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Surgical Services and Transformation of Civil Hospital During ''August War 2008'' in Georgia

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Structural transformation of a civil hospital into a military one during ''August War 2008'' (August 8–12) in Georgia is presented. Damage-control principles, such as hemorrhage control, liver-packing and abdominal tamponade, gastrointestinal tract resection without formation of anastomoses, and other temporary interventions were prioritized. This provided a chance to empty the hospital in a short period to provide the admission of an increased number of combat casualties. There were soldiers from Georgian troops, civilians, and captives of war. The number of total admitted patients was 739. Fifty-two patients were operated on in the surgery department. The following operations were carried out: removal of foreign bodies from the neck region, 6 cases; isolated thoracotomy, pulmorrhaphy, and drainage, 2 cases; laparotomy, hepatorrhaphy, gastrorrhaphy, splenectomy, resection of small intestine, and colostomy, 18 cases; combined operations (thoracotomy plus laparotomy), 9 cases; extended debridement and dressing of wounds, 11 cases; angiosurgical operations, 4 cases; and coloplasty, 2 cases. There were 2 cases of mortality, 1 case of rethoracotomy, and 3 cases of relaparotomy: 2 because of intracavital bleeding and 1 because of sanation.

Key words: War surgery – Damage control – Staged surgical care

Hemorrhage in trauma is a significant challenge, accounting for 30% to 40% of all fatalities, second only to central nervous system injury as a cause of death. However, hemorrhagic death is the leading preventable cause of mortality in combat casualties and typically occurs within 6 to 24 hours of injury.[1] Although hemorrhage is the leading cause of death for combat casualties, catastrophic hemorrhage is rarely a prehospital combat medical management problem, because when it occurs, it tends to cause death before medical care can be provided. In civilian environments, the most seriously injured victims can be reached and transported by emergency medical services personnel within minutes; in combat, it often takes hours simply to transport casualties off the battlefield. In combat situations, even if the transport distances are small, the hazardous nature of the forward combat areas

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frequently prevents medical personnel from quickly reaching the wounded. Furthermore, whereas civilian blunt trauma victims may have a ''golden hour,'' casualties with penetrating battlefield trauma often have only a ''platinum 5 minutes.'' Because of the challenges of treating hemorrhage during combat, it is important for military medical personnel to understand their options for treating hemorrhage quickly and efficiently.[2] At the same time, the burst trauma sets in a number of medicodiagnostic challenges, which leads the physicians to find nonstandard solutions. First, the main concern is the specific preoperative preparation and prioritization of the sequential operative interventions. Even if the damaged area is very small, the wound itself may be deep, and definite medical attention is advisable. The goal of damage control is to restore normal physiology rather than normal anatomy. This goal is used for polytraumatic casualties, for example, a combination of abdominal, vascular, and thoracic injury. The rapid transformation of a civil hospital into the military one for providing the effective medical care of wounded patients seems to be one of the key issues.[3]

We aim to describe our experience and analyze the effectiveness and outcomes of surgical care of combat injuries at civil hospital.

Patients and Methods

After the war activities began (August 8, 2008, to August 12, 2008), military medical divisions initially provided the first medical care directly on the battlefield. At the second stage, the first surgical care was provided by Gori military hospital, which was the nearest hospital to the battle zone. Our center's function was third-stage qualified specialized surgical care, because of the 70-km distance from the battle zone and 1 hour for transportation. Our center represents a multiprofile hospital of 220 beds, where there are different units of basic surgical services, critical and emergency care departments (EDs), and services of other profiles. During the war period, all departments were transformed for the care of wounded patients, and we used war medical doctrine concerning massive disasters and armed conflicts. The ED performed triage and stabilization of patients. In addition, critical and intensive care departments were extended to treat critical patients operated on in Gori Hospital as well as in ours. The sorting principle was based on well-known rules. Particularly, lightly wounded patients were sent to the outpatient department, where the first surgical care under local anesthesia was performed. The management of patients with chest and abdominal cavity penetrative wounds was carried out according to the Advanced Trauma Life Support principles. Patients with cavity penetrative wounds, as well as wounds on other parts of the body, with labile hemodynamics were sent directly to the operating room, where they were stabilized and operated on. The patients with stabile hemodynamics underwent investigations such as X-ray, ultrasound, and computed tomography scan, and then were monitored. From August 10 to August 12, after the Gori occupation and Gori Hospital evacuation, our hospital's objective became to provide first surgical care as well. During this period, damage-control principles were prioritized, such as hemorrhage control, liver packing and abdominal tamponade, gastrointestinal tract resection without formation of anastomoses, and other temporary interventions. Main surgical interventions were then performed in another hospital, or in our center later on. This gave us opportunity to empty the hospital in a short period to provide the admission of an extensive number of new wounded patients. The number of total wounded patients was 739. There were soldiers from Georgian troops, civilians, and captives of war: 486 were treated in the outpatient department, and 253 were treated in the inpatient department. Among the latter, type and localizations of trauma are shown in Tables 1 and 2. A total of 378 patients were admitted in surgical department, 185 were treated in the inpatient department, and 193 were treated in the outpatient department. A total of 148 patients were operated on: 96 of them were from the trauma orthopedic department, and 52 were from the surgery department. Operations performed in the surgery department are shown in Table 3. Methods and technical details of these operations are well known, and there is no need to describe them in detail.

Table 1 Type of trauma

	No.
Gunshot wounds	92
Shrapnel caused	102
Another type of damage	27
Somatic damage[a]	32
Total number of inpatient department treated	253

[a]Combat casualties not wounded.

Results

One patient wounded in the head died immediately after admission. Another heavily wounded and

Table 2 Trauma localizations

	No.
Extremities	100
Head trauma	69
Abdominal cavity trauma	22
Chest trauma	20
Spinal column trauma	5
Multitrauma	5
Casualties not wounded	32
Total	253

Table 3 Operations carried out in the surgery department

	No.
Removal of foreign bodies from the neck region	6
Isolated thoracotomy, pulmorrhaphy, and drainage	2
Laparotomy, hepatorrhaphy, gastrorrhaphy, splenectomy, resection of small intestine, colostomy	18
Combined operations (thoracotomy + laparotomy)	9
Extended debridement and dressing of wounds	11
Angiosurgical operations	4
Coloplasty	2
Total number of operations performed	52

operated on patient died at another hospital later. There were no other operative and postoperative mortality and no major complications. There was 1 case of rethoracotomy and 3 cases of relaparotomy: 2 because of intracavital bleeding and 1 because of sanation.

Discussion

The frequency of recorded mass casualty incidents (MCIs) has increased during the past 50 years, with nearly 2 billion people being affected by disasters in the past 10 years alone.[4,5] The medical sequelae of an MCI generally occur in 3 phases. The largest number of deaths occur in the initial phase, due to injuries incompatible with survival. The extended number of preventable deaths occur in the second phase, occurring minutes to hours after the MCI.[6] Provision of primary health care for the local population should begin as soon as possible. The key medical issues during the second phase are rescue of the victims, provision of timely first aid, and early evacuation of patients with life and limb–threatening injuries to medical facilities. The initial responders to MCIs resulting in complete destruction of social infrastructure are often uninjured local citizens.[6] The large number of casualties presenting for care usually overwhelm surviving local medical personnel and facilities.[7] Circumstances will differ depending on the location of the incident, the previous level of medical care received by the local population, and the degree of destruction of the local infrastructure. The major issue in the third phase after the disaster is special medicine. Access to emergency medical care, delivery room services, and maintenance medication are all important issues requiring consideration.[8–10] Surviving community hospitals must respond to waves of civilian and military casualties while maintaining routine medical and surgical service to the community, depending on the nature of the incident.[11,12] Treatment of late medical complications, such as sepsis, and multiple organ failure are major issues that occur in the third phase.[13] All hospitals in the vicinity of a mass casualty event will likely participate in the care of casualties.[7,14,15] The key concepts for orderly patient management are unidirectional patient flow throughout the hospital and thorough documentation.[16–18] Anesthesiologists, general surgeons, and trauma surgeons are in immediate demand.[19] Initial triage of patients should occur outside of the ED.[19] Physicians and nurses who do not have special training in the surgical disciplines should segregate ambulatory patients in an area outside of the ED itself where they can be evaluated. Ambulatory patients injured in a blast should be screened for asymptomatic pneumothorax and/or rupture of inner abdominal organs at radiology stations prior to discharge from the hospital. Stretcher cases should be admitted directly to the ED for secondary triage to immediate or delayed care. After initial resuscitation, immediate care patients are transferred to the operating theater, intensive care unit, the postanesthesia care unit, or the radiology department, depending on the diagnostic and therapeutic requirements of the individual patient. The postanesthesia care unit is an ideal venue for establishing an extended intensive care unit to accommodate the surge of critically ill patients.[19,20] Most patients will require diagnostic X-rays, and many require computed tomography imaging. Insidious and missed injuries are a major concern.[21] The radiology department is the main bottleneck impeding the orderly flow of patients through the diagnostic and therapeutic intrahospital triage cascade. This can be prevented with staff training and prior preparation of radiology protocols unique to MCIs.[22] Critically ill patients who have suffered penetrating injuries or traumatic amputations may require immediate access to the operating room. Upon notification of a disaster,

elective surgery should be immediately suspended until the scale of the event is clarified.[20] Patients who have not yet been anesthetized should be returned to the preoperative holding area or their wards. Patients who have been anesthetized but have not yet received surgery can be considered on an individual basis. Depending on the severity of their condition, the anticipated length of the procedure, and the scale of the event, a decision may be made to either abort the procedure or proceed with surgery. Surgical procedures underway at the time of notification of the incident should proceed to completion.[19]

Conclusions

Based on our small experience of military medicine during the ''2008 August War'' in Georgia, we would like to suggest some principles of surgical management of war injuries, which are as follows:

1. Correct structural transformation of a civil hospital into a military one, which is provided with modern equipment and highly qualified personnel.
2. Correct triage for effective surgical treatment of wounded patients.
3. Fast evacuation and transportation of heavily wounded patients to the stage of specialized surgical care.
4. Limited laparotomy with intra-abdominal tamponade for temporary hemostasis is an effective method and procedure of choice in critical situations.

Finally, we hope that need for military medical assistance will decrease in Georgia, as well as in the whole world.

References

1. Perkins JG, Cap AP, Weiss BM, Reid TJ, Bolan CD. Massive transfusion and nonsurgical hemostatic agents. *Crit Care Med* 2008;**36**(7 suppl):S325–S339
2. Carr ME Jr. Monitoring of hemostasis in combat trauma patients. *Mil Med* 2004;**169**(12 suppl):11–5, 4
3. Hodalic Z, Svagelj M, Sebalj I, Sebalj D. Surgical treatment of 1211 patients at the Vinkovci General Hospital, Vinkovci, Croatia, during the 1991–1992 Serbian offensive in east Slavonia. *Mil Med* 1999;**164**(11):803–808
4. Campbell S. Responding to international disasters. *Nurs Stand* 2005;**19**:33–36
5. International Federation of Red Cross and Red Crescent Societies (IFRC). *World Disasters Report 2000*. Geneva, Switzerland: International Federation of Red Cross and Red Crescent Societies; 2001
6. Taylor PR, Emonson DL, Schlimmer JE. Operation Shaddock – the Australian Defence Force response to the tsunami disaster in Papua New Guinea. *Med J Aust* 1998;**169**:602–606
7. Kost GJ, Tran NK, Tuntideelert M, Kulrattanamaneeporn S, Peungposop N. Katrina, the tsunami, and point-of-care testing: optimizing rapid response diagnosis in disasters. *Am J Clin Pathol* 2006;**126**:513–520
8. Donchin Y. Israeli field hospital for Kosovo refugees in Macedonia. The Internet Journal of Rescue and Disaster Medicine. 2000;**1**(2). Available at: http://www.ispub.com/ostia/index.php?xmlFilePath=journals/ijrdm/vol1n2/refugee.xml
9. Albright TS, Gehrich AP, Wright J Jr, Lettieri CF, Dunlow SG, Buller JL. Utility of ultrasound in the combat theater: experiences of a gynecologist during Operation Iraqi Freedom/Operation Enduring Freedom. *Mil Med* 2007;**172**:507–510
10. Albright TS, Gehrich AP, Wright J Jr, Lettieri CF, Dunlow SG, Buller JL. Pregnancy during Operation Iraqi Freedom/Operation Enduring Freedom. *Mil Med* 2007;**172**:511–514
11. Peric M, Hamel D, Rac S, Pirc-Tiljak D, Bekavac-Beslin M, Turjak J *et al*. Civilian medicine and war: transformation of a health centre to a war hospital in Croatia (July 1991–October 1992). *Injury* 1996;**27**:395–399
12. Hebrang A, Henigsberg N, Golem AZ, Vidjak V, Brnic Z, Hrabac P. Care of military and civilian casualties during the war in Croatia. *Acta Med Croatica* 2006;**60**:301–307
13. Maegele M, Gregor S, Steinhausen E, Bouillon B, Heiss MM, Perbix W *et al*. The long distance tertiary air transfer and care of tsunami victims: Injury patterns and microbiological and psychological aspects. *Crit Care Med* 2005;**33**:1136–1140
14. Einav S, Feigenberg Z, Weissman C, Zaichik D, Caspi G, Kotler D *et al*. Evacuation priorities in mass casualty terror-related events: implications for contingency planning. *Ann Surg* 2004;**23**:304–310
15. Hogan DE, Waeckerle JF, Dire DJ, Lillibridge SR. Emergency department impact of the Oklahoma City terrorist bombing. *Ann Emerg Med* 1999;**34**:160–167
16. Kluger Y, Mayo A, Soffer D, Aladgem D, Halperin P. Functions and principles in the management of bombing mass casualty incidents: lessons learned at the Tel-Aviv Souraski Medical Center. *Eur J Emerg Med* 2004;**11**:329–334
17. Noordergraaf GJ, Bouman JH, van den Brink EJ, van de Pompe C, Savelkoul TJ. Development of computer-assisted patient control for use in the hospital setting during mass casualty incidents. *Am J Emerg Med* 1996;**14**:257–261
18. Einav S, Schiff S, Goldberg S, Hersch M, Spira R, Zalut T *et al*. Low-tech computerized in-hospital tracking of patient location during multiple casualty incidents. *Intensive Care Med* 2007;**33**:S224

19. Einav S, Spira RM, Hersch M, Reissman P, Schecter W. Surgeon and hospital leadership during terrorist-related multiple-casualty events: a coup d'état. *Arch Surg* 2006;**141**:815–822
20. Einav S, Aharonson-Daniel L, Weissman C, Freund HR, Peleg K; Israel Trauma Group. In-hospital resource utilization during multiple casualty incidents. *Ann Surg* 2006;**243**: 533–540
21. Hare SS, Goddard I, Ward P, Naraghi A, Dick EA. The radiological management of bomb blast injury. *Clin Radiol* 2007;**62**:1–9
22. Körner M, Krötz M, Kanz KG, Pfeifer KJ, Reiser M, Linsenmaier U. Development of an accelerated MSCT protocol (Triage MSCT) for mass casualty incidents: comparison to MSCT for single-trauma patients. *Emerg Radiol* 2006; **12**:203–209