

FIELD MEDICINE

BATTLEFIELD SURGERY: AN EXPERIENCE FROM FORWARD TREATMENT CENTRE
WANA

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ABSTRACT

Objective: To profile the spectrum of injuries and management of casualties treated in forward treatment centre (FTC) Wana over a period of one year by optimizing the available resources of a Field Hospital.

Study Design: Descriptive cross sectional study.

Place and Duration of Study: Forward treatment center Wana South Waziristan Agency, from 21 Jan 2014 to 08 Dec 2014.

Material and Methods: A total of 62 cases brought in FTC were included in the study. Cases were managed according to Advanced Trauma Life Support (ATLS) protocol. A policy of aggressive resuscitation, early primary repair of injuries and evacuation was followed at our setup.

Results: All patients were male with a mean age of 28.1 ± 4.443 yrs. The majority of casualties were military (52 cases, 83.9%) and the major cause of injury was found to be improvised explosive device (33 cases, 53.2%). Extremities were involved in majority of casualties (38 cases, 50.7%). A total number of 91 operations were performed in 62 cases which included 14 laparotomies (15.4%), 21 chest intubations (23%), 9 amputations (9.9%), 19 cases of debridement (20.9%), 10 fasciotomies (11%), 1 tendon repair (1.1%), 10 closed reduction of fractures (11%), 5 closed reduction of dislocations (5.5%) and 2 cases of extremity vascular repair (2.2%).

Conclusion: Optimal utilization of limited resources warrants a responsible approach of surgeons towards injured brought at FTCs. A variety of injuries may be encountered by the forward surgical team who can significantly contribute by providing life and limb saving surgery.

Keywords: Mobile health units, Penetrating, War-Related injuries, Wounds.

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INTRODUCTION

Medical support in the war against terrorism in Pakistan has undergone significant change in the past decade. The non-conventional nature of battlefield led to advancement in terms of medical, surgical and intensive care to improve survival^{1,2}. Particularly an increase in military operations in 2013 and 2014 has resulted in significant increase in number of casualties requiring advanced surgical care. The pillars of modern day trauma surgery are forward surgical support, expeditious evacuation and effective resuscitation strategies. The experience

gained from forward military centers may be extrapolated in civil setups for situation of multiple and mass casualties. The concept of forward surgical teams deployed in a far located military base is not new. The delay in evacuation time in previously fought wars gave birth to the concept of provision of life and limb saving surgery close to the combat line. The experience is unique. Multiple casualties, suboptimal conditions and hostile stressful environment pose a serious challenge to a small dedicated team. Serving in a forward treatment centre (FTC) gives military surgeon a unique opportunity to face directly the second peak of trimodal distribution of death. Experience shared in literature might orient young surgeons to acquire specific skills foreseeing the employment in such committed forward centers.

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The experience of treating casualties in one of the FTCs over a period of one year is presented. The aim is to profile the spectrum of injuries and their management utilizing the limited resources available in a far located field hospital.

MATERIAL AND METHODS

This cross sectional study is a description of all casualties treated in a single FTC from 21 Jan 2014 to 8 Dec 2014. The total duration of stay of surgeon was 188 days in disjointed periods. The centre is a 35 bedded hospital which has witnessed regional militancy for more than a decade. The hospital has limited facilities including the expertise of one surgeon, one medical specialist, one anesthetist and five operation theatre assistants with a laboratory and radiograph suite support. A blood bank assists in temporary provision of whole blood for transfusion. A fully functioning operation theatre capable of performing at least 30 surgeries in 72 hours provides surgical facilities to the injured brought from forward areas.

All trauma cases requiring direct involvement of surgeon were included in the study. Injuries mandating minimal intervention and surgical ailment due to non-traumatic causes were excluded from sample population (fig-1).

The patients were managed according to the Advanced Trauma Life Support (ATLS) protocol. A policy of aggressive resuscitation followed by prompt surgical intervention was adopted at our setup. The aim was to stabilize the patients and provide life and limb saving services at the centre. All surgeries were carried out under general anesthesia in operation theatre with blood products in hand whenever required.

The surgical technique varied from case to case and peroperative decisions were made purely on clinical discretion. All cases of laparotomy were proceeded through a midline incision. Chest intubations were performed by standard blunt dissection technique after rigorous selection fulfilling the indication according to ATLS protocol. Amputations were

proceeded after seeking consent and only for obvious non-salvageable limb/digit. A consideration to salvage the limb was always kept in mind. A doubtful extremity was always seen critically looking for the hard and soft signs of extremity vascular injury and signs of compartment syndrome. First wound debridement was done adequately for every penetrating injury as soon as possible. Closed reductions were done by standard traction and manouvre, the technique varied from site to site. Patients thus stabilized were evacuated to base hospitals by road or by air depending upon the facilities present at that time.

Data was collected & recorded by surgeon himself. Data was analyzed using statistical package for social sciences (SPSS) version 18. Mean and standard deviation for quantitative variables and frequency and percentages for qualitative variables were calculated.

RESULTS

A total of 136 patients were brought to FTC. The exclusion of patients as shown in fig-1 led to a study population of 62 patients the ailment of

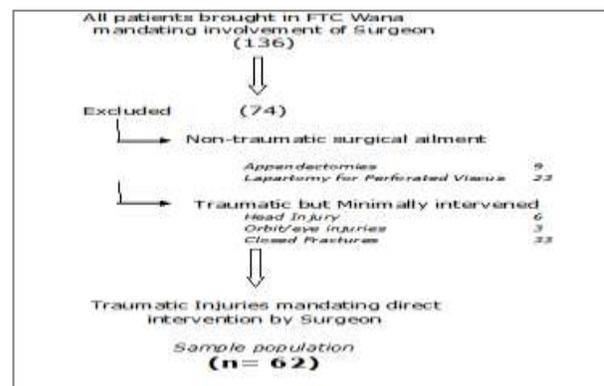


Figure-1: Algorithm showing patients and methodology.

which were attributable to trauma and were directly intervened by surgeon. The mean age and standard deviation for the total patient sample was 28.1 ± 4.443 . The minimum age was 21 years and maximum age was 38 years. All patients were male. Demographics of the patients treated at forward centre are profiled as in table-I. The majority of the casualties treated were

military (52 cases, 83.9%) and the major cause of injury was found to be improvised explosive device (IED) (33 cases, 53.2%). Multiple injuries to 62 patients resulted in a total of 75 sites involved. Extremities were involved in majority of casualties i.e. 38 cases (50.7%). Other sites included injury to chest in 21 cases (28%), abdomen in 14 (18.6%) and head and neck 2 cases (2.7%).

A total number of 91 operations were

intubation was performed in 21 cases, out of which 16 cases (76.2%) were penetrating and 5 cases (23.8%) were of blunt chest trauma.

The management of extremity injuries were the majority encountered at forward centers. All penetrating wounds were explored leading to debridement in 19 cases (20.9%) and fasciotomies in 10 cases (11%). Out of 9 amputations, 5 were below knee amputations, 2 transmetatarsal and 2 were digital amputations. Definitive treatment of

Table-I: Demographicsof sample population (n=62).

Parameters	Number (n)	Percentage (%)	Cumulative Percentage (C%)
Category			
Military	52	83.9	83.9
Civilian	7	11.3	95.2
Opposite enemy	3	4.8	100
Cause of injury			
IED	33	53.2	53.2
Gunshot	14	22.6	75.8
RTA	7	11.3	87.1
Others	8	12.9	100
Total	62	100	100

IED: Improvised Explosive Device, RTA: Road Traffic Accident.

Table-II: Total number of operations performed in 62 cases.

Procedures done	Number (n)	Percentage (%)	Cumulative Percentage (C%)
Laparotomy	14	15.4	15.4
Tube thoracostomy	21	23	38.4
Amputations	9	9.9	48.3
Extremity vascular repair	2	2.2	50.5
Closed reduction (fractures)	10	11	61.5
Closed reduction (dislocations)	5	5.5	67
Debridement (open wounds extremities)	19	20.9	87.9
Fasciotomies	10	11	98.9
Tendon repair (EPL, EPB)	1	1.1	100
Total	91	100	100

EPL: Extensor Pollicis Longus, EPB: Extensor Pollicis Brevis.

performed in the sample population of 62 patients. Detail of operations performed is profiled in table-II. Various procedures performed during laparotomy are shown in fig-2. In majority of the cases (7 cases), a stoma was fashioned on account of perforated injury of gut. Chest

fractures and dislocations by closed reduction was done in total of 15 cases which included 9 cases of distal radius fracture, 1 supracondylar fracture humerus, 2 cases of shoulder dislocation, 1 hip, 1 elbow and 1 case of peritalar subluxation.

Two cases of extremity vascular repair included a left below knee popliteal and left brachial artery. The popliteal artery was repaired via posteromedial approach as shown in fig-3 harvesting reverse saphenous venous graft from contralateral leg. Brachial artery was repaired by direct end to end tension free anastomosis. Both cases were evacuated to base hospital. The recovery went uneventful and both patients walked out with an intact salvaged limb.

DISCUSSION

Appropriate care can significantly improve the outcome of an injured patient³. Indeed the young productive years are affected in war. In this study, mean age of 28.1 years and minimum age of 21 years proved the impact of trauma in young productive years of life as explained in literature^{4,5}. Majority of thoracic trauma can be managed by a simple insertion of tube thoracostomy and need no heroic surgical intervention. The predominant mechanism of

study showing experience of thoracic trauma in military hospitals of Peshawar and Quetta⁹.

The extremity trauma withholds a significant percentage in this series which is comparable to

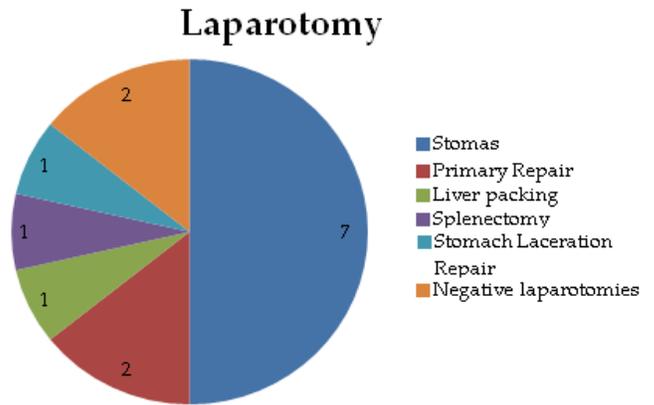


Figure-2: Details of procedures in laparotomies (n=14). the available incidence reported in literature¹⁰. It warrants that every general surgeon acquire the skill and sound decision making in managing acute trauma of extremities. Every penetrating

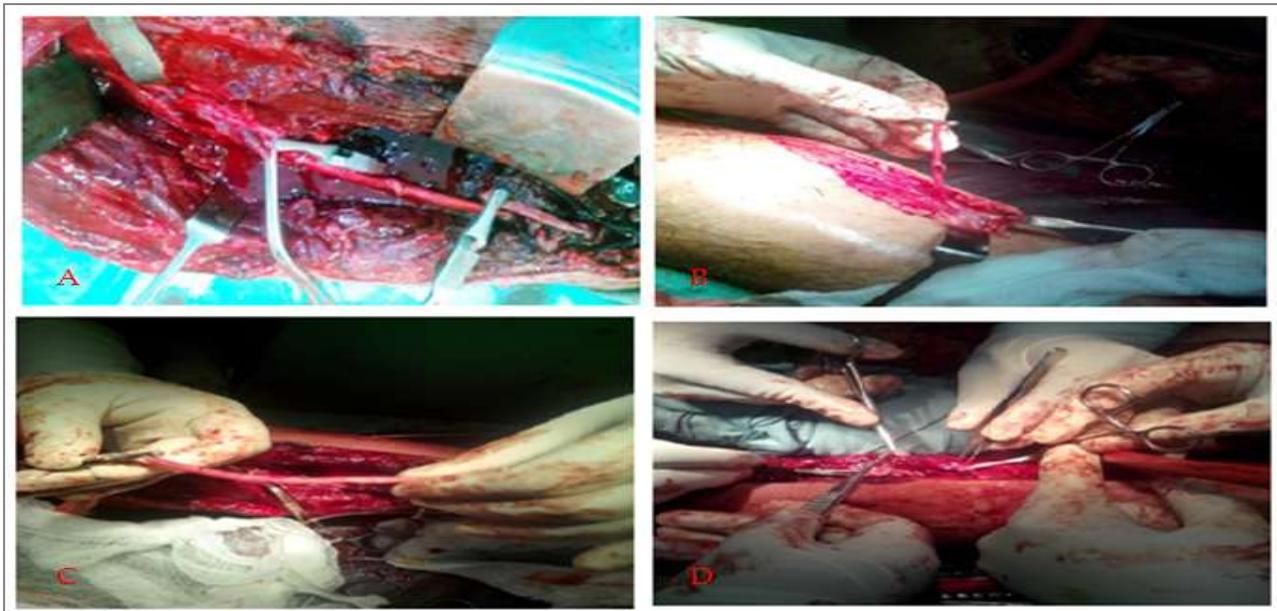


Figure-3: Repair of Popliteal Artery Left- Posteromedial Approach a) Transected ends with loss of segment. b) Harvesting Saphenous graft from other leg. c) Check for rents d) Anastomosis-Parachuting technique.

thoracic trauma as reported in literature is blunt thoracic⁶. The incidence of penetrating trauma is at obvious rise both in military and civilian^{7,8}. In this study, 76.2% of penetrating chest trauma was encountered. This difference was also seen in a

wound was explored owing to the deceptive behavior of bullets and fragments producing small wounds outside and large cavitations within¹¹. Debridement was the mainstay of management of acute wounds. The principles of

debridement are comprehensively explained in literature by Mamoon Rashid¹² which can be followed timely to achieve optimal results.

A good prehospital stabilization of trauma patients at outlying location does not increase the mortality. But for a limb with hard signs of vascular injury; timely evacuation from forward area to surgical facility plays a pivotal role in salvage. A delay of more than 8 hrs is associated with an increased rate of limb loss¹³. Simple ligation of a transected vessel is associated with an increased rate of amputation. The incidence has decreased from greater than 75% in world war-II to less than 10% today owing to development of skill and trend towards repair instead of simple ligation^{14,15}. The management options vary from temporary shunts to an attempt of vascular repair, primarily or with harvested reverse venous graft. We encountered two cases of hard signs of vascular injury both of which reached surgical facility in 5th hour after injury. If evacuation has already been delayed due to difficult terrain ahead the surgeon may proceed for an attempt of vascular repair at the forward centre as even an air evacuation might not help in salvaging limb in such cases. The decision has to be sound, logical and justified. It is a must to acquire skill by today's general surgeon in military who by virtue of his presence can contribute significantly by saving a precious limb, when required.

Management of penetrating hollow viscus injuries has always been controversial in terms of primary repair compared to stoma formation. Factors which favour stoma over primary repair are: greater than 8 hours delay, more than 4 blood transfusions, high energy wounds, extensive devascularization and polytrauma¹⁶. Breitenstein came up with the results that primary repair protected by an ileostomy is preferable as compared to the repair alone¹⁷. Current evidence suggests preferable primary repair for penetrating colon injuries¹⁸⁻²¹. The explanation for large number of stomas fashioned in this series is that the wounds were high energy penetrating and preoperatively the contamination was always

questionable. Or it may be our relatively less experience which might have led to adopt a safe approach by simply exteriorizing the injured bowel.

The limitation of this study is the retrospective data collection by a single surgeon with no central data registry which otherwise could have facilitated in calculating morbidity and mortality in war injured cases. Indeed the outcome can only be taken into account if a good follow up of evacuated cases is available.

CONCLUSION

Optimal utilization of limited resources warrants a responsible approach of surgeons towards injured brought at forward treatment centers. A variety of injuries may be encountered by the forward surgical team who can significantly contribute by providing life and limb saving surgery.

CONFLICT OF INTEREST

The authors declare no financial, competing or other conflict of interest.

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