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War Surgical Care – Experience from Franciscan Hospital »dr. fra Mato Nikolić« in Nova Bila during Conflict in Central Bosnia (1993–1994)

Željko Martinović[1], Velimir Valjan[1], Ante Kvesić[2], Branko Krišto[2], Šime Vučkov[2] and Branko Bakula[2]

[1] Croatian Hospital »dr. fra Mato Nikolić«, Nova Bila, Bosnia and Herzegovina
[2] University Hospital »Mostar«, Mostar, Bosnia and Herzegovina

A B S T R A C T

This report presents experience in treatment of war injuries in Franciscan hospital »dr. fra Mato Nikolić« in Nova Bila, during the war in Central Bosnia from 1993 to 1994, in conditions of encirclement and typhoid fever outbreak. Descriptive-retrospective analysis of organization, implementation and outcomes of surgical care for patients treated from January 1, 1993 till August 20, 1994. In this period, the hospital took care of 2500 wounded persons, 2286 (91.4%) of them male and 214 (8.6%) female, their the average age being 31.5 ± 12.8. There were 1412 gunshot injuries (56.5%), 1022 explosive injuries (40.9%), and 66 blunt injuries (2.6%). There were 1250 injuries to extremities (50.0%), 349 injuries to head and neck (14%), 233 chest injuries (9.3%) and 193 injuries to abdomen (7.7%). There were also 475 multiple injuries (19%). Surgical operations were performed in 1498 patients (60%), with surgical mortality rate of 4.5%. Total hospital mortality rate was 11.4 percent (n=286). Despite extremely difficult conditions of work and lack of doctors, we achieved a low hospital mortality rate. The hospital continued to work after the war. Today, it is a modern health institution in Lašva Valley, Central Bosnia.

Key words: *Bosnia and Herzegovina, war injuries, surgical care, mortality*

Introduction

The war in Bosnia and Herzegovina started in April 1992, causing a complete collapse of healthcare system, especially in small towns and rural areas[1]. This had severe consequences: health institutions had minimum or no medical materials, stock and doctors. In 1992, there were attempts to establish a basic healthcare system in Central Bosnia[1]. The first conflicts in this area started at the same time leading to humanitarian crisis and complete collapse of the health system. As an answer to growing health and humanitarian needs resulting from conflicts, a group of doctors and Franciscans organized an improvised hospital to take care of both military and civil casualties of war in this surrounded Croatian enclave[2]. Due to lack of adequate hospital space in the area, they used the local Catholic Church »Sveti Duh« in Nova Bila, a small town in Lašva Valley, half way between Vitez and Travnik[2]. On December 15, 1992, in war conditions, the Franciscans and doctors decided to set up Franciscan hospital »dr. fra Mato Nikolić«. It was named after the first medical doctor Franciscan from Bosnia fra Mato Nikolić (1776–1844), who graduated medicine in 1807 in Feldsberg in Austria and was granted a medical license by Pope Pio VII. In 1993, only six months after the opening, the conflicts intensified leading to complete encirclement and this hospital became the only humanitarian and medical refuge for 80000 people in the area of Croatian enclave Novi Travnik – Nova Bila – Vitez – Busovača.[1] The hospital had to function autonomously, with available staff, technology and premises. The existing conditions determined the scope and level of medical treatment and due to the total isolation of the enclave, even the complex medical procedures had to be performed at the hospital.

Experience from previous wars in the region significantly influenced our approach, in terms of organization and profession, resulting in reduced invalidity and mortality rates[3]. Our experience indicated necessary points

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of careful preparation of the war medical corps, as well as the material and technical preparation and the adaptation of techniques of taking care for the ill and wounded. In particular, we point to the importance of reducing the time elapsed from the point when the injury is sustained to the point of surgical treatment, taking into consideration the specific war conditions in the enclave, possible urgent evacuation of the wounded and rendering of first surgical aid on site. It is our belief that this approach, as well as the procedures, reduced mortality in our hospital. The essence of this system was to station medical staff and equipment at various positions from the front lines to the improvised war hospital »dr. fra. Mato Nikolić« in Nova Bila[4], enabling the swift evacuation of the wounded. During the conflict, 14500 patients were admitted, and 700 babies delivered, in highly unfavorable conditions of military encirclement and a typhoid fever epidemic[5,6]. In this period, the Croatian enclave was completely isolated and directed itself in terms of medical treatment of the ill and wounded. Expecting that our experience may contribute to good medical care in similar war conditions that may happen in other countries, we present the results of our surgical care under such isolated and extreme conditions.

Patients and Methods

The franciscan hospital in Nova Bila is an example of an improvised war hospital, located only 1,200 m from the front-line. Surgical and other care was provided in unheated premises, with periodical electricity supplied by a diesel generator. A primitive device was used for water distillation and surgical instruments were sterilized in an autoclave heated by firewood. A Red Cross sign was displayed on the church roof. The only operating room was situated in the church cellar and the space in front of it was used for the preparation of patients and surgeons, as well as sterilization, treatment and storing of blood cans and blood derivatives. The laboratory, an obsolete x-ray machine, the reception room with an ambulatory operations room as well as three patient rooms (one of them being the intensive care unit) were situated in another church wing. The laboratory had a school microscope, a colorimeter, a microcentrifuge for urine sediments and hematocrit tests, in addition to a small analysis container. The hospital had 130 beds, including church pews in the mass room. The medical staff consisted of three general surgeons, three general practitioners, thirty nurses and technicians and thirty-five attendants.

From January 1, 1993 till August 20, 1994, the hospital took care of 2535 wounded persons. This retrospective study encompasses 2500 cases with preserved documents. The data are taken from preserved files, reception books, temperature charts, histories of illness, operation protocols and anesthesiologists' charts. The data are classified in four groups: demographic data, character of injury, clinical data and data on the results of treatment. An anatomical scoring system, ISS (The Injury Severity Score)[7,8] was used for the evaluation of the severity of injury. It is determined through the calculation of AIS (The Abbreviated Injury Scale) [9,10] scores for each injury. Scores for the three dominant injuries are squared and added together to produce the injury severity score.

Due to the immediate vicinity of the battlefield, the difficult conditions of evacuation and first aid provision, the injured often arrived at the hospital after inadequate first aid had been administered. Only 30% of the wounded had received the first bandage. In cases of craniocerebral injuries, only 10% of the injured had their breathing path unblocked, i.e. only those who were attended to by medical staff. Unblocking of the vein path and the immobilization of injured limbs were also very rare. As a result, a great number of the wounded arrived at the hospital in a severe shock condition. The evacuation was spontaneous, slow and inadequate, patients were transported by private vehicles, on improvised stretchers. A sanitary vehicle transported only around 10% of the wounded.

A triage procedure was performed at the hospital, according to the emergency and the gravity of the injuries. The severely wounded underwent unblocking of vein paths, got an intravesical catheter and were sent directly to the operation room. Every patient was administered an anti-tetanus serum and human anti-tetanus immunoglobulin, dosed from 250 to 500 IJ. All the patients were given antibiotics according to war schemes[4]. They were prescribed morphine (10–20mg i.v.) or petidine (50–100 mg i.v.) as analgesics. The choice of anesthetics depended on the severity and localization of injury (local or block anesthesia, general intravenous anesthesia or endotracheal anesthesia).

The total mortality data include pre-hospital mortality (death before the arrival and immediately upon reception at hospital), hospital and surgical mortality, all classified according to anatomic localization and type of injury. All the data was inserted into a database program (Access 2000, Microsoft) and processed statistically.

The research encompasses 2500 patients taken into the hospital between January 1, 1993 and August 20, 1994. 91.4% of them were men and 8.6% women. The average age was 31.5 ± 12.8 years (from 1 to 93). Table 1 shows distribution of patients according to age and type of injury. More than a half (1548, 61.9%) of the wounded were between 15 and 34 years old. Predominating injuries were gunshot, caused by high initial speed projectiles from firearms (AK/47, AK/74, canon projectiles etc.).

Table 2 presents the distribution of patients according to anatomic localization and type of injury. It shows that explosive injuries to the head and neck were more frequent than gunshot injuries (7.8% vs. 5.2%), which is a significant statistical difference (χ^2, $p<0.01$).

Injuries to several anatomic regions were far more frequently caused by explosives than gunshot. Patients with gunshot injuries had a higher frequency of penetrating injuries (39.3% vs. 24.4%; χ^2, $p<0.01$) and fractures (8.1% vs. 3.5%, χ^2, $p<0.01$). These injuries were also more severe than explosive injuries (Table 3).

There were 2500 wounded, of which surgical treatment was applied to 1498 (59.9%) of them. Table 4 shows the distribution of patients according to method of treatment and the anatomic localization of the injury.

Surgical interventions were mostly performed on soft tissues (47.3%) (debridement, secondary closure of wounds sing different techniques) and bone system (16.4%) (Table 5).

Results

This report encompasses medical data on 2500 patients with war injuries that were treated in Franciscan hospital in Nova Bila, from January 1, 1993 till August 20, 1994. The total of pre-hospital and hospital mortality are analyzed. The total hospital mortality was 11.4%

TABLE 1
DISTRIBUTION OF PATIENTS ACCORDING TO AGE AND TYPE OF INJURY

	N (%) of patients with injury			
Age group (age)	Gunshot	Explozive	Blunt	Total
0–14	41 (2.9)	53 (5.2)	1 (1.5)	95 (3.8)
15–24	436 (30.9)	283 (27.7)	20 (30.3)	739 (29.6)
25–34	484 (34.3)	345 (33.7)	21 (31.8)	850 (34.0)
35–44	225 (15.9)	184 (18.0)	19 (28.8)	428 (17.1)
45–54	118 (8.3)	85 (8.3)	3 (4.5)	206 (8.2)
55–64	79 (5.6)	46 (4.5)	2 (3.0)	127 (5.1)
65–74	20 (1.4)	17 (1.7)	0 (0.0)	37 (1.5)
>75	3 (0.2)	5 (0.5)	0 (0.0)	8 (0.3)
Unknown	6 (0.4)	4 (0.4)	0 (0.0)	10 (0.4)
Total	1412 (56.5)	1022 (40.9)	66 (2.6)	2500 (100)

TABLE 2
DISTRIBUTION OF PATIENTS TO ANATOMIC LOCALIZATION AND TYPE OF INJURY

	N (%) of patients with injury			
Anatomic localisation		Gunshot	Explozive	Blunt
Head/neck	349 (14.0)	129 (5.2)	195 (7.8)	25 (1.0)
Chest	232 (9.3)	172 (6.9)	57 (2.3)	3 (0.1)
Abdomen	194 (7.8)	151 (6.0)	40 (1.6)	3 (0.1)
Limbs	1250 (50.0)	814 (32.6)	414 (16.6)	22 (0.9)
Multiple	475 (19.0)	146 (5.8)	316 (12.6)	13 (0.5)
Total	2500 (100)	1412 (56.5)	1023 (40.9)	66 (2.6)

TABLE 3
DISTRIBUTION OF INJURY SEVERITY SCORE ACCORDING TO ANATOMIC LOCALISATION AND TYPE OF INJURY

	Injury Severity Score (n,%)				
Anatomic localisation	1–9	10–15	16–24	25–75	Total
Head/neck	223 (8.9)	4 (0.2)	17 (0.7)	105 (4.2)	349 (14.0)
Chest	140 (5.6)	0 (0.0)	35 (1.4)	57 (2.3)	232 (9.2)
Abdomen	98 (3.9)	3 (0.1)	40 (1.6)	53 (2.1)	194 (7.8)
Limbs	1183 (47.3)	5 (0.2)	46 (1.8)	16 (0.6)	1250 (50.0)
Multiple	212 (8.5)	89 (3.6)	66 (2.7)	108 (4.3)	475 (19.0)
Type of injury					
Gunshot	1045 (41.8)	31 (1.2)	123 (4.9)	213 (8.5)	1412 (56.5)
Explosive	752 (30.1)	67 (2.7)	77 (3.1)	126 (5.0)	1022 (40.9)
Blunt	59 (2.3)	3 (0.1)	4 (0.2)	0 (0.0)	66 (2.6)
Total	1856 (74.2)	101 (4.0)	204 (8.2)	339 (13.5)	2500 (100)

TABLE 4
COMPARATIVE PRESENTATION OF METHOD OF TREATMENT AND THE ANATOMIC LOCALISATION OF THE INJURY

	Method of treatment (n,%)		
Anatomic localisation	Surgical	Conventional	Total
Head/neck	130 (5.2)	219 (8.8)	349 (13.9)
Chest	78 (3.1)	154 (6.2)	232 (9.2)
Abdomen	166 (6.6)	28 (1.1)	194 (7.7)
Limbs	812 (32.5)	438 (17.5)	1250 (50.0)
Multiple	312 (12.5)	163 (6.5)	475 (19.0)
Total	1498 (59.9)	1002 (40.1)	2500 (100)

TABLE 5
SURGICAL OPERATIONS

Surgical procedure	Number (%) of patients
Craniotomy	40 (2.7)
Thoracotomy	21 (1.4)
Laparotomy	161(10.7)
Amputation	61 (4.1)
Fracture fixation	245 (16.4)
Angiosurgical operation	58 (3.9)
Operations on soft tissues	709 (47.3)
Combination of two or more procedures	203 (13.5)
Total	1498 (100)

(286). From this number, 74.5% is the mortality of patients from 15 to 44 years of age. The total mortality of children under 14 was 6.3%. The comparative presentation of hospital mortality and anatomic localization of injuries is given in Table 6.

Mortality in patients with head and neck injuries was 4.6 times higher than mortality of patients without such injuries (OR=4.6 95%, CI=3.5–6.1; $p<0.05$). Mortality in patients with head and neck, with chest and abdomen injuries was 5.5 times higher than mortality in patients with etremity injuries (23.1% vs. 5.6%; OR=5.5, 95%, CI=4.2–7.2).

Bullet injuries caused 1.2 times higher mortality rate in comparison to explosive injuries (12.3% vs. 10.9%; OR=1.2, 95%, CI=0.9–7.2) (Table 7).

Mortality was 7.5% in surgically treated patients and 7.3% in patients who did not have operations ($\chi^2=0.02$, $p>0.01$). Surgical mortality structure, according to anatomic localization of injuries, is given in Table 8.

Surgical mortality in patients with head and neck injuries was significantly higher than surgical combined mortality of patients with chest and abdomen injuries ($\chi^2=8.21$, $p<0.1$), and surgical mortality of patients with

TABLE 6
DISTRIBUTION OF MORTALITY ACCORDING TO ANATOMIC LOCALISATION ON INJURY

Anatomic localisation	Number (%) of patients	Pre-hospital mortality (n,%)	Hospital mortality (n,%)	Total (n,%)
Head/neck	349 (14.0)	36 (10.3)	68 (19.5)	104 (29.8)
Chest	232 (9.2)	31 (13.4)	22 (9.5)	53 (22.9)
Abdomen	194 (7.8)	12 (6.2)	21 (10.8)	33 (17.0)
Limbs	1250 (50.0)	3 (0.2)	15 (1.2)	18 (1.4)
Multiple	475 (19.8)	26 (5.5)	52 (10.9)	78 (16.4)
Total	2500 (100)	108 (4.3)	178 (7.1)	286 (11.4)

TABLE 7
DISTRIBUTION OF MORTALITY ACCORDING TYPE OF INJURY

Type of injury	Number (%) of patients	Pre-hospital mortality (n,%)	Hospital mortality (n,%)	Total (n,%)
Gunshot	1412 (56.5)	77 (5.4)	97 (6.9)	174 (12.3)
Explosive	1022 (40.9)	31 (3.0)	81 (7.9)	112 (10.9)
Blunt	66 (2.6)	/	/	/
Total	2500 (100)	108 (4.3)	178 (7.1)	286 (11.4)

TABLE 8
DISTRIBUTION OF SURGICAL MORTALITY ACCORDING ANATOMIC LOCALISATION OF INJURY

Anatomic localisation	Number (%) of patients	Operated patients (n,%)	Surgical mortality (n,%)
Head/neck	349 (14.0)	130 (37.5)	33 (25.2)
Chest	232 (9.2)	78 (33.6)	13 (16.6)
Abdomen	194 (7.8)	166 (85.5)	18 (10.8)
Limbs	1250 (50.0)	812 (64.8)	15 (1.8)
Multiple	475 (19.0)	312 (65.6)	34 (10.8)
Total	2500 (100)	1498 (59.9)	113 (7.5)

TABLE 9
DISTRIBUTION OF HOSPITAL MORTALITY ACCORDING TO INJURY SEVERITY SCORE

ISS group*	Number (%) of patients	Hospital mortality (n,%)	Operated patients (n,%)	Surgical mortality (n,%)
1–9	1856 (74.2)	12 (6.7)	1095 (73.1)	10 (0.9)
10–15	101 (4.0)	1 (0.6)	71 (4.7)	1 (1.4)
16–24	204 (8.1)	19 (10.7)	165 (11.0)	7 (10.3)
25–49	222 (8.8)	136 (76.4)	163 (10.8)	81 (46.6)
50–75	117 (4.7)	10 (5.6)	4 (0.2)	4 (100)
Total	2500 (100)	178 (100)	1498 (59.9)	113 (7.5)

*Injury Severity Score

multiple injuries (χ^2=13.91, p<0.1). The distribution of surgical mortality according to severity of injury (ISS) is given in Table 9.

There was no evident statistical difference between surgical mortality in patients with minor (ISS=1–9) and moderate injuries (ISS=10–15). In patients with injury severity score higher than 16, there was a significant difference in surgical mortality (ISS=25–49 vs. ISS=16–24, χ^2=58.86, p<0.01).

Discussion

Hospital mortality (mortality during surgical treatment) in Nova Bila is significantly higher than hospital mortality registered in other battlefields[11–13]. However, taking into consideration all the elements of treating war injuries in Croatian enclave Novi Travnik – Nova Bila – Vitez – Busovača and the conditions that the hospital was operating in, mortality could have been a lot higher. This report focuses on patients with injuries of war sustained during Central Bosnia conflict, from January 1, 1993 till August 20, 1994.

It presents experience from a field war hospital that was working in conditions of complete encirclement, a typhoid fever outbreak and the suspension of all medical and humanitarian aid. It was a fight for survival and international humanitarian organizations and institutions were the only available source of aid to the population of the enclave and to the health services. In 1992, many medical workers abandoned their hospitals and the remaining staff did not have sufficient experience in the repression of various infectious diseases or treating of war penetrating injuries and multi-organ injuries caused by high-initial speed projectiles. Six doctors were there to take care of around 130 inpatients, plus around ten new patients every day, in extreme war conditions[14]. The injured were transported on stretchers from nearby front lines to the operation room, to the intensive care unit, without any cardial and pulmonal support equipment. The transport of gravely wounded patients to other hospitals (mainly to Clinical Hospital Split in Croatia) happened sporadically and was only possible with assistance of the UN forces[15].

The long isolation, resulting in poor life conditions, led to an outbreak of typhoid fever, which has been an endemic disease in this area since the World War II. The epidemic was caused by contaminated drinking water in the spring of 1994, and the repression and eradication of this disease required additional efforts. In this period, 22 patients with typhoid fever were hospitalized, and it was an additional challenge in terms of both hygiene and drinking water supply[6].

The results of this study show the representation of war injuries and mortality in patients of all ages, including children and eldery. According to the data from studies taken from other war areas, more than half of the injured were between 15 and 30 years old, while around 74% of them belong to the age group from 15 to 4416. This study also confirms such results. The majority of patients had gunshot injuries caused by powerful penetrating projectiles, and it is also one of the significant characteristics of Central Bosnian conflict. The ballistics of these wounds showed the projectiles deeply penetrating tissues and consequentially severely damaging or de-

stroying these tissues, which is one of the causes for the high mortality rate. The distribution of types of injuries in Nova Bila is similar to those of Lebanon[12] and Afghanistan[13]. Explosive injuries were diagnosed in 40.9% of patients in Nova Bila which is less than in Vietnam (47.9%)[17] and Croatia (51.2%)[18–20].

According to data from available literature, 70% of all war injuries are sceletomuscular. Such injuries generally cause a low mortality rate as isolated injuries, but they cause significant morbidity[15]. The main medical problems in treating such wounds were shock and sepsis, although the importance of these two in modern surgery has significantly changed. Today, there are practically no indications for amputation due to infection. The introduction of the vascular structure reconstruction approach in war injury treatment has led to a drastic decrease in the amputation rate from 36% in the World War II to only 1%–2% in the Vietnam War[21]. The most frequent angiosurgical procedure used in Nova Bila was a blood vessel suture in the lateral laceration of arteries. Successful blood vessel reconstruction was performed in 5 (8.6%) patients (Table 5).

The frequency of head and neck injuries in Nova Bila is similar to those recorded in Lebanon (15.4%)[12] and Afghanistan (11.8%)[13]. One of the significant characteristics of the Nova Bila conflict is the high frequency of gunshot injuries to the head caused by high penetrating power projectiles. The frequency of such injuries in Nova Bila is twice as high as the frequency of such injuries in Vietnam (15.7%)[17], Lebanon (15.4%)[12] and Croatia (25.6%)[18], and three times higher than in Afghanistan (11.8%)[13]. One of the reasons for this is lack of military helmets, which reduce the frequency of penetrating craniocerebral injuries, even though they do not protect complete face and neck. Severe head injuries (ISS>16, AIS>3) were diagnosed in 35% of patients.

The frequency of injuries to chest is similar to those recorded in Vietnam, Afghanistan, Chechnya and Somalia[16]. According to literature, around 15% of all war injuries are chest injuries. Some 10% of these injuries are superficial and 90% penetrating. Two thirds of all penetrating injuries to chest are injuries to the heart, major blood vessels or the lung hilus, and one third are injuries to lungs [16,19,22,23]. Quick recognition of injuries causing shock and hypoxia (tension pneumothorax, hematothorax and pericardial tamponade) and immediate treatment of these save lives. The frequency of chest injuries in Nova Bila was 9.3% and they were often combined with abdomen injuries. Severe injuries were diagnosed in 40% of patients.

Data on the frequency of war injuries to the abdomen range from 8% to 20% of all war injuries[16]. Rignault[25] claims that actually 20% of all the people injured in battlefield sustain an abdomen injury, and that approximately one half of these die. The leading causes of death are: bleeding (60%), sepsis (25%) and lung insufficiency (15%)[25]. The frequency of abdomen injuries in Nova Bila was 7.8%, and two thirds of them were penetrating. A total of 42.3% of patients had severe injuries (ISS>16). None of the patients with critical injuries (ISS>50) made it to the hospital.

Multiple injuries to several anatomic regions were diagnosed in 475 (19%) patients. Data from available literature show that their frequency is around 18%, and that it varies depending on the type of military conflict[16]. Around 80% of mortality with these injuries is caused by hemorrhage, since it is often very hard and sometimes even impossible to control bleeding in some tactical conditions. In terms of treatment, 186 (60%) patients with multiple injuries needed a combination of two or more surgical operations. This required additional efforts considering the circumstances, lack of surgical specialists and necessary surgical equipment.

The traditional approach to treatment of war injuries supports surgical exploration with definitive reparation of all diagnosed injuries. This approach is successful when there is a limited number of patients. With multiple extensive injuries, this approach has a high mortality rate. Surgical intervention focused on controlling of bleeding and contamination, with delayed final reparation of all injuries, increases the survival rate. Both approaches were used in Nova Bila hospital, depending on the tactic conditions on the front-line. Conservative treatment was most frequently applied in patients with head, chest and multiple injuries. The treatment of such injuries requires specialist staff, who were not available at the time, and it was impossible to evacuate patients to other hospitals. Surgical intervention was performed on one third (31.6%) of patients in Nova Bila. Patients with head injuries were treated surgically, using less aggressive intracranial debridement[26–27]. A total of 40 patients were craniotomised, with high surgical mortality rate. One of the reasons for this is the high frequency of craniocerebral injuries caused by penetrating high power projectiles.

The same issues arise from the treatment of penetrating injuries to the chest. Experience from the wars in Vietnam[17], Lebanon[12] and Cambodia[28] emphasize the importance of an early thoracotomy, which gives good results with injuries to the heart, big blood vessels and the upper respiratory tract as isolated injuries. Urgent thoracotomy was performed in 71% of patients (73% of which survived) in Lebanon, 13% in Afghanistan and 15% in Croatia[28–29]. In Nova Bila urgent, thoracotomy with or without frenotomy was performed on 5.6% of patients. The pre-hospital mortality rate in Nova Bila was 4.3%. In Central Bosnia, the injured patients usually died on the battlefields or during the long and inadequate transport. The patients were mostly evacuated by private vehicles or carried to hospital, and only the comparatively stable ones could survive to undergo a surgery.

The hospital mortality in Nova Bila was higher than the mortality recorded on other battlefields. There is a noticeably high mortality with head and neck injuries, multiple injuries and extremity injuries (Table 6). Hospital mortality with chest and abdomen injuries is similar to those in Lebanon and Afghanistan[12–13]. More than 90% of the wounded sustained severe to critical injuries (ISS>16), which testifies to extensiveness and gravity of

the injuries. High mortality rate in injuries to the limbs indicates insufficient pre-hospital care and slow evacuation. War experience from the 20th century emphasises the importance of fast evacuation to the point where surgical care can be provided and establishing mobile surgical teams for the purpose of reducing the period of time elapsing from the point where the injury is sustained to the point of surgical treatment. This approach requires a high level of organization, good material and technical equipment and air transport (Vietnam)[17]. On the other hand, the long and slow evacuation in Afghanistan[13] could only be survived by those who were relatively stable, which influenced the recorded low rate of hospital mortality of 2.5%. The concept of mobile surgical teams, technology, as well as »life saving« and »limb saving« operations on site additionally influenced the decrease in hospital mortality (under 1% in Croatia)[30].

Fast transport of the injured, with adequate pre-hospital care, increases the survival rate in the first hour after the injury.

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Š. Vučkov

Brdo 10, 51000 Rijeka, Croatia
e-mail: drvuckov@gmail.com

RATNA KIRURŠKA SKRB – ISKUSTVA FRANJEVAČKE BOLNICE »DR. FRA MATO NIKOLIĆ« U NOVOJ BILI TIJEKOM SUKOBA U SREDIŠNJOJ BOSNI (1993.–1994.)

SAŽETAK

U radu su prezentirana iskustva u liječenju ratnih ozljeda u Franjevačkoj bolnici »dr. fra Mato Nikolić« u Novoj Bili tijekom rata u Centralnoj Bosni od 1993. do 1994. godine u uvjetima okruženja i epidemije trbušnog tifusa. Deskriptivno retrospektivna analiza ustroja, provedbe i ishoda kirurške skrbi ranjenika liječenih u periodu od 1. siječnja 1993. do 20. kolovoza 1994. godine. U navedenom periodu, u bolnici je zbrinuto 2500 ranjenika, 91,4% muškog i 8,6% ženskog spola, prosječne starosne dobi 31,5 ± 12,8 godina. Dominantne su strijelne ozljede 56,5% (n=1412), 40,9% (n=1022) su eksplozivne, a 2,6% tupe ozljede. Najčešće su ozljede ekstremiteta 50,0%, zatim glave i vrata 14%, prsnog koša 9,3%, trbuha 7,7% i 19% multiple ozljede. Operativno je liječeno 60% ranjenika uz stopu kirurškog mrtaliteta od 7,5%. Ukupna stopa hospitalnog mortaliteta je bila 7,4% (n=178). Unatoč iznimno teškim uvjetima rada i nedostatka liječničkog kadra, postignuta je niska stopa hospitalnog mortaliteta. Bolnica je nastavila s radom i u mirnodobskim uvjetima. Danas je to moderna bolnica u Lašvanskoj dolini Centralne Bosne.