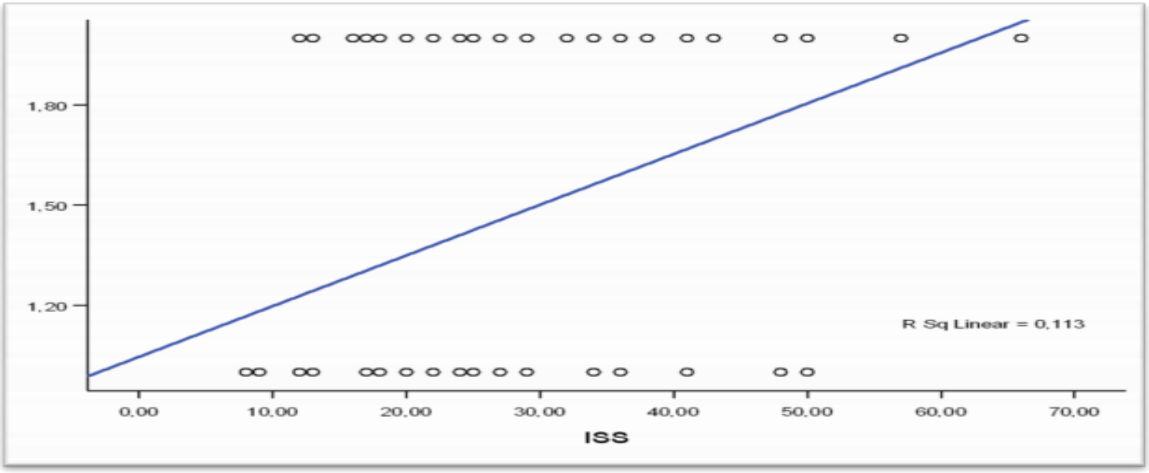
As seen in the table below; when ISS <15, NOM was favored whereas when ISS >25, OM was favored. The high value of ISS is in some cases associated with polytrauma and extra abdominal injury (EAI), which add value to the ISS and its derivatives.
Even though the intraabdominal injuries may be low ranked, the same logic follows when ISS< 15 and OM is indicated, since although the damages are unique the extent of their degree is high.

ISS	NOM	OM	TOTALE
<15	11(22%)	3(6%)	14(28%)
15-25	9(18%)	13(26%)	22(44%)
>25	3(8%)	10(20%)	13(28%)
TOTALE	23(48%)	26(52%)	49(100%)

ISS - Injury Severity Score; OM – Operative management; NOM – Non Operative management

Table 3: *Presentations of cases by ISS and a final treatment*

Children who had a higher ISS score were treated with OM more than NOM; a significant connection was found between ISS and the form of treatment (coefficient of Kendal's correlation: r = 0318, n = 49, p <0.001) (see Graph 1).



Graph 1: *Relationship between ISS and mode of treatment*

Damage to the following organs was treated by OM in 26 (52%) cases: spleen 11 (22%); Liver 6 (12%), diaphragm 3 (6%), intestine 2 (4%), kidney 2 (4%), duodenum 1 (2%), colon 2 (4%), pancreas 1 (2%), urethra 1 (2%), and urinary bladder 1 (2%). In the majority of cases, combined damage was observed.

Damage to solid organs was observed in 20 (40%) cases and damage to cavitary organs was observed in 7 (14%) cases that underwent OM.

In patients with splenic injuries (SI) treated with OM, 9 (18%) cases were pure BATp due to direct trauma to the abdominal wall and 3 (6%) cases were combined BATp with other intraabdominal injuries.

Rib fractures were not always present in SI as a result of the elasticity of the rib cage.

In all cases with OM in this age group, the average ISS score was 24.7 with

maximum and minimum values of 50 and 12, respectively.
In both cases ending in death, the ISS scores were 43 and 50; one patient had LI and retroperitoneal hematoma (RPH) due to vena cava rupture who died in the operation theatre (OT), while the other case had SI, CCT and acute irreversible shock.

Regarding the time of performing OM in this age group: *A within 0-2 h in 13 (26%), B within 2-6 h in 8 (16%), C within 6-24 h in 6 (12%), and D over 24 h in 2 (4%) cases.*

The time of intervention in interval A in this age group occurred in cases with HdInSt after MVA (66%) and FfH (34%), determined during the primary
In this interval, no rib fractures were presented. Of all cases treated with OM, rib fractures in this age group were present in only 5 (20%) cases and a contusion of the thoracoabdominal wall was seen in 6 (24%) cases.

The time of intervention in interval C occurred in 6 (12%) cases with damage to the spleen, liver, and kidney, in the period that coincides with the secondary assessment as a result of failure in the procedures for NOM. In this interval, damage to the duodenum and pancreas was observed in 1 case caused by BA. With the delay in OM, stabilization and resuscitation procedures were required as HdInSt was present.

The time of intervention in interval D occurred in 2 (4%) cases with damage to the liver and kidney (20%), in the period that coincides with the tertiary assessment. These injuries, coupled with assessment and in cases with damaged organs such as the liver, spleen, kidney, and large vessels, as well as those associated with diaphragm injury, rib injury, and cranial and extremities fractures. In the two cases that ended in death, the children were passengers in a motor vehicle.

The time of intervention in interval B occurred in 8 (16%) cases with damage to the spleen in 6 (60%), the liver in 2 (20%), and the kidney in 2 (20%) cases, in the period that coincides with the secondary assessment. These cases were caused by MVA in 5 (50%), FfH in 5 (20%), HsO in 2 (20%) and in one case bicycle accident (10%).

colon and intestine injuries, were observed in cases lacking clinical signs and diagnostic tools, making early diagnosis very difficult.

We performed splenectomy in 7 (28%) cases in interval B; 86% of these cases required resuscitation and assessment for TP with HdSt and had positive diagnostic and clinical data. In only one case, in interval A, OM was performed because the patient had HdInSt and positive clinical data which required emergency OM.
We performed a liver suture in 3 (12%) cases in intervals B, C, and D; 86% of these cases required resuscitation and assessment for TP with HdSt and had positive diagnostic and clinical data.
We performed perihepatic packing in 2 (8%) cases in interval A. In one patient, OM was performed because the patient had HdInSt and positive clinical data which required emergency OM. The

other patient, in interval D, i.e. during the tertiary assessment, in this time was had HsC of the liver which had ruptured a second time and required emergency OM.
We performed a diaphragm suture in 3 (11%) cases in interval A; in these patients, OM was performed because the patient had HdInSt and positive clinical data which required emergency OM because of SO injury. Those cases in interval D had a delay in diagnosis.
We inserted a chest tube in 5 (18.5%) cases in interval A. This procedure was performed because the patient had HdInSt and positive clinical data which required an emergency chest drain.
We performed a suture and intestinal resection in 5 (18.5%) cases in interval A, in which OM was performed because the patients had HdInSt and positive clinical data which required emergency OM. In interval C, i.e. during the secondary assessment, cases required resuscitation and assessment for TP with HdSt and had positive diagnostic and clinical data.
We performed nephrectomy and kidney suture in 2 (8%) cases in intervals A and B because the patients had HdInSt and positive clinical data which required emergency OM.
We performed a colostomy in 1 (4%) case in interval D because of a delay in diagnosis.

Regarding combined BATp, most were cases of polytrauma (51%) followed by combined BATp with TT (48.4%) and finally combined BATp with fractures of the extremities (0.6%). In some cases, they were signs or symptoms suggesting of IAI.
It is known that rib fractures generally occur in the lower part of the rib cage, and in a significant number of cases in our study, a statistically significant correlation was found between thoracic contusion (with or without fracture of the ribs) and spleen or liver injury.

In our study, most patients underwent OM (52%), with the most commonly damaged organ being the spleen (33%), followed by the liver (18%) (see Table 12). Regarding the distribution of NOM cases (48%), damaged organs that were treated by NOM in 23(48%) cases were the liver in 11 (22%), spleen in 11 (22%), kidney in 2 (4%), and pancreas in 1 (2%). The majority of cases were caused by combined damage.

Type of intervent	Nr of cases	%	Time of operation			
			0-2 h	After 2-6 h	After 6-24 h	Over 24 h
Spleenectomy	9	33,0	1	6	-	-
Liver Suture	2	7.0	1	1	1	-
Perihepatic packing	3	11.0	1	-	-	1
Suture et intestinal resection	3	11.0	2	-	3	-
Colostomy	1	4.0	-	-	-	1
Nefrectomy / kidney suture	1	4.0	1	1	-	-
Diaphragm Suture	3	11.0	1		1	-
Primary suture D_1 & drain	1	4.0	-	-	1	-
Vassal suture	2	7.0	1	-	-	-
Chest Drain	5	18.0	5	-	-	-

Table 4: *Distribution of the type of operations and the time of their performance.*

In all cases treated by NOM in this age group, the average ISS score was 31.5 with maximum and minimum scores of 41 and 8, respectively.

In patients with SI treated by NOM, 2 (8%) cases of SI were pure BATp due to direct trauma to the abdominal wall; 9 (36%) cases were combined BATp with other IAI.
Rib fractures were seen in 11 (44%) cases, and were not always present with SI as a result of the elasticity of the rib cage.

Regarding combined BATp treated with NOM, 40% were polytrauma and 40% were combined BATp with TT. In 5 (20%) pure BATp cases treated with NOM, 4 (16%) cases were caused by FfH and 1 (4%) was caused by MVA.
In 20 (80%) cases of combined BATp, the 10 (40%) cases with polytrauma were caused by MVA in 4 (20%) cases, FfH in 4 (16%) cases, and HsO in 1 (4%) case.
The 10 (40%) cases of combined BATp with TT were caused by MVA in 6 (24%) cases, FfH in 3 (18%) cases, and HsO in 2 (12%) cases.

The patient's situation in the ED was evaluated using the Allgower formula (FC/TA) to determine the HdSt for this age group with NOM: a - HdSt [(FC/TA) = 0.5] in 15 (65%) cases and b - possible HdSt [(FC/TA) = 1] in 8 (35%) cases.

The evaluation of the data shows that there was a significant correlation between the ISS and TRISS scores, with values of 14 and 2.14 for patients treated by NOM.
Length of stay (LOS) in hospital is a very important element.
In paediatric patients with BATp, the LOS in hospital was *A - 0-1 days in 2 (4%)*

cases, B - 1-7 days in 26 (52%) cases, and C - more than 7 days in 21 (44%) cases.
In paediatric patients with BATp treated by NOM, the LOS in hospital was *B - 1-7 days in 18 (36%) cases and C - more than 7 days in 5 (10%) cases.*
In paediatric patients with BATp treated by OM, the LOS in hospital was *A - 0-1 days in 2 (4%) cases, B - 1-7 days in 11 (22%) cases, and C - more than 7 days in 13 (28%) cases.*

The complication rate was low; in children with BATp treated by NOM.
We observed sepsis in 2 (4%) cases and pleural effusion in 1 (2%) case.
In children with BATp treated by OM, we observed sepsis in 5 (10%) cases, haemopneumothorax in 3 (6%) cases, wound infection in 3 (6%) cases, ARF in 2 (4%) cases, and HsC of the liver 1 (2%) case.

The mortality rate was 4 (8%); in 2 (4%) cases, death occurred during surgery in the OT due to acute irreversible shock and in 2 (4%) cases death occurred after 72 h due to TBI.

ISS	Koefficient of Correlation of Kendal's tau b	Nr of cases	p value
Complication rate	0,254	49	<0.001
LOS	0,279	49	<0.001

ISS - Injury Severity Score; *LOS - Length of stay*

Table 5: *Comparative data between the ISS and the complications rate and LOS*

Kendal's tau-b correlation coefficient showed a statistically significant correlation between the ISS score and complications (r = 0.254, n = 49, p <0.001) and between the ISS score and LOS (r = 0279, n = 49, p <0.001) (see Table 5).

Discussion

In this study, it was found that 13% of cases who presented at our hospital were in the pediatric age range, which constitutes a number comparable to results in the literature where about 8-10% of all cases presenting to hospital are in the pediatric age range [9]. This relates to a number of factors such as social-economic class and demographic changes.

Abdominal injuries were found in 25% of cases with polytrauma in the pediatric age range. The leading cause of BATp, according to the mechanism of injury, was MVA with 28 (56%) cases, followed by FfH with 16 (32%) cases and HsO with 6 (12%) cases. This suggests that children are careless pedestrians and are unaware of traffic rules, which requires the extension of learning these rules in pre-school. These values are similar to the literature data, where most abdominal injuries are due to MVA (41%) and FfH (8%).
We have a relatively big difference in our country since the technical safety of dangerous toys and security measures in the workplace are not respected (Cooper 2004) [6].

The distribution of injuries by age is given graphically above, where the greatest number of injuries occurred in 6-7 year olds, almost fully agreeing with the literature data. Regarding the distribution of examinations in children with traumatic injuries conducted at the time of arrival, we obtained complete blood counts in all cases (100%) of children with suspected IAI13. In a study on children with traumatic injuries, it was estimated that an initial hematocrit value of less than 30 indicates that IAI is likely (Holmes and others) [13].

The data about special examinations was pelvic x-ray (25%), FAST (92.4%), PDL (5%), and CT scan (60%). The use of CT scans in TP with HdSt has increased the number of cases with NOM (Morse, Garcia 1994)[19].

Regarding the treatment strategy, OM was realized in (58.8%), cases. Our results show an apparent difference with today's trend of treating the majority of BATp cases by NOM; 90% of cases are treated with NOM with complete recovery in 90-98% of traumatized cases [20, 21, 22]. However, this depends on a number of factors such as age, the mechanism of injury, the time hospital presentation, the mode of transportation and any associated injuries.

Regarding the damaged organs, we found damage to the liver (10%), spleen (40%), kidney (20%), intestine (10%), and colon (20%). In the literature, the spleen is the most commonly damaged organ in BATp, followed by the liver as the second damaged organ 24; this discordance regarding the liver is linked to the poor quality of the available apparatus. However, in some studies, damage to the liver is more common than damage to the spleen [13].

The diagnosis and management of LI in children is very important because liver trauma is the leading cause of death in BATp [25]. In the last two decades, the treatment trend for LI in most cases in which the bleeding stopped spontaneously has been to follow the treatment algorithm for LI upon ED admission [23]. The use of CT scans in the diagnosis and grading of LI (Mirvis classification) [20] is very useful and has consequently reduced the operability of grade III LI which was previously treated with OM in up to 7% of cases. The basic criterion is HdSt, i.e. if even after energetic resuscitation HdInSt occurs again, then the solution is OM [23]. The success rate for treating LI by NOM ranges from 85-90% [26, 27].

In the OM of LI, techniques such as perihepatic packing, suturing the liver, liver resection, lobectomy, and atypical resection of the liver are used (Chuang and others 2006) 28. NOM of children with LI or SI depends on HdSt, TP in patients who require less than half of the estimated blood volume (i.e. <40 ml/kg), and the presence of EAI that requires OM [29].

Splenectomy was performed in >90% of children (usually only 13-50% of adults). Regarding of the sort of BATp, in most of cases BATp was combined with polytrauma (51%) followed by TT (48.4%). We also observed a strong correlation between rib fractures and damage to the liver and spleen.

Using mathematical formulas has contributed to the predictive success of trauma and improved the quality of modern trauma management.

Kendal's tau-b correlation coefficient showed a statistically significant correlation between the ISS score and the type of treatment (r = 0318, n = 49, p <0.001), between the ISS score and the mode of transport (r = 0190, n = 49, p = 0.001), and between the ISS score and HdSt in the ED (r = 0.338, n = 49, p <0.001). A statistically significant link was not found between the ISS score and the type of trauma (r = 0.012, n = 49, p = 0.836) (see Table 7).

ISS	Koefficient of Correlation of Kendal's tau b	Nr of cases	P value
Type of trauma	0,012	49	0,836
Sort of treatment	0,318	49	<0.001
Mode of Transport	0,190	49	0,001
HdCo in ED	0,338	49	<0.001

HdCo - Hemodynamic Condition; ISS - Injury Severity Score; ED-Emergency Department

Table 6: *Relationship between ISS and Type of trauma, Sort of treatment, Mode of Transport, HdCo in ED.*

Conclusions

BATp is a serious threat to the health of children. Treatment should be carried out not only at national trauma centres but in every regional hospital or even in smaller hospitals where the protocols for trauma are rigorously applied in general and in particular for children. The use of AIS, ISS, RTS and TRISS scores contributes in this regard in predicting the evolution of trauma.

The management IAI has undergone a significant evolution in recent years. NOM of BATp is successful in more than 90% of cases, although this depends on a variety of factors and conditions that are in accordance with the anatomical and pathophysiological conditions of the patient.

The mortality of BATp was calculated depending on the organs affected:

• With damage to organs such as the liver, spleen, kidneys or pancreas, the mortality rate is less than 20%.
• If the damage includes some CO, the mortality rate increases to over 20%.
• If the damage includes large vessels, the mortality rate is over 50%.

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Original Article

Recurent Abdominal Pain and Intestinal Parasitosis. Our Results in a one Year Study.

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Abstract

Background: Abdominal pain in children is the most common problem with which the pediatricians faces in their practice. Recurrent abdominal pain is defined as " the presence of at least three episodes of abdominal pain over a period longer than three months and severe enough to affect the activities of the children". Even though it is considered that functional bowel diseases are the most common cause of recurrent abdominal pain several studies have recognized that numerous organic disorder such as intestinal parasitic infections may lead to abdominal pain.
Aim: The aim of this study is to observe the prevalence and the type of intestinal parasites in a representative sample of children living in the municipalities of Tetova and Dibra.
Materials and methods: Our study was done in a period between January 2018-2019 in the municipalities of Tetova and Dibra. Totally 470 children examined due to recurrent abdominal pain from the pediatrician was subject of this study.
Collected stool samples was checked for the presence of intestinal parasites in microbiological laboratories in Tetova and Dibra.
Results: 470 children were included in our study. 248 of them were girls and 222 boys with a median age of 8.2 years. 67 of the children were positive (14.25 %) for intestinal parasites.
Conclusions: Our study reveals that intestinal parasites were frequent among children in our country. The incidence of intestinal parasitosis is higher among the children who come from families with lower socioeconomic status compared to children who come from families with good conditions. The same situation is related to education, respectively children of educated parents are least vulnerable to intestinal parasitosis.
Keywords: recurrent abdominal pain, intestinal parasite, children

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Full Text

Introduction

Abdominal pain in children is the most common problem with which the pediatricians faces in their practice. These pains often have chronic character and are recognized as recurrent abdominal pain (RAP). Recurrent abdominal pain is defined as " the presence of at least three episodes of abdominal pain over a period longer than three months and severe enough to affect the activities of the children"[1].

The clinical presentation of children with recurrent abdominal pain is the appearance of colic pain mostly associated with functional and autonomic symptoms such as nausea, headache, pallor etc[2]. Even though it is considered that functional bowel diseases are the most common cause of recurrent abdominal pain several studies have recognized that numerous organic disorder such as intestinal parasitic infections may lead to abdominal pain.

The incidence of intestinal parasitosis remain high not only in developing countries but at the same time even in developed ones. This incidence is highest among children and young people and is associated with lack of regular hygiene practices, low economic standing and lack of health education.

Several studies from different authors also emphasize the close connection of intestinal parasitosis with the supply with clean water and water purity, shedding of sewage, appropriate control of sanitary facilities and their distribution, management with waste pits and landfills and the way of removing and disposing of waste.

Most of children with intestinal parasitosis remain asymptomatic, whereas some of them complain of abdominal pain, weakness, anorexia, nausea, headache and altered bowel symptoms.

Aim of the study

The aim of this study is to observe the prevalence and the type of intestinal parasites in a representative sample of children living in the municipalities of Tetova and Dibra. The data were obtained by the stool examination for intestinal parasites of children involved in this study.

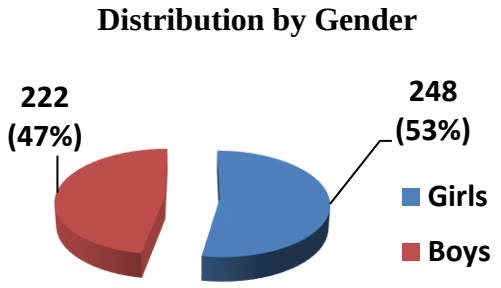
Material and methods

Our study was done in a period between January 2018-2019 in the municipalities of Tetova and Dibra. Totally 470 children examined due to recurrent abdominal pain from the pediatrician was subject of this study. In all the children were performed a fecal analysis for intestinal parasites. From parents of children younger than eight years old was requested to collect a faeces sample from their children, while older children learned how to collect fecal samples themselves.

A relevant demographic and clinical data such as age, gender, level of education, place of life - rural or urban area and main health complaint such as onset and duration of pain were collected by the parents. Collected stool samples was checked for the presence of intestinal parasites in microbiological laboratories in Tetova and Dibra.

Results

Out of the total 470 children included in our study 248 of them were girls and 222 boys with a median age of 8.2 years. Most of the children (360) were school age children respectively more than seven years old (Graphic 1).



***Graphic 1**: Gender distribution*

As far as residence is concerned, 320 children are from the urban areas, whereas 150 from the rural areas. The most of children came from middle and low socioeconomic families (335) and from parents with a low or secondary education (310) (Table 1).

Epidemiologic data		
Residence	Urban	Rural
	350	120
Socioeconomic status	Low/ Middle	Good
	335	125
Education	Low/ Middle	High
	300	170

***Table 1:** Epidemiological data*

From 470 children with recurrent abdominal pain and tested for intestinal parasites, 67 were positive (14.25 %). According to our results Ascaris lumbricoides appeared to be the most common parasite isolated in 23 children followed by Giardia lamblia in 21 patients, Enterobius Vermicularis in 13, and Taenia species in 10 children (Table 2).

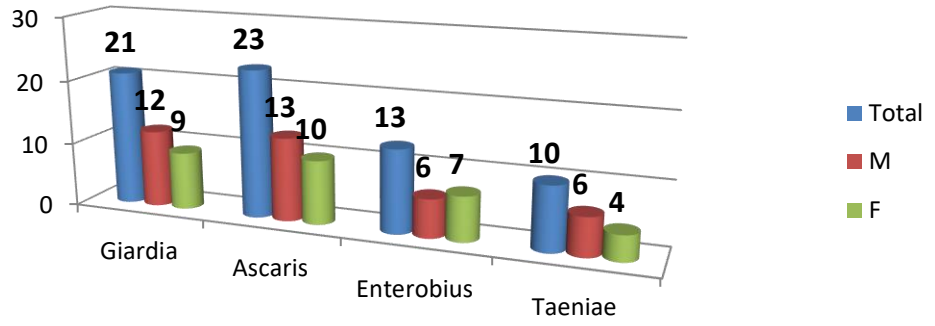


Table 2: *Types of parasites and gender distribution*

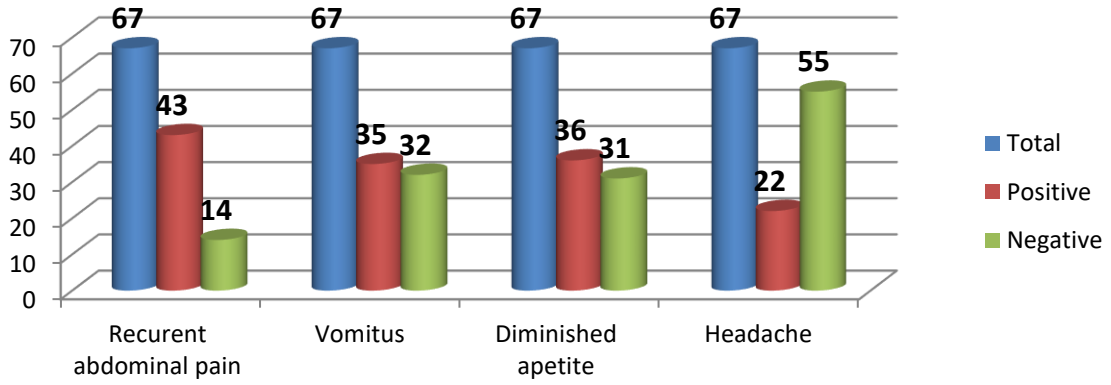
As seen in table 2, boys were found to be more positive than girls and, children of parents with medium or low socioeconomic status was more affected than those who come from wealthy families.

At the same time, children from parents with higher education show lower incidence of infection compared to children of parents with low degree education.

Parents Socioeconomic status & Education		
Socioeconomic status	Low or medium	Good
	41	26
Education	Low or middle	High
	44	23

Table 3: *Incidence of intestinal parasitosis by socioeconomic status and education*

Among infested children the most common clinical manifestations were recurrent abdominal pain, vomitus, diminished appetite and headache (Graphic 2)



Graphic 2: *Clinical manifestations*

Regarding residence it was not any statistically significant differences between children from Tetovo and Dibra

Discussion

The prevalence of intestinal parasites remains high throughout the world. however, their prevalence is much higher in areas with poor hygiene and bad socioeconomic status. In our study we examined 470 children with gastro intestinal disturbance and the microbiologic data show that 14.25 % of them had intestinal parasitic infection. Incidence of intestinal parasitosis in our study is much lower than the incidence reported by some others authors. So Biadun *et al.* (2001) during 24 years study and after examination of totally 2828 children reported a prevalence of intestinal parasitosis from around 45.9 %. Basso et al., from Brazil in a study conducted in 2008 among schoolchildren reported a prevalence of enteric parasitosis from 37 - 89 %. The highest prevalence of IPI among schoolchildren (33.4%) was reported by Aksoy et al., in study realized in Turkey at 2007. In a study in Albania realized by Sejdini et al. (2011) the overall prevalence of intestinal parasites was 19.0%.

In another study realized by Gualdieri et al. (2011), a totally 514n faecal samples of immigrants in Naples were tested, and the prevalence of parasites resulted to be 61.9 % with the most prevalent species *Giardia intestinalis and* Ascaris *lumbricoides.*

Our study like many other studies show a significant association between intestinal parasitosis in children and abdominal pain. Manifestation of the intestinal parasitosis with stomach pain suggests us to perform examination of the stool for parasites in all children with recurrent abdominal pain.

Many studies performed worldwide like our study show a close relationship between intestinal parasitosis and the poor personal hygiene habits, close physical contact of children between, low socio-economic status of families, overcrowded families etc.
As reported by some authors[6], even in our study boys resulted to have a higher prevalence of intestinal parasites than girls. We suppose the reason for this should be that the boys spend more time playing outdoors and are far more in touch with soil or water contaminated by waterborne parasites.

Conclusions

Our study reveals that intestinal parasites were frequent among children in our country. As it is evident in our study the incidence of intestinal parasitosis is higher among the children who come from families with lower socioeconomic status compared to children who come from families with good conditions. The same situation is related to education, respectively children of educated parents are least vulnerable to intestinal parasitosis.

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Review Article

Treatment of Chronic Ankle Instability: A Review

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Abstract

Treatment of chronic ankle instability remains a challenge for orthopedic surgeon. Surgical procedures for this disorder include anatomic direct repair, anatomic reconstruction with an autograft or allograft, and arthroscopic repair. Open direct repair is commonly used for patients with sufficient ligament quality. Reconstruction incorporating either an autograft or an allograft is another promising option in the short term, although the longevity of this procedure remains unclear. Use of an allograft avoids donor site morbidity, but it comes with inherent risks. Arthroscopic repair of chronic lateral ankle instability can provide good to excellent short- and long-term clinical outcomes, but the evidence supporting this technique is limited. Deterioration of the ankle joint after surgery is also a concern. Studies are needed on not only treating ligament insufficiency but also on reducing the risk of ankle joint deterioration.

Keywords: ankle instability, treatment, chronic

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Full Text

Introduction

Management of chronic lateral ankle instability (CLAI) is a challenge for the orthopedic surgeon because it is a common source of ankle dysfunction.[1] This disorder may involve mechanical and/or functional instability. The anterior talofibular ligament (ATFL) and calcaneofibular ligament (CFL) are the major static lateral ligamentous stabilizers.[2] The ATFL is the primary constraint to inversion stress in plantar flexion. Most patients experiencing mechanical instability have either an ATFL injury alone or combined ATFL and CFL injuries.[2]
Conservative treatment is often successful in patients with CLAI. When symptoms persist despite an adequate trial of nonsurgical management, surgical treatment aimed at restoring ankle stability is typically indicated. Several surgical techniques has been described, including anatomic direct repair with or without local tissue augmentation, anatomic ligament reconstruction using either an autograft or an allograft, and arthroscopic repair. Anatomic direct repair with or without inferior extensor retinaculum (IER) augmentation remains the first-line surgical treatment of CLAI, except in the setting of malalignment or in a patient with global laxity or in whom robust soft tissue is absent. However, a 2011 Cochrane review concluded that clinical evidence is insufficient to determine the optimal surgical strategy for this pathology.[3]

Surgical Treatment

Traditionally, surgical management of CLAI has been classified as nonanatomic or anatomic. Nonanatomic procedures, which typically involve tenodesis of the peroneus brevis tendon, include a variety of techniques aimed at stabilizing the talocrural joint[1] (Figure 1). Eventhough nonanatomic techniques can provide successful short-term outcomes, their use is controversial.



Figure 1

Studies have shown impairment of ankle and subtalar joint function subsequent to nonanatomic procedures.[4,5] In one prospective study comparing the Chrisman-Snook and the modified Broström procedures in 40 patients with CLAI, several patients treated with a nonanatomic procedure reported that their ankles felt "too tight," a sensation not reported by those

undergoing anatomic procedures.[6] In addition, follow-up studies have shown that patients undergoing nonanatomic surgery, such as a Watson-Jones tenodesis or an Evans procedure, experienced unsatisfactory long-term outcomes.[7,8] Recently, Sammarco[9] found that wound complication rates were higher among patients undergoing nonanatomic tenodesis than in those undergoing anatomic procedures.

As a result of these concerns, the use of nonanatomic procedures has declined. Nevertheless, the technique is still considered in patients requiring total ankle arthroplasty or cavovarus reconstruction and in patients in whom the hindfoot has been realigned, necessitating a more robust lateral ligament reconstruction.

Anatomic procedures aimed at replacing the deficient ATFL and CFL are broadly categorized as either direct repair of the injured ligament or ligaments, or anatomic reconstruction with an autograft or allograft. Direct repair is indicated for patients with adequate ligamentous remnants, whereas anatomic reconstruction is indicated for those with obesity, generalized ligamentous laxity, prior unsuccessful stabilization procedures, and poor or insufficient ligamentous remnants.[10]

In cases with concomitant ATFL and CFL injuries, surgical treatment of the CFL is not always indicated. The CFL has been proposed as a primary stabilizer of the subtalar joint, and injury to the ligament has been associated with progression of subtalar instability. In addition, accurate clinical and radiologic diagnosis of CFL tears is challenging.[11] Furthermore, the role of the CFL in this process remains controversial. Wang et al[12] found that sectioning the CFL had no effect on the stability of the subtalar joint subsequent to open reduction and internal fixation for calcaneal fractures. Maffulli et al[13] recently assessed isolated ATFL repairs in 42 patients with CLAI whose CFL injury had been repaired. In 38 of those patients, the mean American Orthopaedic Foot and Ankle Society ankle-hindfoot score improved from 51 preoperatively to 90 postoperatively (mean follow-up, 8.7 years). Therefore, the authors suggested that surgery may not be required to manage a CFL injury.

The IER has been incorporated in surgical management of CLAI to augment the strength of anatomic ATFL procedures and confer long-term stability to the subtalar joint.1 Good to excellent outcomes with low complication rates have been reported with this modification.[1,14,15] Similarly, Aydogan et al[16] reported that IER augmentation protected the primary ATFL repair in a cadaver study. In contrast, Behrens et al[17] reported no significant biomechanical difference in initial ankle stability with or without IER augmentation. Recent anatomic and clinical studies also suggest that incorporation of the IER may not provide clinical and radiologic

advantages over traditional anatomic repair.[18,19]

The use of concomitant arthroscopy with CLAI reconstruction has recently increased, as the result of the limited ability of MRI to accurately show the intra-articular lesions frequently involved in CLAI.[20] A large database study demonstrated that although concomitant arthroscopy produced a higher revision rate, it was associated with a lower incidence of subsequent invasive procedures, including ankle arthrodesis.[21]

Anatomic Direct Repair

Anatomic direct repair is generally accepted as the first-line surgical treatment of CLAI. This procedure involves the use of native ligament remnant(s) with or without local tissue for reinforcement. The most common types of anatomic direct repair are the Broström procedure, the Gould modification, and the Karlsson modification[1,2] *(Figure 2).* These reparative techniques are appealing because of their low cost, minimal invasiveness, procedural simplicity, and low complication rates. However, anatomic direct repair is not recommended for patients with insufficient ligamentous tissue, prior unsuccessful stabilization procedures, high body mass index, or generalized ligamentous laxity.[10,13,22]



Figure 2

Direct repair has shown promising functional outcomes, with most patients demonstrating good to excellent results.[1,23-25] Bell et al[23] performed the Broström procedure on 31 patients. In the 22 patients evaluated at a mean follow-up of 26.3 years, the mean overall numeric ankle function score was 91.2 (out of 100; standard deviation, 10.2). Tourné et al[24] reported long-term results in 150 patients after ligamentous retensioning and reinforcement with the use of the extensor retinaculum. After a mean follow-up of 11 years, 93% of the patients had satisfactory results, with no deterioration of the articular surface detected on radiographs. A 2009 retrospective case series by Li et al[25] investigated outcomes after anatomic direct repair in an athletic population and found that 49 of the 52 high-demand athletes assessed had returned to their preinjury level of performance 2 years postoperatively.

Different variations in anatomic direct repairs have been reported. In a study by Karlsson et al,[26] 60 patients were randomly assigned to receive direct repair with either IER reinforcement or bone-tunnel techniques. At a mean follow-up of 3.1 years, no significant difference was found between the treatment

groups in terms of either functional outcome or mechanical instability.
Biomechanical studies have similarly revealed no significant differences in tensile strength and stiffness between direct repair techniques and suture anchor stabilization.[27] Cho et al[28] compared 20 patients treated with bone-tunnel techniques with 20 patients treated with suture-anchor techniques in a prospective randomized study. The mean time to follow-up was 28.4 months in the bone tunnel group and 29.2 months in the suture anchor group. No significant difference was observed between these techniques after evaluation with the Karlsson scale, the Sefton grading system, and stress radiographs.

Recently, direct repair has been augmented with ligament tape. In a biomechanical study using cadaver specimens, Viens et al[29] compared suture tape augmentation alone, direct repair with suture tape augmentation, and an intact ATFL. The ATFL with suture tape augmentation was found to be at least as strong as the native ATFL. Similarly, in a study comparing tape augmentation with a native ATFL in a cadaver model, Willegger et al[30] determined that the two had similar degrees of biomechanical stability. In a biomechanical study, Schuh et al[31] compared direct repair, suture anchor, and suture anchor combined with ligament tape augmentation. They found that the ligament tape augmentation technique provided statistically superior performance in terms of angle at failure (P = 0.02) and failure torque (P = 0.04) compared with the traditional Broström and suture anchor techniques.
A prospective study by Cho et al[32] evaluated clinical outcomes of the internal brace technique[29] using suture tape in 34 patients with chronic ankle instability. At the final follow-up (>2 years), the mean foot and ankle outcome scores had significantly improved from a mean of 63.1 preoperatively to 93.2 (P < 0.001). In addition, both "talar tilt angle and anterior talar translation had significantly improved to an average of 4.5° and 4.1 mm, respectively" (P < 0.001).
Currently available evidence indicates that anatomic direct repair in patients with CLAI has the potential to provide good to excellent short- and long-term clinical outcomes. Modifications in technique are expected to improve functional outcomes; however, because of the novelty of the procedures, definitive conclusions regarding their use are premature.

Anatomic Reconstruction

Anatomic reconstructions has two general categories: those using autografts and those using allografts. Currently, these surgical strategies are indicated for patients with poor-quality ligament remnants, a previously unsuccessful lateral ankle repair, a high body mass index, or generalized ligamentous laxity or patients for whom direct repair may

not be an option.10 For example, Dierckman and Ferkel[10] reported that approximately 20% of patients with CLAI were not suitable candidates for anatomic repair, instead requiring anatomic reconstruction with a graft.

Autograft

The advantage of using autografts for tendon reconstruction is superior tissue quality. However, an disadvantage of this strategy is the possibility of donor site morbidity. Options include local grafts (ie, peroneal longus, extensor digitorum longus) and free grafts (ie, Achilles tendon, plantaris, palmaris longus, bone-patellar tendon, hamstrings).[1]

Several authors have reported good short-term clinical outcomes after anatomic reconstruction using autograft.[1,21,33] Takao et al[33] described anatomic reconstruction using an autologous gracilis tendon and an interference fit anchoring system in 21 patients with CLAI. All patients achieved mechanical stability on stress radiographs. However, although good short-term outcomes have been reported with this procedure, no study has described long-term outcomes.

In another study, Kennedy et al[22] performed a hybrid anatomic lateral ligament reconstruction technique that involved substituting a peroneus longus autograft for the native ATFL in 57 athletes (*Figure 3*). All patients had achieved mechanical stability at a mean of 32 months after surgery, and 91% had returned to their previous level of sports activity.



Figure 3

Allograft

Allografts avoid the risk of donor-site morbidity, conferring shorter surgery times and less postoperative pain. Furthermore, as knowledge about potential materials has evolved, allografts have become increasingly popular options for treating patients with CLAI. Several sources have been used to manage lateral ankle instability, including the toe extensor and/or flexor, fascia lata, hamstrings, plantaris, anterior tibialis, and peroneus longus tendons.[1] There are several disadvantages to allografts, however, including an inherent (albeit low) risk of disease transmission and infection associated with the graft, as well as delayed biologic healing and higher cost.[10]

Clanton et al[34] recently addressed concerns about the tensile strength of allografts in a biomechanical study. The authors investigated the strength and stiffness of intact ATFLs and allograft reconstructions of the ATFL and found that the allografts demonstrated strength and stiffness similar to that of the native ligament.

Similar to the use of autografts, anatomic reconstructions using allografts in the management of

CLAI can provide good to excellent short-term outcomes.[1,35-37] In the largest case series to date, Jung et al[35] prospectively reviewed 70 patients (72 ankles) treated with anatomic reconstruction using semitendinosus tendon allografts. At an average of 22.1 months postoperatively, they evaluated 64 of these patients (66 ankles) and found that the mean American Orthopaedic Foot and Ankle Society score improved from 71 to 91 ($P < 0.05$) and the mean Karlsson-Peterson score increased from 55 to 90, whereas talar tilt decreased from 15° to 4°. Xu et al[36] retrospectively compared allograft reconstruction with autograft procedures and found no significant difference in clinical outcomes, talar tilt, or talar shift between treatment groups at a minimum follow-up of 12 months. Dierckman and Ferkel[10] retrospectively described outcomes with an anatomic reconstruction technique in an athletic population. In their cohort, 71% of athletes were either one level below their preinjury Tegner activity level or had returned to their previous level of play at a mean follow-up of 38 ± 30 months. Matheny et al[37] compared anatomic repair involving IER reinforcement with allograft reconstruction and reported that "allograft reconstruction produced similarly favorable outcomes, including high patient satisfaction [and] high function and activity levels."

Anatomic reconstruction using autografts and allografts in patients with CLAI provides good to excellent short-term outcomes. However, surgical techniques vary, and it remains unclear which procedures are most beneficial in the long term.

Arthroscopic repair for CLAI is becoming increasingly popular.[38] This minimally invasive procedure is performed using primarily suture anchors and is thought to reduce postoperative pain and complications while hastening recovery. A strong ligamentous remnant of high quality is an important indicator for arthroscopic repair.

Studies have demonstrated no significant differences in the amount of load to joint failure between arthroscopic and standard open procedures in matched ankles.[39] In addition, studies of arthroscopic repair for CLAI have reported good to excellent clinical outcomes.[1,40-42] Nery et al[40] conducted the longest follow-up study of arthroscopic ligament repair of CLAI to date, in which 94.7% of patients had good to excellent clinical results at a mean follow-up of 9.8 years. Acevedo and Mangone[41] reported that, in 73 patients who underwent arthroscopic ligament repair for the treatment of CLAI, Karlsson-Peterson scores improved from a mean of 28.3 preoperatively to a mean of 90.2 at a mean follow-up of 28 months; 69 of 73 patients were satisfied with the results.

Only two clinical studies have compared the outcomes of arthroscopic repair with those of open anatomic repair in the treatment of CLAI. Matsui et al[42]

retrospectively reviewed 55 ankles and found that patients in the arthroscopic group had less pain 3 days after surgery and returned to daily activities quicker than patients in the open repair group. However, the authors also found no significant difference in clinical scores between the groups at 1 year postoperatively. In a randomized controlled trial, Yeo et al[43] reported no difference in clinical or radiologic outcomes between arthroscopic anatomic repair and open anatomic repair groups.

Arthroscopic repair in the treatment of CLAI may provide good to excellent short- and long-term clinical outcomes. However, arthroscopic repair is more technically demanding than an open procedure.[38] In addition, few studies have compared arthroscopic repair with open procedures. In a recent systematic review, Matsui et al[44] found that quality evidence was insufficient for recommending the use of a minimally invasive procedure.

Other Considerations in Patients With CLAI

Despite providing adequate ankle stabilization, standard open procedures may not prevent joint deterioration. In a retrospective study of nonaugmented anatomic direct repair of lateral ankle ligaments for CLAI involving 21 patients, Muijs et al45 reported that grade I osteoarthritis was observed at a mean follow-up of 13 years in 7 of the 15 patients who did not have preexisting arthritis. After another 6 years of follow-up, five of these seven patients also developed grade I osteoarthritis in the contralateral ankle, with one patient progressing to grade II osteoarthritis. In a case series of 38 patients followed for a mean of 8.7 years after a Broström procedure, 5 patients had grade I arthritic changes and 3 had grade II arthritic changes.[13]

The reasons for these degenerative arthritic changes have been explored in multiple studies.[46-48] Prisk et al[46] demonstrated in cadaver specimens that the lateral ankle ligament reconstruction technique does not completely restore native contact mechanics of the ankle joint or hindfoot motion patterns. Two subsequent studies by Huebner et al[47,48] reported that catabolic reactions after acute injury increase the risk of degenerative changes, even in a mechanically stable joint.

Current evidence indicates that CLAI may be a precursor to posttraumatic osteoarthritis of the ankle.[49,50] Therefore, some surgeons advocate concomitant ankle arthroscopy with ankle ligament reconstruction. This practice is somewhat controversial, however, and data supporting its use are insufficient.

A correlation between cavovarus foot deformity and CLAI has been documented.[51] In 20 ankles requiring revision of lateral ligament reconstruction, Strauss et al[52] demonstrated that the most commonly associated condition was hindfoot varus alignment (28%).

Irwin et al[53] reported good clinical outcomes in 22 patients who underwent lateral ankle ligament reconstruction and realignment osteotomy for cavovarus foot deformity.

In patients with CLAI and foot deformities, simultaneous correction of the deformity may be necessary for the success of an ankle stabilization procedure. In the professional athlete, mechanical realignment may best be deferred until the end of his or her playing career because recovery times can be prolonged.

Complications

Sammarco[9] reported that complication rates after nonanatomic and anatomic procedures were 9.7% and 3.8%, respectively, for nerve injuries and 4.0% and 1.6%, respectively, for wound problems. Recurrent instability, meanwhile, may be the result of four principle causes: inadequate anatomic reconstruction, functional instability, reinjury, and predisposing factors.[9] Predisposing factors include ligamentous laxity, long-standing instability, high functional demand, and cavovarus deformity.[9,51] As noted, anatomic reconstruction procedures were associated with lower rates of recurrent instability than were nonanatomic procedures and anatomic direct repair procedures.[9]

Arthroscopic procedures for CLAI have been associated with relatively high complication rates.[38] In a systematic review, Wang et al[38] reported that 31 of 178 patients with ATFL who were treated with arthroscopic suture anchor placement experienced complications, mostly comprising nerve damage, but the relatively high complication rate may be the result of variations in technique. The high rate of sensory nerve injury may be the result of the presence of a communicating branch between the superficial peroneal and sural nerves inferior to the fibula. In one cadaver study, this communicating branch was observed in 58% of specimens examined, and the average distance from this branch to the crest of the lateral malleolus was 4.7 cm.[54]

Acevedo et al[55] defined a so-called safe zone at a distance of 1.5 cm from the tip of the fibula, which is not near the communicating branch reported in their anatomic study. Awareness of this safe zone may help surgeons avoid nerve injuries during arthroscopic procedures.

Summary

Several topics regarding the surgical management of CLAI are under debate. Successful outcomes of these procedures may depend on ligament quality and patient characteristics. Because of issues inherent in nonanatomic procedures, use of this technique is decreasing. Standard open direct repair has had continued widespread use in patients with sufficient ligament quality. This procedure can provide good to excellent clinical outcomes, potentially lasting >20 years.

Reconstruction techniques incorporating autografts are another promising option for CLAI in the short term, although the longevity of this procedure is unclear. In contrast, anatomic reconstructions using allograft can provide equivalent outcomes without the risk of donor-site morbidity but with potential inherent risks and costs. Interest in arthroscopic repair has also grown. Although arthroscopy may provide good to excellent clinical outcomes in both the short- and long-term, evidence supporting its use is limited.

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Perspective

Role of Health Care Professionals in Prevention of Hospital-Acquired Infections Caused By Carbapenemase Resistant Bacteria: Proactive Approach S in General Hospital Ptuj.

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Abstract

Background: Health-related infections represent a very important complication of health care treatment. They are associated with high morbidity, mortality, disability and high costs of treatment, care and rehabilitation. The problem is its rising incidence, mainly as pathogens have developed various antimicrobial resistance mechanisms. Enterobacterias that excrete carbapenemases are a significant problem, especially as the treatment options for infections is increasingly limited. Several guidelines dictate measures to prevent their spread and control at different levels of health care. Implementation of guidelines in practice is not easy, as it requires a lot of knowledge, cooperation, consistency, material, environmental and human resources. The role of health care professionals is indispensable in this field. The aim of the article is to present the role of health care professionals in the prevention of Carbapenem-resistant Enterobacteriaceae (CRE) infections and proactive approach of General hospital Ptuj in preventing and controlling CRE.

Keywords: health-related infections, bacteria-resistant carbapenems, measures

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Full Text

Introduction

According to the World Health Organization, health-related infections are the most common unwanted event in health care worldwide (WHO, 2011). They are infections acquired in healthcare settings. These include hospital infections, infections in patients in nursing homes, in long-term care facilities, infections in patients requiring permanent outpatient care (dialysis, chemotherapy) or need permanent medical care at home. Hospital infections represent the most important proportion of health-related infections, especially as they usually affect the most vulnerable groups of patients (Lejko Zupanc, 2013). In the European Union, every 20th hospitalized patient has a hospital infection, which represents 4,1 million patients and 37,000 deaths associated with these infections on a yearly basis (ECDC, 2008). Hospital infections are not only financial costs, but they extend hospitalization, contribute to mortality and permanent disability of patients (Lejko Zupanc, 2013).

The proportion of patients with a hospital infection is significantly higher in Slovenian hospitals than in the European Union, which points to the exceptional severity of the problem. The dominant cause of hospital infection in Slovenia is Enterobacteriaceae (43.3%). The most common cause of hospital infections in Slovenia and Europe is E. coli. In Slovenia, the most common causes of pneumonia and lower respiratory tract infection are Klebsiella spp. and P. aeruginosa (20.7%), the most common causes of surgical wound infections are enterococci (23.2%), the most common cause of urinary tract are E. coli infections (38.5%) (Klavs et al., 2013).

A particular problem in the field of hospital infections is the spread of antimicrobial resistance. According to ECDC (2013) was more than half of Klebsiella spp. Resistant to cefalosporins of the third generation. In Slovenia, 41.9% of P. aeruginosa strains are resistant to carbapenems, according to ECDC data, this proportion is lower in the European Union (31.8%). According to ECDC, of all tested A. baumanii is 81.2% carbapenem-resistant and can be found one in five isolates in Slovenia. These results are not encouraging and may indicate an increased use of carbapenems and an increase in antibiotic-resistant bacteria (Klavs et al., 2013). The increase of antibiotic resistance, especially beta-lactam antibiotics, is becoming an increasing problem at the global level. The consequences of infections caused by resistant bacterial strains are increased morbidity, mortality and increased costs of treatment (Hawkey, 2009).

In the last two decades of the 20th century, the attention of the medical profession and the pharmaceutical industry was directed mainly towards the problem of spreading resistant gram-positive bacteria, in particular MRSA and VRE (Nicasio et al., 2008). At the beginning of the 21st century, attention is paid to gram negative bacteria, increasing concern is caused by the occurrence of multiple resistant Enterobacteria (Adraševič et al., 2012). In Slovenia, we currently see the biggest problems in gram negative bacteria. According to all indicators, Slovenia is facing a threatening epidemic of growing resistance to gram negative bacteria (Lejko Zupanc, 2013).

Carbapenemase-producing Enterobacteriaceae

Carbapenem are beta-lactam antibiotics that have the broadest spectrum of activity among all beta-lactams. They are used as the latest choice for the treatment of bacterial infections when other antibiotics, no longer have an effect (Papp Wallace et al., 2012). A problem is the spread of the antimicrobial resistance. In recent years, Enterobacteria have emerged with new antibiotic resistance mechanisms and treatment of infections is very limited (Livermore, 2012). The spreading of Enterobacteria that excrete carbapenemases presents a serious public health problem, and the extent of the problem varies greatly between countries (Canton et al., 2012). In Slovenia, we encounter individual cases (Štrumbelj et al., 2013). Many cases are related to importation from a foreign country such as Greece, Serbia, Croatia, Bosnia, Italy, Libya and India (Pirš et al., 2013). Carbapenem-resistant Enterobacteriaceae (CRE) infections are associated with poor outcomes and high mortality, high treatment costs (Hawkey, 2009; Magiorakos et al., 2017).

Prevention of CRE and the role of health care professionals in preventing CRE

In December 2015, the Slovenian National Commission for the Control of Hospital Infections adopted recommendations on measures to prevent the transmission of CRE. These recommendations focus primarily on the early detection of asymptomatic patients, strict contact isolation measures, the sensible use and control of antibiotic consumption and consultation with an infectious disease physician (NAKOBO, 2015).

In literature, there are several recommendations for preventing the spread of CRE. Literature shows that it is possible to completely avoid hospital expansion at early stages. It is also possible to act later, but with incomparably higher costs and lesser final success. Core infection prevention and control measures to minimize risk of spread of CRE within and between healthcare settings are: antimicrobial stewardship, environmental cleaning, equipment reprocessing, faecal and medical waste management, guidelines and processes, hand hygiene, infrastructure and capacity for patient accommodation, microbiological capacity, staff education, staffing, surveillance (Magiorakos et al., 2017). WHO (2017) prepared evidence-based recommendations on measures for the prevention and control of CRE, which consists of main eight recommendations: implementation of multimodal infection prevention and control strategies, importance of hand hygiene compliance for the control, surveillance of CRE infection and surveillance cultures for asymptomatic CRE colonization, contact precautions, patient isolation, environmental cleaning, surveillance cultures of the environment for CRE colonization/contamination and monitoring, auditing and feedback.

The European Expert Group proposes regional, national and international coordination (Štrumbelj, 2012). The key measures for successful prevention of the spread of CRE are primarily the early detection and the restriction of the spread with hospital hygiene measures and the screening of patients and their contacts (Akova et al., 2012; Monuz

Price et al., 2013). Early detection of asymptomatic carriers is important. It is necessary to find also healthy carriers as they are an important reservoir of resistant bacteria (Štrumbelj, 2012). Risk factors for the occurrence of CRE are hospitalizations in health care institutions where CRE has been already present and contact with a patient with proven CRE. Surveillance samples include a rectal swab or a stool, which should be taken at the admission and then repeated after seven days. Patients with suspect on CRE should be in isolations until two surveillance samples are negative (NAKOBO, 2015). Contact isolation is recommended. Patients with CRE can be in cohort contact isolation, however, patients with other multiple resistant bacteria, such as MRSA, ESBL, VRE should not be in the same rooms. The contact isolation measures usually include the installation in a single room with own sanitary facilities (or cohort), the hygiene of the staff, patients and visitors, and the correct use of personal protective equipment. In case of contact with the patient or his immediate surroundings, we use protective gloves. A surgical mask is used only if the patient has a bacterium isolated in the respiratory system or in the aerosol forming processes. Medical devices must be separated and assigned only to a particular patient. We use disposable devices, which should be discarded. It is necessary to disinfect the patient's environment, using conventional cleaners and disinfectants. Particular attention should be paid to the cleaning and disinfection of sanitary facilities and on the final cleaning after the completion of the isolation measures (Pirš et al., 2013; NAKOBO, 2015). Contamination of surfaces contributes significantly to the colonization of patients., Terminal cleaning of hospital rooms with a disinfectant with hydrogen peroxide has been shown. As a successful measure to prevent the spread of bacteria that excrete carbapenems (Pirš et al., 2013). In our experience, disinfection with UV light it is extremely effective, which in addition to the efficacy also enables the patients to be quickly reinstalled into disinfected hospital rooms.

NAKOBO (2015) state that separate staff should take care for a colonized patient, if possible. In practice, it is often difficult to ensure that, as it is often difficult to ensure a sufficient number of insulation rooms. It is well known that the increase in the number of hospital infections is significantly affected by the lack of rooms and personnel (Clements et al., 2008). It is therefore important for nursing staff us to be aware of the seriousness of the problem. They should perform their tasks in accordance with the standards and professional guidelines. When there is a lack of separate rooms, we should try to find the safest solution for patients - implementation of isolation measures, separate from other patients. Pirš and others (2013) and NAKOBO (2015) state that inter-hospital and intra-hospital patient transfers are particular problem in preventing an outbreak. Health care staff should be warned that the patient is colonized or infected with CRE when transferred to other hospitals or other departments. The role of health care professionals is extremely important, as nurses should verbally and in writing inform other staff about the colonization. The patient's identification in the computer information system is also important (NAKOBO, 2015).

Health care professionals can greatly contribute to reducing the spread of CRE. The consistent implementation of all standard measures to prevent the spread of healthcare-related infections are required. Hand cleansing is the primary action to reduce health-care-associated infection and cross-transmission of antimicrobial-resistant pathogens (Pittet et al., 2006). Healthcare professionals should follow WHO guidelines: My 5 Moments for Hand Hygiene approach. This approach recommends healthcare workers to clean their hands before touching a patient, before clean/aseptic procedures, after body fluid exposure/risk, after touching a patient, and after touching patient surroundings. It is important that health care professionals understand the importance of consistent hand hygiene and warn each other about possible deviations. Hygiene is also essential in patients and visitors. Patients need to wash and disinfect the hands after using the toilet and before leaving the hospital room. For visitors, the disinfection of hands is required before entering the hospital room and before contact with the patient and before leaving the hospital room (NAKOBO, 2015). Health care professionals should educate patients and visitors and about consistent hand hygiene.

The occurrence and spread of resistant bacteria are mainly associated with too frequent and incorrect use of antibiotics, therefore it is necessary to optimize the use of antimicrobial drugs in human medicine, veterinary and food industries with strict indications. Consistent measures must be taken to prevent and control health-related infections under national guidelines by including local epidemiological features. The education of healthcare professionals, patients, visitors and the public is a very important factor (Gorišek Miksić and Gorišek, 2017). Patients should be familiar with the problem of the emergence and spread of multiple resistant microorganisms, including CRE. Patients should be advised to take antibiotics as prescribed by physicians. Patients should not take antibiotics when this is not necessary and follow the prescribed instructions. In addition, hands should be washed regularly. We are all responsible for maintaining the effectiveness of antibiotics. Responsible use of antibiotics can help stop the spread of resistant bacteria and maintain the effectiveness of antibiotics for use in future generations (ECDC, 2016).

CRE prevention in General hospital Ptuj

General hospital Ptuj adopted proactive approach to problem solving, that is, pre-prepared readiness of resources and procedures, allowing early detection and limitation of the CRE problem. Identification of asymptomatic carriers is essential step, as experience shows that a lot of patients are not identified in early stages of hospitalization. In this area, the role of the Commission for the control of hospital infections is very important. Task of Commission is primarily to prepare professional guidelines and standards. As prevention of hospital-acquired infections are possible through strict adherence to evidence-based practices, it is important that the Commission prepare professional guidelines and standards based on current evidence such as WHO, ECDC guidelines and

evidence from UpToDate. The next step is implementation of guidelines and standards into clinical practice and education of staff. Important role in implementation and education have physician for control of hospital infection and nurse for hospital infection. They prepare and provide theoretical education, support and advice in the implementation of guidelines in practice and monitor the practice in terms of constant surveillance. They also educate patients and their relatives about hospital-acquired infections and its prevention measures.

Conclusion

Health care professionals have an important role in controlling and preventing CRE. Everyone can contribute. Many health care professionals will need to change their thinking and awareness of the problem of health-related infections and the problem of the resistance of bacteria against antimicrobials. This is also the awareness of the necessity of daily, consistent implementation of all measures to prevent the spread of bacteria resistant to carbapenems, with an emphasis on hand hygiene.

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Case Report

MAC Anesthesia during Endoscopic Percutaneous Gastrostomy (PEG) in a Patient with Amyotrophic Lateral Sclerosis (ALS). A Case Report

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Abstract

Background: Amyotrophic lateral sclerosis (ALS) is a serious disease in which some brain and spinal cells die slowly. These nerve cells are called motor neurons and control the muscles that allow the body parts to move. Initially, the disease causes bodily fatigue and muscular weakness through degeneration of the upper and lower motor neurons, leading to loss of ability to initiate and control the voluntary bodily functions. In late stages this disease causes difficulty in the normal swelling and eating that causes the need for PEG in patients with ALS. This clinical picture increases the difficulty and the anesthetic risk used during the PEG application.

Case presentation: We are describing our experience in a 56-year-old male patient, ASA III suffering from ALS and being admitted to our clinic to insert PEG. The patient presented BMI =15.6. After the patient provide informed consent, we were monitoring him for detect changes in pulse oximetry, noninvasive blood pressure, heart rate and visual assessment of ventilator activity, level of consciousness and discomfort. We used balanced propofol for moderate sedation (BPS), loading dose 1mg midazolam, 0.1 mg of fentanyl, and 5-15 mg propofol in smaller bolus dose were applied for more precise dose titration. The operation was performed after the patient lost the consciousness and had no pupil reflex. The EGD entered to the stomach. Fistula was localized after the visualization of light from the tube. Local lidocaine was applied and 1cm incision on the abdominal wall gave the possibility for application of fistula and gastro stoma placement. The patient wakes up 10 minutes after the end of the procedure without using antidotes. The patient after treatment went home in two days using gastro stoma for enteral feeding.

Keywords: Amyotrophic lateral sclerosis, MAC, PEG, BMI

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Full Text

Introduction

Amyotrophic lateral sclerosis (ALS) is a group of rare neurological diseases, that is known with different names as Motor Neurone Disease (MND), Charcot's disease, Lou Gehrig's disease is a neurodegenerative disease. It characterized by progressive muscular paralysis reflecting degeneration of motor neurons in the primary motor cortex, corticospinal tracts, brainstem and spinal cord. (1) Amyotrophic lateral sclerosis (ALS) that usually affected the nerve cells (neurons) serve for controlling voluntary muscle movement. Voluntary muscles produce movements like chewing, walking, and talking. The disease is progressive, meaning the symptoms get worse over time. Nowadays there is no cure for ALS but treatment can relieve symptoms and raise the quality of life. The incidence of sporadic amyotrophic lateral sclerosis (SALS) in the 1990's is reported to be between 1.5 and 2.7 per 100,000 population/year (average 1.89 per 100,000/year) in Europe and North America (2). Dysphagia is a common symptom of ALS and leads to increased risk of aspiration, malnutrition, weight loss and dehydration. Mostly patients with ALS live 3-5 years after diagnosis but only 10% live more than 10 years after first symptoms. Malnutrition and dehydration can also occur inpatients whom have severe upper limb weakness, especially if they live alone for social reason, as this leads to difficulties in meal preparation and consume or prolonged meal times. ALS is associated with a hyper metabolic state; therefore, patients require increased calorie intake (3,4). Most guidelines state that supplementary enteral feeding should be considered when body weight falls by > 10% of the pre-diagnostic or baseline weight (5,6). The three options available for enteric feeding include percutaneous endoscopic gastrostomy (PEG), percutaneous radiologic gastrostomy (PRG) or radiologically inserted gastrostomy (RIG), and nasogastric tube (NGT) feeding. PEG is the standard procedure for enteral feeding, although the procedure requires mild sedation and therefore has implications in patients with respiratory weakness. To minimize risks, evidence suggests that PEG should be performed before VC falls below 50% of predicted (5,7) A percutaneous endoscopic gastrostomy seemed a better, though potentially hazardous, alternative in view of the often severely restricted pulmonary function of these patients. Therefore, we prospectively investigated the use of percutaneous endoscopic gastrostomy in our patients with amyotrophic lateral sclerosis. This clinical picture increases the difficulty and the anesthetic risk used during the PEG application therefore we decided to used monitor anesthesia care (MAC) for safety of patient.

Case presentation

A 56-year-old male patient, ASA III suffering from ALS and with swallowing difficulties admitted for elective operative treatment to the first clinic of general surgery to insert PEG.

The patient presented BMI =15.6 and he had a period of 4 years diagnosis. The patient was with mild pulmonary dysfunction After the patient provide informed consent , we was monitoring him for detect changes in pulse oximetry, non-invasive blood pressure, heart rate and visual assessment of ventilator activity, level of consciousness and discomfort. We used balanced propofol for moderate sedation (BPS), loading dose 1mg midazolam, 0.1 mg of fentanyl, and 5-15 mg propofol in smaller bolus dose were applied for more precise dose titration. The operation was performed after the patient lost the consciousness and had no pupil reflex. The EGD entered to the stomach. Fistula was localized after the visualization of light from the tube. Local lidocaine was applied and 1cm incision on the abdominal wall gave the possibility for application of fistula and gastrostoma placement. The patient wakes up 10 minutes after the end of the procedure without using antidotes. the vital parameters were normal with used 5 liters of O2 nasal. The patient after 2 days intensive care treatment will total parenteral nutrition went home using gastrostoma for enteral feeding after 48 hours.

Discussion

The management of ALS/MND has considerably changed over the past two decades, with an emphasis on coordinated multidisciplinary care between specialist, community-based therapists and palliative care teams. Although the condition is considered incurable, many of the symptoms arising during the course of the disease are treatable, and all efforts should be made to improve quality of life and help maintain the patient's autonomy for as long as possible. Patients with ALS and their relatives are likely to suffer from depression, feelings of hopelessness and anxiety regarding end-of-life issues following the diagnosis or as the disease progresses (9). Symptomatic treatments aim to improve quality of life of patients and care givers. Malnutrition, specifically under-nutrition which is typically associated with disease. PEG is the modality of choice for long-term enteral access for patients who are unable to maintain sufficient oral intake. Contraindications to PEG placement include pharyngeal or esophageal obstruction, major coagulopathy, abdominal wall abnormalities and the presence of prior abdominal surgery involving stomach and splenic flexure of the colon. Although generally safe, PEG placement can be associated with many potential complications like pneumoperitoneum, entero-cutaneous fistula, small bowel or colon injury, splenic or hepatic injury, intra or retro-peritoneal bleeding and abdominal wall bleeding (10). Swallowing difficulties and diaphragmatic weakness are usually late features (11). Respiratory insufficiency occurs commonly in patients with ALS and is a major cause of mortality. PEG is the standard procedure for enteral feeding, although the procedure requires mild sedation and therefore has implications in patients with respiratory weakness. (5-9). The team of anesthesiologists may be asked to provide anesthesia for procedure that require sedation, monitor anesthesia care (MAC) or

general anesthesia. MAC is a type of anesthesia service during which a patient is typically still aware, but very relaxed. During endoscopy the patients are in a minimal, moderate or deep "procedural sedation" which allows the specialist to perform the procedure and aims patient's safety and comfort. The common medicines used for sedation are benzodiazepines as midazolam which act on the brain and SNQ and opioids as fentanyl which decrease the patient´s perception of pain, dexmedetomidine, low dose ketamine or propofol. Propofol is ideally suited for endoscopy sedation because it is a short acting anesthetic induction drug but always is required greater level of monitoring (11).

Conclusions

Conscious sedation MAC may be considered safe because less drugs are typically administered during PEG insertion in ALS patients and these did not lead to respiratory complications or to an increase the other complications. Our data indicate that conscious sedation can be used safely in ALS patients with mild to moderate pulmonary dysfunction.(12) However, the application of sedatives and analgesics should be titrated carefully after monitoring the patient's level of consciousness and hemodynamic value to avoid central respiratory depression and airway obstruction, since the airway of the patient is not secured during **MAC**. It should be chosen as a proper anesthetic alternative after patient co-morbidities and preferences in all the type of endoscopic procedures. The choice of sedative and analgesic is based on the required depth of sedation and analgesia of each procedure. The presence of a sufficiently experienced anesthesiologist, as well as oxygen supply, monitoring devices and emergency equipment, are required during MAC both in and outside the operating room.

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Case Report

Pedicled and Perforator Flaps in Reconstrucion of Post Trauma Defects in Upper Limbs.

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Abstract

Background: Upper extremity soft tissue reconstruction is an extensive topic as a multitude of options exist for diverse soft tissue defects involving shoulder, arm, elbow, forearm, wrist, and hand. Many of the times flap cover is necessary for resurfacing exposed critical structures like tendons, neurovascular structures, bone and to provide supple tissue over joints. Pedicled and perforator flaps are seen in last years as a good choice to restore length, sensitivity and function of the injured upper limb.
The aim of this paper is to give an overview of the definitions of as well as to present our experience regarding pedicled and perforator flaps.
Materials and methods: A retrospective analysis of 15 trauma patients who underwent pedicled and perforator flaps during the 2012-2016 timeframe period was made. The patients were divided according to their type of injury, as well as the types of flasp that were used.
Results: We have performed in total: 7 Foucher's flaps, 4 Posterior Interosseous Artery flaps, 1 Radial Recurrent Artery flap, 1 Quaba flap, 1 SDMA flap. We had only two cases of partial necrosis of the flaps and all the others survived completely.
Conclusions: Every single flap elevated successfully is linked with a meticulous surgical technique. We should take a special care in pedicle positioning because pedicle strangling was the most important negative factor in our two flap partial necrosis. Understanding the mistakes will help us to improve our surgical techniques day after day.
Keywords: post-trauma defect, reconstruction, pedicled flaps, perforator flaps

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Full Text

Introduction

Upper extremity soft tissue reconstruction is an extensive topic as a multitude of options exist for diverse soft tissue defects involving shoulder, arm, elbow, forearm, wrist, and hand.

Many of the times flap cover is necessary for resurfacing exposed critical structures like tendons, neurovascular structures, bone and to provide supple tissue over joints.

The options include local, regional, distant and free flaps. It is well established that free flap option is a versatile single stage procedure facilitating simultaneous reconstruction of other critical structures. It also allows post-operative mobilization and early discharge and return to work. On the other hand, it requires additional resources, workforce, prolonged operating time and carries a risk of total loss of flap.

Pedicled flaps have been the workhorse flaps for reconstruction of the upper limb in many centers across the world. Though the procedure includes multiple surgery, prolonged immobilization, and joint stiffness, refinements in the execution of flap can prevent many of the disadvantages. In some aspects, the outcome is better than free flap reconstruction.

Pedicled and perforator flaps are seen in last years as a good choice to restore length, sensitivity and function of the injured upper limb.[15]

To be successful in such complicated procedures we should be aware of:

1-Careful planning of the most effective flap in the area involved

2-Careful selection of the patient [age, diseases, drug and alcohol abuse]

3-When is possible we can identify the perforator vessel or the artery of the supposed pedicle using a hand Doppler

4-In some cases an Angiography is important

5-The consent of the patient is extremely important[4, 5]

Pedicled and Perforator Flaps

A pedicle flap is a tissue transfer nourished by a well-defined longitudinal vascular pedicle.

A perforator flap can be strictly defined as a tissue transfer nourished by a myocutaneous perforator.

A perforator flap is named after the nutrient artery or vessels and not after the underlying muscle. If there is a potential to harvest multiple perforator flaps from one vessel, the name of each flap should be based on its anatomical region or muscle.

Practically the perforator flap technique has expanded to any perforator to the skin, including myocutaneous and septocutaneous vessels[1, 2, 3].

Materials and Methods

A retrospective analysis of 15 trauma patients who underwent pedicled and perforator flaps during the 2012-2016 timeframe period was made. The patients were divided according to their type of injury, as well as the types of flasp

that were used. We have measured pedicle length and main artery diameter using a Castro-Vievo caliper. Flap survial, flap sensitivity, donor site sensitivity, patient satisfaction, smoking, alcohol abusing and bulky flap complication presence were followed up for a three months period of time. All pedicles were identified and measured. Hand Doppler was useful especially in perforator flaps.

Results

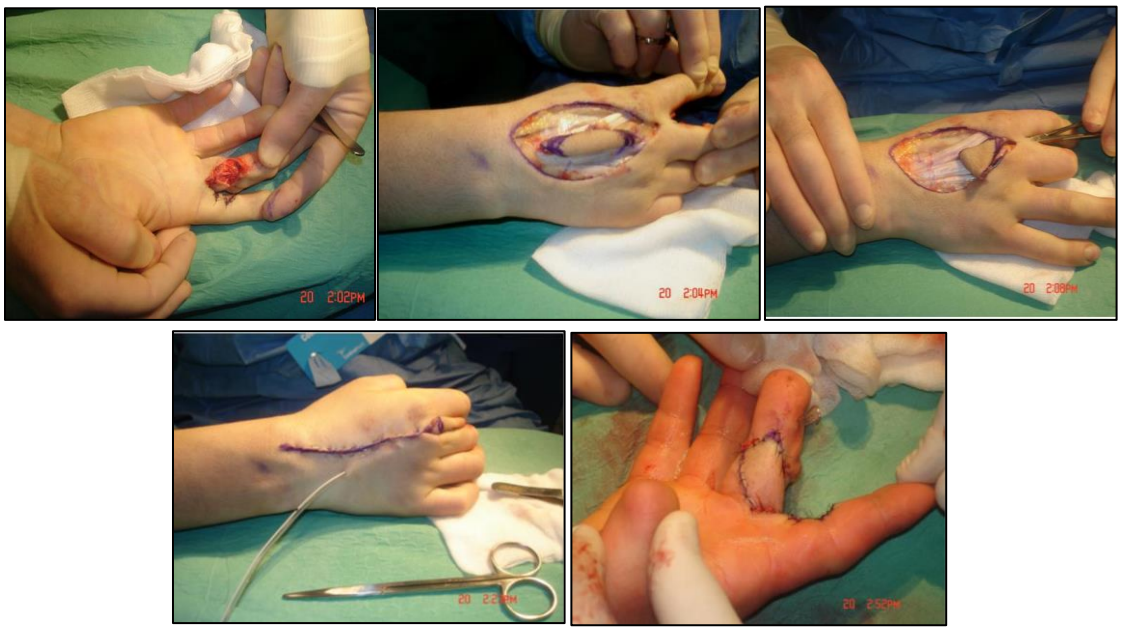
Out of 15 trauma patients in total, 7 of them were work injuries with bone or tendon exposure in upper limbs, 7 patients had injuries due to electrical burns treated before with escharectomies and 1 patient had a fire gun injury of the hand.

We have performed in total: 7 Foucher's flaps, 4 Posterior Interosseous Artery flaps, 1 Radial Recurrent Artery flap, 1 Quaba flap, 1 SDMA flap.
We had only two cases of partial necrosis of the flaps and all the others survived completely. The bulky flap complication and flap sensibility problems were the main concerns of our patients three months after the surgery.

Types of flaps performed

1-Second dorsal metacarpal artery flap

Flaps can be used proximally or distally based. The reliability of such a flap decreases from second to the fifth metacarpal bone regarding the frequency of presence of the DMAs.
The pedicle length ranged from 5-7 cm[6, 7]. The procedure is depicted in the following images.



Figures 1-5: *A work injury*

2 - Foucher's Flap

The outer diameter of the FDMA at its widest point is 1.0±1.5 mm. In those without a palmar branch the diameter is less than 1 mm. A muscular branch is present in 40%. Flap pedicle is about 5-9 cm. The length of the flap ranged from 2-4 cm. The flap width ranged from 1.5-2 cm.

Surgical Technique

First, we did the flap painting in the dorsal part of the index finger above the proximal phalanx. We had to take care making the incision mainly in the radial part of the phalanx.

We raised the flap for security reasons in paratenon level because the artery in 43% of the cases run in subfascial plane.[12, 13, 14]



Figures 6-9: *A work injury*

3- PIA FLAP (posterior interosseous artery flap)

The PIA is located in the intermuscular septum between the extensor digiti minimi and extensor carpi ulnaris muscles. The artery gives off several fasciocutaneous perforators along its length and supplies almost the whole width of the skin on the posterior aspect of the forearm. The pivot point of the reversed vascular pedicle was about 1.0 cm proximal to the ulnar head and the pedicle length was about 7-8 cm.[10, 11]



Figures 10-13: *A gun injury*

4- Radial Recurrent Artery Flap

The radial recurrent artery courses laterally and then upward along the medial surface of the brachioradialis, in a line between the brachialis and brachioradialis. This branch of the radial artery arises in the cubital fossa. Above the lateral epicondyle it forms an anastomosis with the radial collateral artery branches of the profunda brachi artery.[8,9]



Figures 14-16: *Electrical Burn*

Conclusions

Every single flap elevated successfully is linked with a meticulous surgical technique.

We should take a special care in pedicle positioning because pedicle strangling was the most important negative factor in our two flap partial necrosis.

We have our failures too. Understanding the mistakes will help us to improve our surgical techniques day after day.

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Case Report

High Thoracic Epidural Anesthesia in Cardiac Surgery as a Sole Anesthetic Technique. Series of 12 Interventions.

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Abstract

Epidural anesthesia has been used widely as a combination to general anesthesia in cardiac surgery since early seventies. The addition of this technique to general anesthesia may have beneficial effects on clinical outcome. Several clinical trials and experiments have shown that there may be significant benefits using epidural anesthesia in cardiac surgery. Somehow neuroaxial blockade manages to attenuate the response to surgical stress and improve perioperative analgesia. Between august 2014 and September 2018, high thoracic epidural anesthesia was applied to 12 patients as a sole anesthetic technique. Epidural anesthesia was chosen because the patients had relative contraindications to general anesthesia and mechanical ventilation. This paper gives an overview of epidural anesthesia usage and our experience.

Keywords: epidural anesthesia, cardiac surgery, perioperative analgesia.

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Full Text

Introduction

Epidural anesthesia has been used widely as a combination to general anesthesia in cardiac surgery since early seventies. However its use as a sole technique in cardiac surgery dates long after. One of the first big performed a series of 137 patients with epidural anesthesia demonstrating its beneficial effects when used in selected patients (1). The addition of this technique to general anesthesia may have beneficial effects on clinical outcome (2). Several clinical trials and experiments have shown that there may be significant benefits using epidural anesthesia in cardiac surgery. Somehow neuroaxial blockade manages to attenuate the response to surgical stress and improve perioperative analgesia (3). After the introduction of off-pump technique another milestone in cardiac surgery was the use of high thoracic epidural anesthesia which made it possible to have more beneficial results in long-term management of postoperative pain in cardiac surgery. It made it possible to avoid the drawbacks of mechanical ventilation and general anesthesia in selected patients (4). Of course several studies have shown the high satisfaction rate of pain control in patients operated under high thoracic epidural anesthesia (5). Also the fact that on-pump surgery is done in normothermic temperatures, appears to give a more physiological approach to perioperative management of the patients (6).

Methods and materials

Between august 2014 and September 2018, after explaining and taking the permission from the patients, high thoracic epidural anesthesia was applied to 12 patients as a sole anesthetic technique, 8 male and 4 female. The catheter was inserted 24 hours prior to surgery at T3-T4 level in the first 8 cases. In the late 4 cases the catheter was inserted 1 hour before the surgery. Sensory block was tested with 2 ml of lidocaine 2%. Epidural anesthesia was chosen because the patients had relative contraindications to general anesthesia and mechanical ventilation. Their age varied from 52 to 81 years old. The most important and common characteristic of these patients was the poor pulmonary function test. Seven of them had mixed dysventilatory syndrome with no reversibility to any treatment. FEV1 ranged from 49-53%. Anesthesia was obtained by infusion of bupivacaine 0.15mg/cm and sulfentanyl 100 ɣ initial dose and then continuous infusion of bupivacaine from epidural catheter with a dose of 0.06mg/cm/h.

Results

Five patients had valve replacement surgery and seven CABG. One patient did off-pump CABG and the other six on-pump CABG. Three patients out of 12 had to go on pump twice due to hemorrhage. Two of them were put on pump immediately, intraoperatively, after the first time and the third one was re-operated 4 hours later due to blood

loss. The patients were under epidural anesthesia and did not need to be intubated. Patients were followed up thirty days after the operation. No mortality was observed 3 months postoperatively. Life threatening arrhythmia was seen in only one patient who was intubated during the perioperative period. He had on –pump 3-vessel CABG. He had dilated cardiomyopathy with an EF of 30%. The operation was successful without any intra-operatory complication. Immediately after being transferred to ICU the patient had a cardiac arrest. He was intubated urgently and cardiopulmonary assistance was given. He managed to recover despite a long stay in ICU. He was transferred to the ward 7 days after surgery and left hospital two weeks after in a very good condition. Ten patients did not need ICU assistance more than the day of the operation. They were transferred to the ward the second day and 9 of them were discharged without any complication the fifth day after the surgery. One patient left hospital at the seventh day. One patient was transferred to the ward immediately after the operation. She was mobilized 1 hour after the surgery and did not experience any complication nor feel any pain.

Conclusion

We can definitely say that epidural anesthesia is a very suitable technique when it comes to perioperative pain management in patients undergoing cardiac surgery. The postoperative management of these patients is easier due to the low incidence of complications and the early mobilization. Generally no life threating arrhythmias are seen in comparison to their incidence in patients operated under general anesthesia. Studies show that there is a low probability of epidural hematoma, varying approximately 1:12 000 to 1:150000 which is comparable to non-cardiac surgery (7). Epidural anesthesia is a very suitable technique in selected patients with contraindications to general anesthesia and mechanical ventilation. However more studies and experience is needed to have a better view of the benefits, indications and uses of this technique in cardiac surgery.

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Case Report

Multiseptate Gallbladder with Recurrent Abdominal Pain. A Case Report and Literature Review.

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Abstract

Background: Chronic abdominal pain is a common disorder in children and adolescents worldwide. In attacking this problem, the pediatrician often concentrates on the gastrointestinal or genitourinary tract as a source of the pain. Too little attention is paid to the gallbladder as the cause of pain in this age group.[1] We report a 6-year-old girl who presented with recurrent abdominal pain and was diagnosed as having a multiseptate gallbladder (MSG). MSG, although rare, should be considered in the differential diagnosis of patients presenting with recurrent abdominal pain and abdominal ultrasonography should form part of the investigation.

Keywords: gallbladder, abdominal pain, ultrasonography.

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Full Text

Introduction

The multiseptate gallbladder is one of the rarest congenital malformations of the gallbladder. The first detailed description of a multiseptate gallbladder appeared in the radiologic literature in 1963.[2] The presenting features include abdominal symptoms such as right upper abdominal pain, nausea, and vomiting. The patients with MSG may also be asymptomatic and can be diagnosed incidentally during ultrasonography (USG) examination. In this case presentation, we aimed to present a patient with a multiseptate gallbladder who presented with recurrent abdominal pain.

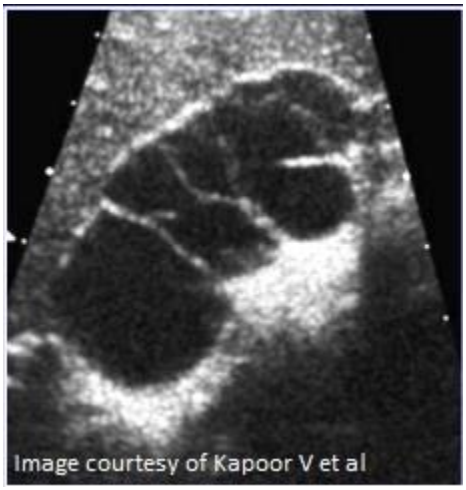
Case report

A 6-year-old girl with recurrent abdominal pain of about 6 months duration was admitted to our hospital. Starting as a dull ache in the right upper quadrant of the abdomen, with no radiation to the back, the right shoulder, and the interscapular area, the pain persisted, its intensity varying from mild to moderate. There were no associated fever, nausea, vomiting, itching, or jaundice. The physical examination and laboratory studies such as complete blood count, liver function tests, electrolytes, and urinalysis revealed no specific abnormality. The sonographic examination of the abdomen was performed with a 3.5- MHz convex transducer and a 7.5-MHz linear transducer. USG examination performed in supine and left decubitus posture with full inspiration. The intercostal approach was performed when necessary. On sonographic examination, the gallbladder showed multiple linear echoes, consistent with septa projecting into the lumen, some of which crossed the lumen and connected to the opposing walls mimicking a honey-comb pattern. There was no evidence of gallbladder wall thickening, gallstones or dilatation of the bile ducts. Based on these USG findings, the diagnosis of a multiseptate gallbladder was made. The patient was referred to the gastroenterology clinic.

Discussion

The multiseptate gallbladder is thought to be a congenital malformation, although the embryogenetic mechanism is not clear. Simon and Tandon proposed that, this was due to incomplete vacuolation of the developing gallbladder. Bhagavan et al.[3] have suggested that, MSG may be a result of the solid embryonic gallbladder growing faster than its bed and investing peritoneum, causing aberrant bends and kinks. The same authors also postulated that, a variation in the wrinkling, lobulation, and clefting of the gallbladder (seen in cat and guinea pig embryos) may result in MSG[3,4]. Asymptomatic patients are very rare in the literature[5]. Clinically, most patients present with colicky pain suggestive of cholecystitis, usually in the right upper quadrant or in the epigastrium, or long term abdominal symptoms such as right upper quadrant tenderness, recurrent abdominal pain, nausea and vomiting, and gastrointestinal complaints. It has been

postulated that, the symptoms are produced because of a transient inability of thick bile to pass through the small openings between the septa, resulting in stasis and increased intraluminal pressure of the gallbladder[6,7]. USG examination of the gallbladder is usually sufficient to diagnose MSG, although other modalities such as computed tomography, magnetic resonance cholangiopancreatography (MRCP) and endoscopic retrograde cholangiopancreatography have been described to establish the diagnosis[8]. In patients with multiseptate gallbladder, sonography demonstrates multiple linear, fine echogenic bands without acoustic shadowing or septa crossing the lumen of the gallbladder, giving the organ a honeycomb appearance[9]. MSG, especially in childhood, may coexist with choledochal cysts[10], thus a detailed radiological examination of the hepato-biliary system is needed to exclude a choledochal or pancreatic pathology. Cholelithiasis[11,12] and acute acalculous cholecystitis[13] are the other two complications of MSG. Except for biliary tract anomalies, a relationship between cholangiocarcinoma and MSG is also known[14,15]. Regarding the potential associated anomalies and risk of cancer, regular follow-up is undoubtedly substantial in an asymptomatic patient with MSG. On sonographic examination, desquamated gallbladder mucosa and the hyperplastic cholecystoses must be considered in the differential diagnosis. Desquamated gallbladder mucosa is seen as multiple linear echoes in the gallbladder lumen which do not arise from the wall of the gallbladder and the clinical setting is compatible with acute cholecystitis[16]. The appearance of polypoid cholesterolosis and adenomyomatosis may mimic multiseptate gallbladder, but there is no bridging of the gallbladder lumen by the cyst-like Rokitansky-Aschoff sinuses or polypoid bulbous echoes. A hydatid cyst should also be considered in the differential diagnosis. Cholecystectomy provides the relief of the symptoms in symptomatic patients with MSG[17], while nonoperative management with regular follow-up is reasonable in the absence of the symptoms attributable to the MSG or an associated biliary tract anomaly [4]. Cholecystectomy should also be considered in elderly, asymptomatic patients in whom MSG is incidentally discovered, due to the possibility of undetected carcinoma of the gallbladder[18]. In conclusion, MSG, although rare, should always be considered in the differential diagnosis of children presenting with recurrent attacks of abdominal pain. Recurrent abdominal pain in childhood due to gallbladder is often misinterpreted as being due to intestinal and genitourinary etiologies. Cholelithiasis and cholecystitis are very rare before puberty and, if present, they are mostly



related to bacterial and parasitic infections, hemolytic conditions and chronic gastrointestinal diseases [19]. We think that the cause of recurrent abdominal pain in our patient was the mechanical effect of septa impairing bile flow. As these septa do not contain muscle fibers, difficulty in bile flow is a consequence of the impaired motility of the gallbladder. Multiseptate gallbladder, although rare, should also be borne in mind among the etiologic factors of recurrent abdominal pain, and abdominal ultrasound should form part of the investigation.

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Case Report

Unexplained Severe Lactic Acidosis in Young Patient.

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Abstract

Case report: A 27-year-old previously healthy man was admitted to the ICU complaining nausea, vomiting and disorientation, after he ingested 1500 mg paracetamol, but its relatives explained that they possess in the house only metformin (maybe he ingested metformin instead of paracetamol). First blood gas showed moderate, and hours later severe lactic acidosis Ph 7,01, Lac 25 m mol/L, BE -26,4. Aggressive rehydration and hemofiltration was started, until full recovery after 24 hours of hospital admission. He was discharged after three days in healthy condition.

Discussion: Lactic acidosis is a common cause of metabolic acidosis at the ICU. Type A is most common and caused by hypoperfusion or hypoxia, whilst type B has other causes including use of the antidiabetic drug metformin. Metformin associated lactic acidosis (MALA) is an important treatment-associated condition, and although rare, it is very serious.

Conclusion: MALA should be strongly suspected in patients presenting with wide anion gap metabolic acidosis and high blood lactate concentration. Bicarbonate hemodialysis or continuous renal replacement therapy should be urgently arranged for patients with MALA.

Keywords: Lactic Acidosis, metformin, hemofiltration.

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Full Text

Introduction

Lactate levels greater than 2 mmol/L represent hyperlactatemia, whereas lactic acidosis is generally defined as a serum lactate concentration above 4 mmol/L. Lactic acidosis is the most common cause of metabolic acidosis in hospitalized patients. Although the acidosis is usually associated with an elevated anion gap, moderately increased lactate levels can be observed with a normal anion gap (especially if hypoalbuminemia exists and the anion gap is not appropriately corrected). When lactic acidosis exists as an isolated acid-base disturbance, the arterial pH is reduced. However, other coexisting disorders can raise the pH into the normal range or even generate an elevated pH. Lactic acidosis occurs when lactic acid production exceeds lactic acid clearance. The increase in lactate production is usually caused by impaired tissue oxygenation, either from decreased oxygen delivery or a defect in mitochondrial oxygen utilization.[1]

Case report

A young 27 years old man with previously good healthy, presented in hospital complaining, initially nausea and later vomiting, also little bit disorientation and inability to stand still. Physical examination was unremarkable, with normal chest and heart examinations. Heart rate was 100 per min and blood pressure 110/70 mmHg. Respiratory rate was a little bit higher; 15-18 min. His oral mucosa and tongue was dry and pallid face.

Initially we cannulate cubital venae and started normal saline solution for hydration, supposing that a patient was in first stade of dehydration. One hour later patient started to complain for abdominal pain and in auscultation was observed hyperperistalsis. Respiratory rate increased to 20 without changing in heart rate and blood pressure.

In first blood gas immediately, after he was admitted in hospital, there was a slight metabolic acidosis (pH 7,432. BE -4,8) but hours later he profoundly developed moderate to severe lactic acidosis (pH 7.255 lac 13m mol/l, BE -15,5) and glucose level 72 m/dl. Blood tests on admission showed neutrophil leukocytosis at 12.5×109/L and slight elevated C-reactive protein.

The patient didn't tell any precise information about what did he had consumed the day before, only a pizza with mushrooms afternoon and 1500 mg acetaminophen for the headache. He didn't complain for any fever, but he was a heavy smoker (50 cigarettes per day).

To exclude splanchnic hypo perfusion we perform a thoracic abdominal TAC which was normal, with abdominal organ well perfused.

After that the patient was sent back to ICU and again we started an aggressive rehydration. (3 L cristaloid solution in 3 hours).

Urinary catheter was inserted with 200 ml residual urine. For continuous epigastric pain 5 mg iv morphine and 30 mg papaverine iv was injected.

Despite this treatment, lactic acidosis became more severe pH 7.01 BE- 26,4 Lac 26 m mol/l. After insertion of 12 FR two

lumen Arrow catheter, in left subclavian vein CVVHDF was started, in prismaflex machine (Gambro-Sweden) with M-100 AN-69 membrane. In table 1 there is a progression a blood gas during the period of treatment. After CVVHD was started we saw a good improvement of clinic situation blood gas analysis. Lactate level after 20 hour became normal with no more bicarbonate deficit. We stopped hemofiltration because of the good urinary output without stimulation.

In the next day, patient started to enteral nutrition and he felted well like the day was before the illness.

The patient, during interrogation, denied any drug abuse and insisted on acetaminophen consumption in the house, but his relatives confirmed that they didn't possess any acetaminophen in the house, but only metformin 500 mg of the mother, because she suffered from diabetes type 2. In the third day patient was discharged from hospital in perfect condition.

Gas\Time	***10.49 pm***	***2.40 am***	***3.36 am***	***7.27 am***	***8.35 am***	***9.35 am***	***10.4 am***	***10.36 am***	***12.12 pm***	***1.43 pm***	***5.49 pm***	***8.59 pm***
ph	7.327	7.257	7.255	7.01	7.18	7.132	7.09	7.176	7.263	7.307	7.378	7.392
Pco2	40.5	26.9	26.2	18.7	26	27.5	30.1	30.1	33	30.8	32.9	36
Po2(mmHg)	33.5	102	99.1	121	144	129	147	137	136	126	126	128
ctHB(g/dl)	15.1	15.5	14.2	15.9	15	14.9	15.4	15.3	14.7	13.4	13.2	11.7
Hct(%)	46.4	47.5	43.5	48.8	45.9	45.6	47.4	46.8	44.9	41	40.6	35.9
Chco3(m	21.2	14.2	13.9	8.4	9.8	11.4	11.1	12.8	15.9	16.7	19.3	21.8
SO2	65.8	97.8	97.3	97.2	98.4	98.5	98.6	98.8	99.3	99.3	99.4	99.6
K+ (mmol)	3.8	5	5.1	5.6	5.4	5.7	4.9	4.8	4.9	5.4	4.8	4.4

Table 1: *Progression of blood gas*

Amphetamine	*neg*
Barbiturates	*neg*
Cannabinoids (Marihuana, Hashish)	*neg*
Opiates (morphine, heroine, codeine)	*<300 ng/ml*
Benzodiazepines	*neg*
Methaqualone	*neg*
Propoxyphene	*neg*
Phencyclidine(PCP)	*neg*
Methadone (dolophne)	*neg*
Cocaine Metabolite	*neg*
Ketone	*30 mg/dl*

Table 2:

Urinalysis test

Discussion

Lactic acidosis is a common cause of metabolic acidosis with increased anion gap amongst patients at the intensive care unit. Lactic acid is normally produced in excess by about 20 mmol/kg/day, which enters the bloodstream. It is then metabolized mostly via the liver and the kidney. Some tissues can use lactate as a substrate and oxidize it to carbon dioxide (C02) and water, but only the liver and kidney have the necessary enzymes to utilize lactate for the process of gluconeogenesis.

The tissues which normally produce excess lactic acid include the skin, red cells, brain tissue, muscle, and the gastrointestinal (GI) tract. During heavy exercise, it is the skeletal muscles which produce the most excess circulating lactate, which normalizes in the absence of impaired hepatic metabolism. In general, elevated lactate can be the result of increased production, decreased clearance, or both[2]. In 1976, Cohen and Woods presented a subdivision of lactic acidosis into type A and B[3], making type A represent overproduction of lactate due to tissue hypo perfusion like in sepsis or shock, or from tissue hypoxia. Type B lactic acidosis, on the other hand, is characterized by elevated lactate levels from other causes. An example is metformin induced lactic acidosis, which is not seldom seen in the ICU. The antidiabetic agent metformin may trigger lactic acidosis presumably by inhibiting gluconeogenesis and lowering both hepatic uptake and metabolism of lactate to glucose[4].

What caused severe lactic acidosis acidosis in our patient?

Regarding the information taken from the patient and its relatives we can suppose a few theories.

First, if we take in consideration that the patient took for its headache 1500 mg acetaminophen divided in hours! Paracetamol (acetaminophen) is one of the most commonly taken drugs in overdose in many areas of the world, and the most common cause of acute liver failure in both the UK and USA.

Paracetamol poisoning can result in lactic acidosis in two different scenarios:
Firstly, early in the course of poisoning and before the onset of hepatotoxicity in patients with massive ingestion; a lactic acidosis is usually associated with coma. Experimental evidence from studies in whole animals, perfused liver slices and cell cultures has shown that the toxic metabolite of paracetamol, N-acetyl-p-benzo-quinone imine, inhibits electron transfer in the mitochondrial respiratory chain and thus inhibits aerobic respiration. This occurs only at very high concentrations of paracetamol, and precedes cellular injury by several hours.

The second scenario in which lactic acidosis can occur is later in the course of acetaminophen poisoning as a consequence of established liver failure. In these patients lactate is elevated primarily because of reduced hepatic clearance, but in shocked patients there may also be a contribution of peripheral anaerobic respiration because of tissue hypoperfusion[5].

For high anion gap metabolic acidosis, less frequent cause is the temporary accumulation of the organic acid 5-oxoproline. 5- oxoproline is primarily metabolized to glutamate by the enzyme 5-oxoprolinase and is eliminated by the renal system.
5-oxoprolinemia is classically caused by lack of glutathione. Hereditary 5-oxoprolinemia is a result of autosomal recessive deficiencies caused by hereditary error in one of the enzymes involved in the gamma-glutamyl cycle, but these rare cases usually present in childhood with hemolytic anemia and neurological defects.
A diagnosis of 5-oxoprolinemia should be considered in any patient with unexplained metabolic acidosis and a history of therapeutic acetaminophen dosing, particularly those patients with coexisting conditions that may decrease the glutathione stores [6]. Our patient didn't took high doses of acetaminophen, didn't have any comorbidities.
Hepatic enzymes, INR, bilirubin were in normal value during the whole time in hospital. So, patient didn't develope any acute hepatic failure and was physically healthy man before this frightened episode for his life.

Secondly, *let, s suppose that is a mushroom poisoning* (he had eaten a mushroom pizza the night before). The most common consequence of mushroom poisoning is simply gastrointestinal upset. Most "poisonous" mushrooms contain gastrointestinal irritants that cause vomiting and diarrhea. Some of them like "Amanita phalloide" which contain amatoxin a thermoresistant poison.
Indestion of amatoxin can cause acute hepatic failure [7].
Some other mushroom possess Orellanine which causes kidney failure within 3 weeks after ingestion, monomethylhydrazine causes brain damage, seizures, gastrointestinal upset, and hemolysis etc. Isolated severe lactic acidosis is not seen in mushroom poisoning.

Thirdly, *and most importantly, maybe is oversensitivity of organism to low doses of metformin!* Metformin is nowadays the first-line drug of choice for the treatment of adults with type 2 diabetes [8].
This drug is the sixth most frequently prescribed in the USA (> 50 million prescriptions in 2009) and is taken by almost 1.5% of the Italian population [9,10].
Metformin has an absolute oral bioavailability of 50 to 60%, and gastrointestinal absorption is apparently complete within 6 hours. The distribution of metformin follows a two-compartment open model and the distribution volume is around 63-276 liters. Metformin is not metabolized in the body, and 90% of absorbed metformin is eliminated unchanged in the urine. Plasma protein binding is negligible, so the drug is dialyzable. Metformin is a safe drug when correctly used in properly selected patients.
The literature has reported numerous side effects of metformin, including gastrointestinal disturbances such as nausea, anorexia, vomiting, diarrhea, abdominal discomfort and the sensation of a metallic taste in the mouth. Impaired absorption of vitamin B12 and folic acid

[11], hemolytic anemia [12], acute hepatitis [13], and lactic acidosis are less frequent.
Lactic acidosis is a rare but serious side effect, with an estimated incidence of 0.03 per 1000 patient- years.
In particular, no cases of lactic acidosis (a relatively common side effect of other biguanide compounds) were reported in 347 trials with 70,490 patient-years of metformin use [14].
The term metformin-associated lactic acidosis (MALA) refers to any case of lactic acidosis that develops in a patient treated with metformin, with no further mechanistic insight.

What are the argument that our patient by mistake took metformin instead of Paracetamol?

a) Gastrointestinal symptoms (nausea, vomiting, abdominal pain).
b) Severe lactic acidosis in one patient that one day before was a healthy person (no sepsis and not low cardiac output).
c) Rapid inset of lactic acidosis 6 hours later after ingestion of tablets.
d) Rapid improvement of blood gas after initiation of hemofiltration (metformin is dialyzable drug).
e) Metformin possession in the house 500 mg (like paracetamol) because his mother suffered from diabetes type 2.

Arguments against MALA:

a) The patient denied metformin ingestion.
b) Low dose of metformin (in literature there are a cases with MALA with high doses of metformin).
c) Measuring metformin level in blood was not possible in hospital.

Conclusion

In unexplained severe lactic acidosis type B should be strongly suspected metformin overdosing. Bicarbonate, rapid hydration and early hemodialysis or continuous renal replacement therapy should be urgently arranged for patients with MALA.

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Case Report

Surgical Treatment of Rectal Prolaps in 83 Year Old Patient. A Case Report.

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Abstract

Background: Prolapse of the rectum is an uncommon problem. It is defined as a protrusion of the rectum through the anus and can cause disability. There is no concensus in literature which surgical approach is the most appropriate. The aim of our case report is to share our experiance and results of the Altemeier procedure.
Case report: 83 years old female patient was admited to the department for general and abdominal surgery. She was diagnosed with rectal prolapse, which could not be reponated. She felt pain and was incontinent.
Results: We decided that optimal treatment for the patient was operation. Altemeier approach was performed. In our opinion, we achieved a favorable outcome.
Conclusion: As stated above there is no clear concensus on which treatment is the most appropriate for rectal prolaps. In our case after careful consideration, we decided that the Altemeier approach was the best solution for the patient.
Keywords: rectal prolapse, Altemeier approach, surgical treatment.

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Full Text

Introduction

Rectal prolapse is protrusion of the rectum through the anus (1). Three different clinical entities are often combined under the umbrella term rectal prolapse: Full-thickness rectal prolapse, mucosal prolapse, internal prolapse (internal intussusception) (2).

The incidence of rectal prolapse has been estimated to be approximately 2.5 per 100,000 inhabitants with a clear predominance among elderly women (3). Female/male ratio is around 10/1 (4).

The etiology is multifactorial and includes weakness of the pelvic floor, chronic constipation, multiple pregnancies, previous pelvic surgery and a deep pouch of Douglas (5)

Full-thickness prolapse of the rectum causes significant discomfort because of the sensation of the prolapse itself, the mucus that it secretes, and because it tends to stretch the anal sphincters and cause incontinence.(6)

Rectal prolapse is a disease, which is an important cause of social and functional problems and has a continuing debate about the ideal surgical treatment (7). The aim of treatment is to control the prolapse, restore continence, and prevent constipation or impaired evacuation (8).

There are different studies suggesting different kinds of treatment. In our case report, we will cite only some of them.

In the article from Eung Jin Shini, it is said that: In elderly and high-risk patients, perineal approaches, such as Delorme's operation and Altemeier's operation, have been preferred, although the incidence of recurrence and the rate of persistent incontinence seem to be high when compared with transabdominal procedures. From the late twentieth century, the laparoscopic procedure has been applied to the treatment of rectal prolapse.(8)

From monitoring the trends in surgical management and outcomes from the American College of Surgeons National Surgical Quality Improvement Program database Authors reported that: Open rectopexy, laparoscopic rectopexy and perineal rectosigmoidectomy. All 3 surgical approaches carry low morbidity among the sick and elderly. In the USA Perineal rectosigmoidectomy remains the predominant approach. (9)

One study which reviewed articles on PUBMED reported that: Perineal procedures are preferable for patients who are not fit for abdominal procedures, such as elderly frail patients with significant comorbidities. The decision between perineal rectosigmoidectomy and Delorme procedures will depend on the surgeon's preference, although the perineal rectosigmoidectomy has better outcomes (10)

And study which was published in 2019 and included 43 female patients which were operated on with Altemeier's procedure reported that: the patients had low complications rate and no mortality. The procedure improved evacuation in constipated patients while it didn't improve fecal and urinary continence. Recurrence of prolapse was 40% at four years. (5)

Case report

The 83 year old female patietn was hospitalized for rectal prolapse.

Patient mentions she feels pain in the area of the anus and also reports she has troubles with controling defecation but reports no urinary or gynecological problems. We performed rectal examination: there was a prolapse of the rectum during palpation the patient complained she felt pain, consequently we did not perform a digito rectal examination.

We explained the diagnosis, which was rectal prolaps, the possibility of optimal

treatment with regard to her condition which is transanal excision, and the possibility that in the event that the state of the disease we will detect during operation will require an additional operation. We explained to her the most common complications and the possibility of unintended complications, which is a rare occurance.

Also, the patient was acquainted with possible additional treatments (abdominal cavity, chest cavity puncture, central channel settings ...), which will be performed in the event her condition will require it. In this regard, she also received basic explanations regarding possible complications (bleeding, unwanted punction of the target organ, pneumatic or chemototoraks.

After that, the patient was admitted to our department for surgical treatment of rectal prolapse, which could not be manually reponated.

After appropriate preoperative preparation, the pation was put in gynecological position, we first performed anemization of the mucous membrane throughout the entire circumference of the prolapse, then we made an incision throughout the entire circumference until we reached mesorectum or mesocolon. In this region, we prepared and ligated vessels with solitary sotures until we reached intestinal circumference. At this level, we performed the excision of the rectosigm at about 8 to 12 cm, after that we created coloanal anastomosis with solitary sotures. The anastomosis was transient. After tha, we concentrated on and achieved hemostasis. In the intestinal lumen, we set spongostan (photo 1-7).

The operation was carried out without major complications.



***Photo 1**: Prolapse of the rectum at the beginning of the operation*

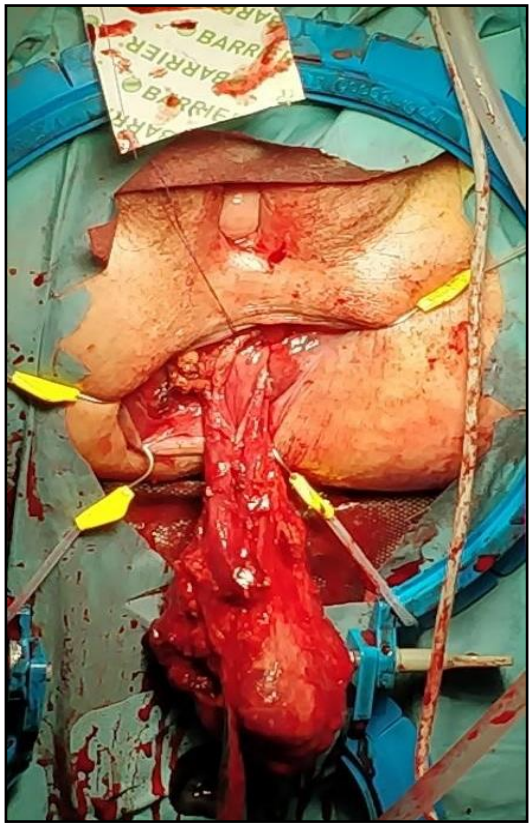


Photo 2

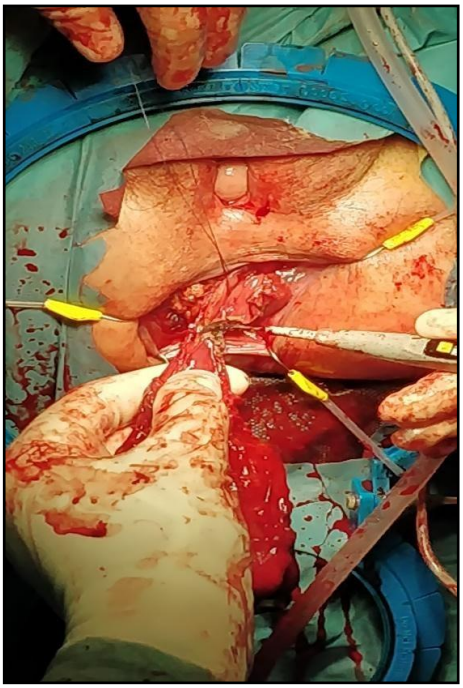


Photo 3



Photo 4



Photo 5: *End of surgery*

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