

THE EXPERIENCE OF THE CROATIAN ARMY BRIGADE 105 MEDICAL CORPS UNIT AS A MOBILE SURGICAL TEAM 1991-1992

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SUMMARY – The fierce and abrupt aggression on Croatia in 1991-1992, characterized by practically no border between the battlefield and the rear, communication breakdown, destroyed economy, and great psychological impact on both civilians and army units imposed the need of high-professional, independent mobile medical corps units qualified for providing highly differentiated health care immediately upon wound infliction, and for efficient evacuation and transportation of patients in extremely difficult conditions. The structure and work of the Medical Corps Unit working as a mobile surgical team of the Croatian Army Brigade 105 from Bjelovar, Croatia, from September 1, 1991 till October 1, 1992 is presented. With such a unit structure, the time of patient transfer to operative theater was considerably reduced, thus decreasing the overall patient morbidity and mortality, and minimizing the definitive grade of disability. During the study period, 242 operative procedures were performed in 228 patients, 222 of these in local anesthesia and 20 in general anesthesia. The overall Brigade 105 mortality was 2.16%.

Key words: *Mobile surgical team; Military medicine; War; Croatia*

Introduction

Medical Corps Unit of the Croatian Army Brigade 105 provided medical care for the wounded in action and civilians at the fields in west and east Slavonia and Posavina. In our practice, we relied on the Handbook of Emergency War Surgery (issued by the Croatian Army Medical Corps Headquarters, 1991) and experiences acquired during war actions around Grubišno Polje, Daruvar and Pakrac, when we were attached to the Croatian National Guard units¹⁻⁴. Using our previous experience in combination with reasonable planning and appropriate training of medical personnel, orderlies, and all Brigade 105 members in first aid and self-aid, we achieved enviable results that exceeded all expectations. Putting the role of disease prevention, health maintenance, urgent surgery and patient transportation from the front-

line on an equal footing, we managed to minimize the grade of disability, to reduce mortality, and to upgrade the Brigade 105 members' moral and combat readiness. The mode of providing medical care was greatly dictated by the current war actions, casualties, logistics, and transportation options available^{1,2,5-7}.

We performed medical corps restructuring that differed from the classic echelon structure because at the beginning of the war the corps and army units had been encircled by the enemy on several occasions, and had to provide all forms of medical care with patient evacuation being either completely impossible or associated with very difficult conditions. Therefore, medical corps were reinforced with a number of surgeons of various specialties, who had previously attended six practical and educative seminars in first aid, immediate care and emergency surgery for all medical corps members^{1,2,7}.

An admission-triage department and department of general medical aid, a surgical team qualified for performing emergency surgical procedures, an evacuation department with two vehicles with 6 beds each and driv-

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Table 1. Age and sex distribution of patients operated on at brigade aid post from September 1, 1991 to October 1, 1992

Male, n (%)	Female, n (%)	Total, n (%)	Age (yrs)
5 (2.3)	3 (1.3)	8 (3.6)	<18
114 (51.8)	4 (1.8)	118 (51.8)	18-30
74 (32.5)	1 (0.4)	75 (32.9)	31-40
16 (7.0)	2 (1.0)	18 (8.0)	41-50
5 (2.3)	1 (0.4)	6 (2.7)	51-60
2 (0.9)	1 (0.4)	3 (1.3)	61-70
Total 216	12	228	

ers, and an inpatient clinic with 8-12 beds were established. Thus structured medical corps unit was regularly accommodated in the most appropriate premises at 2- to 5-km distance from the frontline, providing due safety to the patients and personnel⁵⁻⁸. A mobile surgical team does not diminish the role of the second and third echelon providing specialist medical care but helps the patient be properly managed prior to transportation to distant institution for further treatment, thus improving the chances for recovery. In recent wars, especially in Iraq, emphasis has been put on the formation of mobile surgical teams, with due contribution of the Croatian military medicine⁹⁻¹².

Results

During the period from September 1, 1991 till October 1, 1992, the Brigade 105 mobile surgical team performed 242 operative procedures in 228 patients, 151 of these at Slavonia battlefield, and 91 at Posavina battlefield. Age and sex distribution of patients is presented in Table 1. There was a high predominance of male subjects aged 18-30 (n=114; 50%) and only 12 (5.3%) female patients. The number of wounded and type of surgically treated diseases shown in Table 2 revealed the patients with explosive wounds and gunshot wounds involving lower extremities to prevail (n=107; 46.9%). The types and number of surgical procedures are shown in Table 3. There were 242 operative procedures, including 103 (42.6%) primary wound care procedures. The number of procedures exceeded the number of patients because some patients required two or more procedures.

Discussion

In patients free from life-threatening injuries and in good general condition, the triage and first aid were fol-

lowed by primary treatment of the war wound according to the principles of war surgery^{1,2,13}, consisting of wound toilette with hydrogen peroxide, wide wound debridement with removal of foreign bodies, hemostasis, wound drainage and tamponade with a gauze pad soaked with povidone iodide. This type of tamponade was used in all gunshot and explosive wounds, without any case of war wound infection. Wounds were left open except those involving the face and head. Primary suture was placed to protect exposed bone, tendon or vascular bundles. Immobilization was done in all extremity lesions. In thorax lesions, thoracic drainage was used^{1,7,9,13}. The majority of operative procedures were performed in local anesthesia (lidocaine, Novocain, bupivacaine) in combination with intravenous analgesics and sedatives (Dolantin, diazepam). In 20 patients, the operation was performed in endotracheal anesthesia with the use of a mobile semi-open anesthesiology instrument^{14,15}. It should be noted that the procedures in general anesthesia were performed in the most difficult conditions at

Table 2. Diseases and injuries surgically treated at brigade aid post from September 1, 1991 to October 1, 1992

Disease/Injury	n	%
Cut	70	31.0
Explosive wound	67	29.4
Gunshot wound	40	17.5
Purulent process	17	7.5
Burn	12	5.3
Atheroma, blister	11	4.8
Fracture, dislocation	5	2.2
Amputation	5	2.2
Ingrown nail	4	1.8
Knee effusion	1	0.4
Total	228	100

Table 3. Surgical procedures performed at brigade aid post from September 1, 1991 to October 1, 1992

Surgical procedure	n	%
Primary care of war wound	103	42.6
Primary care of war wound according to Friedrich	70	28.9
Incision, drainage	17	7.0
Atheroma extirpation	11	4.5
Nail ablation	6	2.5
Secondary suture	6	2.5
Fasciotomy	5	2.1
Immobilization, repositioning	4	1.7
Tendon suture	4	1.7
Necrectomy	4	1.7
Amputation, reamputation	3	1.2
Thoracic drainage	1	0.4
Blister care	7	2.9
Knee puncture	1	0.4
Total	242	100

the Posavina battlefield, where an anesthesiologist was included as a medical corps member. There were no complications with either local or general anesthesia. All patients received usual antibiotic therapy: penicillin 2x2.4 million IU, Garamycin 2x120 mg and Medazol 3x500 mg; and antitetanic protection with AnaTe 0.5 mL and HAIG 250-500 IU. Patients with massive blood loss were administered crystalloid and colloid solutions (Ringer, glucose, Soludex 40, Soludex 70)^{1,2,16}. Sixty-seven of 228 patients operated on stayed at the medical corps inpatient clinic for a short period of time, 1-2 days, and then were transported to Bjelovar General Hospital for additional treatment when possible according to battlefield conditions. Only those severely wounded (n=24) were transported to the nearest hospitals in Vinkovci and Slavonski Brod, immediately upon the necessary first aid. Other soldiers returned to their units right upon treatment. During the study period, 65 Brigade 105 members died, 59 of them killed in action, whereas six patients died from the consequences of severe wounds inflicted in action. None of the patients died during the procedure of triage, first aid or evacuation⁹⁻¹². During the study period, overall Brigade 105 mortality was 2.16% as compared with the rates of 1.8% to 4.1% reported from some recent wars, and 3.7% in the Falklands war^{8,14}.

Conclusion

Patriotic war in Croatia modified the principles of the classic medical corps structure by preferring establishment of mobile surgical teams. These Croatian experiences have subsequently found application in some recent wars such as that in Iraq, where the medical corps structure was based on a forward resuscitative surgical team, thus significantly reducing the time elapsed from wounding to timely surgical intervention, and thus the morbidity, mortality and eventual disability. Also, the medical corps and transport personnel are not unnecessarily exposed for untimely evacuation, while the army unit moral increases with awareness of appropriate medical care in case of wounding. The only pitfall of the system is the vicinity of battlefield and surgical team exposure to war actions.

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Sažetak

ISKUSTVA SANITETA 105. BRIGADE HRVATSKE VOJSKE KAO MOBILNOG KIRURŠKOG TIMA TIJEKOM 1991.-1992. GODINE

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Snažna i iznenadna agresija na Hrvatsku tijekom 1991. i 1992. godine, praktično izjednačavanje bojišnice i pozadine, prekinute prometnice, gospodarsko osiromašenje te snažan psihološki učinak kako na civilno stanovništvo tako i na vojne postrojbe zahtijevali su osnivanje visokostručnih, neovisnih mobilnih sanitetskih timova osposobljenih za pružanje visokodiferencirane zdravstvene zaštite neposredno nakon nastanka ozljede te za evakuaciju i prijevoz ranjenika pod najtežim uvjetima. Prikazuje se rad i organizacija brigadnog sanitetskog voda 105. brigade Hrvatske vojske iz Bjelovara u razdoblju od 1. rujna 1991. do 1. listopada 1992. godine, koji je djelovao kao mobilna kirurška ekipa. Ovakav ustroj je skratio put ozlijeđenih prema kirurškoj sali i tako smanjio pobol i smrtnost ranjenika, a konačni invaliditet sveo na najmanju moguću mjeru. U navedenom razdoblju liječeno je 228 ranjenika u kojih su izvedena 242 operacijska zahvata, od toga 122 u lokalnoj, a 20 u općoj anesteziji. Ukupna smrtnost u 105. brigadi bila je 2,16%.

Ključne riječi: *Mobilni kirurški tim; Vojna medicina; Rat; Hrvatska*