War Injuries in Civilians Treated in Požega Hospital, Croatia

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SUMMARY: The management of 131 civilians with war injuries, treated at the Department of Surgery, Požega County Hospital, during the 1991-1995 period is presented. The majority of 55 (42%) of patients were injured at the front line. There were 75 (57.3%) of patients with explosive injuries 67 (51.2%) involved the extremities, while 29 (22.1%) involved the head. Seven (5.3%) patients died. Amputation of part of an extremity was required in five (3.8%) patients.

Introduction

The 1991-5 war in Croatia was characterized by artillery attacks on residential areas (1-4) which included medical institutions (5-7). This resulted in a high proportion of explosive injuries to civilians as well as soldiers (8).

Although Požega was not the target of a direct assault many civilians were injured (9). The town therefore offered a good model for the study of war-related injuries in civilians, not caused by direct combat activities. Our study focused on the circumstances of wound infliction, etiology of injuries, localization of injuries and results of treatment.

Patients and Methods

During the five years of war in Croatia (August 13, 1991 till January 1, 1996), 1,129 wounded were treated at the Požega County Hospital, 546 (48.4%) of them as inpatients and 583 (51.6%) as outpatients. Most 616 (54.6%) were soldiers and policemen, and the remainder were civilians 131 (11.6%), 11 (1%) enemy soldiers and 371 (32%) unknown. In the civilian group there were 86 men and 45 women, mean age 38.7 years (range 6-92 years). Most (N=108) were hospitalized, and only 23 were treated as outpatients. The mean duration of hospital treatment was 10.1 days (range 1-81 days). There were 16 (12.2%) children aged <15 years, one dying during the treatment.

Results

Most of the civilian injuries 55 (42%) resulted directly from hostile action. Twenty-nine (22.1%) resulted from accidents whilst handling weapons or explosive devices. In 25 (19%) cases, mainly outpatients, the circumstances of wounding were unknown (Table 1).

Table 1
Circumstances of war wounding in 131 civilians treated at Požega Hospital during the 1991-1995 war period.

Circumstances of wounding	N	%
In action	55	42.0
Accident	29	22.1
Traffic	1	0.8
Fight and row	12	9.2
Suicide	9	6.9
Unknown	25	19.0
Total	131	100.0

Table 2
Aetiology of war injuries in civilians treated at Požega Hospital during the 1991-1995 war period.

Type of injury	N	%
Gunshot	51	38.9
Explosive	75	57.3
Stroke, fall	4	3.0
Unknown	1	0.8
Total	131	100.0

With regard to aetiology, explosive wounds 75 (57.3%) prevailed, followed by gunshot 51 (38.9%) and other wounds (Table 2).

The most common sites of injury were the extremities (51.2%), head 29 (22.1%) and abdominal region (13.7%). Monotrauma was found in 39 (29.8%) polytrauma in ten (7.6%) civilians (Table 3).

Table 3
Localization of war injuries in civilians treated at Požega Hospital during the 1991-1995 war period.

Localization	N	%
Head, face, neck	29	22.1
Thorax	13	9.9
Abdominal and lumbar region	18	13.7
Extremities	67	51.2
Unknown	4	3.1
Polytrauma	10	7.6
Monotrauma	39	29.8
Multiple wounds	82	62.6

In the management of 127 soft tissue injuries, primary suture was done in 35 patients, the majority (N=82) being allowed to granulate (Table 4). Bone fractures were mostly treated by plaster casts (10) and external fixation. An external fixator conversion by a flat Müller plate with autologous spongioplasty was performed in only one patient. There was a low proportion of penetrating wounds to the thorax, abdomen, urogenital tract and head. The treatment of these is presented in Table 4.

Soft tissue infection was the most common complication (9.9%), followed by nerve damage (4.6%) and in five (3.8%) amputation of part of the extremities. (Four in

Table 4
Treatment of war injuries in civilians at Požega Hospital.

Type of war wound	Type of treatment	N	%
Soft tissues N=127	Primary suture	35	27.6
	Secondary suture	5	3.9
	Thiersch	5	3.9
	Granulation	82	64.6
Bone N=30	Primary osteosynthesis	1	3.3
	Secondary osteosynthesis	1	3.3
	External fixator	4	13.3
	Cast	10	33.3
Penetrating Thoracic N=5	Segmentectomy	2	
	Pulmonary suture	1	
	Cardiac suture	2	
Penetrating Abdominal N=7	Anus praeter	2	
	Suture	4	
	Hemicolectomy	1	
Urogenital N=2	Nephrectomy	1	
	Kidney suture	1	
Head N=7	Craniotomy	7	
	Hemostasis	7	

Table 5
Complications of war injuries in civilians treated at Požega Hospital (N=131)

Complication	N	%
Infection	13	9.9
Nerve damage	6	4.6
Blood arteries and heart	3	2.3
Amputation	5	3.8
fingers	2	
femur	1	
forearm	2	
Mortality	7	5.3

explosive injury and one in a gunshot wound). Seven (5.3%) patients died, one of them a 6-year-old child with cranial injury (Table 5).

Case Reports

Case 1

A 23-year-old woman was admitted to the hospital, immediately after having attempted suicide by shooting herself in the left chest with a smallbore gun. She was in shocked and pale with a blood pressure of 80/40 mm Hg, pulse 100/min, but conscious. A small, round entry wound was seen on her left chest, medial to the mamilla. The bullet was detected ultra sonographically and by radiology behind the left auricle. The wound localization indicated emergency left-sided thoracotomy. An abundance of liquid and clotted blood was found in the left thorax. Incision of the visible haemopericardium and removal of blood clots revealed a small wound to the right auricle which was bleeding. The wound was closed with finger pressure and

Table 6
War injuries in civilians according to total war traumatism in some Croatian towns.

Town (Ref. No.)	Total number of wounded	Civilians N (%)
Osijek (4)	4,545	1,669 (36.7)
Šibenik (1)	321	126 (39.3)
Dubrovnik (2)	1,039	232 (22.3)
Vinkovci (9)	1,186	437 (36.9)
Slavonski Brod (3)	7,043	1,398 (19.8)
Virovitica (10)	405	88 (21.7)
Požega (our data)	1,129	131 (11.6)

stitched using a haemostatic suture. The bullet was found, and the pericardium was closed by continuous suture. A drain from the left thorax was connected to a negative pressure device. When hemostasis had been achieved a stratified thoracic wall suture was performed. The patient was then administered antibiotics, analgesics, sedatives, caloric and electrolyte infusions, and antitetanous prophylaxis.

The postoperative course was uncomplicated. Beside initial therapy, the patient received only one unit of blood. Diagnostic procedures were performed the following day. The cardiologist detected a short systolic murmur in the mesocardium, and slightly elevated ST segment at some ECG leads, which he explained by tachycardia (130/min). Laboratory findings were normal. The patient was transferred to the Rebro Department of Surgery, Zagreb University Hospital Center, 20 hours after the wounding.

Case 2

A 16-year-old boy was transported by an ambulance and admitted, after wounding to the left chest with a hunting gun. The patient was conscious but pale, sweating with a blood pressure of 90/60 mm Hg and a pulse approximately 130/min. Breath sounds were hardly perceptible over the left hemithorax. In the region of the left nipple, some 20 tiny wounds surrounded with subcutaneous emphysema were observed. An emergency exploratory operation was instigated. During skin cleansing the patient went into cardiac arrest. He was immediately resuscitated, and a left-sided posterolateral thoracotomy performed. A large amount of blood, found on opening the pleura, was removed. Incision of the very tight pericardium revealed two punctiform lesions to the right ventricle, while a third lesion had caused disruption of the left coronary artery, the latter was stitched by a "U" suture at which point the patient suffered a further arrest and further attempts at resuscitation were unsuccessful and the patient was declared dead 30 minutes after admission.

Case 3

A 26-year-old man suffered a gunshot wound to his right thigh, during enemy action in a village near Požega (Fig 1). He was transferred to the hospital within the hour. Intralesional soft tissue debridement, removal of

Fig. 1. Multifragmental supracondylar fracture of the right femur

accessible foreign bodies and devitalized bone fragments, fascial incision for oedema, and haemostasis were performed under a general, endotracheal anaesthesia. The wound was not sutured and the fracture was stabilized with an external fixator (Fig 2). The wound healed in three weeks but because of the patient's poor self discipline secondary osteosynthesis (conversion) with a condylar angular plate was required four weeks after wounding. The patient was from Bosnia and he chose to return there to join the army. He presented for control examination 12 months after the wounding (Fig 3), when the graft was removed. The functional result was excellent.

Discussion

During the war in Croatia, the town of Požega was not directly attacked, but its surroundings were the scene of major war actions on three occasions (8), posing specific demands upon the Požega Hospital Department of Surgery.

The periods of action on the Požega front were from July 16, 1991 to April 22, 1992 with 582 wounded, in the neighbouring Bosanka Posavina April 23, 1992 to December 30, 1992 with 388 wounded, and the "peaceful" period 1993- 1995 with 159 war wounds. In addition the town of Požega was exposed to several air-raids in 1991,

Fig. 2. Fixatio externa with external fixator.

and shelling with cluster bomb in 1995.

Analysis of the wounded civilians (Tables 1-3) indicated three main features, i.e., aetiology (explosions), sites of injury (extremities and head) and circumstances of wounding (on the front), because residential areas at the frontline (villages in the Požega surroundings and towns in Bosanska Posavina) were the scene of war actions. These characteristics were also recorded as well as in other related analyses (1-4). Weapons had previously been unavailable to the Croats, until the onset of the war. This could account for the increased use of arms in various stress situations (7% of suicides, Table 1).

In Požega, the proportion of wounded civilians was not very high, because the town was not directly attacked (8) unlike other towns (1,4,9,10), where the civilian trauma ranged from 20% to 40% (Table 6). All these towns were attacked by heavy artillery, from air, water and ground which not surprisingly resulted in higher total number of casualties than in Požega (Table 6).

Although we followed the principles of war surgery (11), our shortcomings were evident, for example there were two secondary procedures involving the use of Thiersch's plastics, where there was an excess of granulation tissue. The study also revealed inappropriate keeping of medical records (19% of unrecorded cases).

Fig. 3. The fracture from Figures 1 and 2, twelve months after spongionasty and secondary osteosynthesis with condylar angular plate.

Table 1), which could by no means be justified by the delay in computerization (1993). There were no generalized infections (tetanus, gas gangrene, sepsis, osteitis), although local infections (9.9%) exceed the percentages reported elsewhere (4). Five penetrating thoracic injuries were all treated with thoracotomy (Table 4) asking the question as to whether all these procedures were really necessary.

The mortality rate was high (5.3%) compared to total mortality of the Požega military 28 (2.5%) and the figures of some other Croatian towns (1-4).

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