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Review Article

Management of war wounds - Review

Bharath Kumar Singh[1], Ravi Kumar Chittoria[1,*]

[1] *Dept. of Plastic Surgery, Jawaharlal Institute of Postgraduate Medical Education and Research, Dhanvantari Nagar, Puducherry, India*

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ABSTRACT

The breakthroughs in surgical knowledge and its applications have always taken place in war zones. The major combat that had place over the past ten years was Operation Iraqi Freedom. The military has created more sophisticated weapons, telecommunications systems, vehicles, and protective head and body gear over the past 30 years. The bulk of the world's wars have also been fought on the ground, which has led to the majority of combatants being hurt by bullets, missiles, and explosives. The soldier's chest, abdomen, and neck are now protected, in contrast to prior conflicts, and their limbs are now relatively more susceptible to the lethal effects of these weapons of war. In the past, many of these young people would have died from these wounds. But since the early 1970s, medical science has significantly advanced, and today we are saving the lives of warriors who have lost limbs. Reconstructing the injured tissues is currently the difficult task. We will talk about current developments in the treatment of war-related injuries in this review paper.

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1. Introduction

Understanding the history of military trauma care requires an understanding of the degree of injury caused by the weaponry used and the surgeon's perception of the healing process. Surgery had to change as a result of advancements in weaponry technology if surgeons wanted to increase patient survivability.[1] Stabilizing the trauma patient and providing intensive forward resuscitative care are the first steps in the reconstruction of combat injuries. The higher military treatment institution provides decisive management following a series of treatments in medical environments that are more and more supported.[2,3] Complex care can now be delivered more quickly thanks to aggressive medical care and quick air transport. All cutting-edge military systems around the globe have special hospitals for combat-wounded patients to facilitate sophisticated injury rehabilitation. A good team including oral and maxillofacial surgeons, plastic surgeons, and orthopaedic surgeons works together to address injuries. The treatment of combat wounds will be covered in this article.

2. Materials and Methods

Even with the state-of-the-art medical treatment, communication, and transportation systems available, managing war wounds is challenging. Based on an examination of numerous studies about battle wounds, we completed this review article. This review article, which was developed based on the reviews, focuses on the management of battle wounds.

3. Results

The evaluation of numerous studies revealed the following conclusions: early resuscitation, transportation, communication, global positioning systems, and

* *Corresponding author.*
E-mail address: drchittoria@yahoo.com (R. K. Chittoria).

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sophisticated medical care have all cut mortality and morbidity. Early blood transfusion aids in reducing fatalities at the injury and impact sites. Osteomyelitis is becoming less common because to antibiotics. As a stopgap measure until flap cover and reconstructive surgeries, negative pressure wound therapy proved helpful. The Hybrid Reconstructive Ladder aids in choosing how to repair damage sustained during an impact as well as how to choose how to reconstruct.[4]

4. Discussion

The world's military systems evolved their own systems for medical referral and care depending on their needs and advantages. For example, highly sophisticated military systems like the USA had five levels of medical care for their injured soldiers. The most prevalent injuries resulting from battle are those to the extremities. The injuries to the extremities frequently included fractures of Gustilo grades III or IV.[5] Muscle loss was noticeably greater than loss of nerves or blood vessels, indicating a very extensive region of harm in the wounds. Limb salvage techniques can be used on any lower extremity that would operate as a limb, had unharmed distal sensibility, and a fixable bone lesion. Patients received debridement treatments within 24 hours after arriving.[6,7] The wound vacuum aided closure dressing was used during this initial treatment. The vacuum-assisted closure dressing was replaced every 48 hours[8,9] in addition to irrigation and debridement until the wound bed was clean. Beads loaded with antibiotics were inserted into the wound when there were bone deformities. They filled the deficiency up until the soft-tissue envelope was restored and stabilised. A bone graft was then used to replace the beads. For difficult reconstruction, patients received microvascular procedures.[10] When choosing the donor site, factors including the length of the pedicle needed to reach vessels outside the damaged zone and the predicted tissue requirements were taken into account.[11,12] Instead of using fascio-cutaneous tissues in wounds where cultures were positive, we used muscle tissues. The rectus and latissimus dorsi were the muscles that were used the most frequently. Vein grafts were employed in six patients to make an anastomosis away from the damaged location. During the first two months, low-molecular-weight heparin and sequential compression stockings were applied.[13] The most frequently grown organism was Acinetobacter baumannii, which is sensitive to meropenem and imipenem.[14] Based on these findings, we started empirically administering meropenem to open wounds up until final cultures. Amputations were performed to reduce haemorrhages quickly, and then when there was insufficient soft tissue protection or persistent osteomyelitis.[15] Amputation rates among Vietnam War veterans have been estimated to reach 45%. The early evacuation of these patients to tertiary centres for limb repair since Vietnam has been a significant alteration in the course of therapy. During the Vietnam War, the patient might have to wait weeks or even months before their leg was repaired. It has been demonstrated that this therapeutic delay has negative effects, especially in situations of open fracture. The patient is now transported to a hospital where limb reconstruction can be performed just days after the damage. The reduced incidence of persistent osteomyelitis may be due to this quicker wound healing. However, advancements in our wound care and reconstructive techniques might be to blame for our patients' greater incidence of limb survival. We regularly and early debride wounds in our patients in conjunction with the wound vacuum assisted closure dressing. Washouts and debridement techniques were performed to make sure that the wound bed had healthy, viable tissue and little to no drainage. Definitive closure was obtained once these conditions were met. Procedures for bone stabilisation were performed in the field or at the nearby hospital. Because of the earlier stabilisation, soft-tissue reconstruction might begin 1 to 2 weeks after the injury. Treating open fractures within 15 days of the initial injury is associated with a better percentage of successful limb reconstruction and a lower incidence of osteomyelitis. Because of their thick and prolonged vascular pedicles, these muscle flaps were chosen. if the damage was sufficiently extensive that vein grafts were needed. For upper extremity reconstruction, the cephalic vein is employed, and for lower extremity reconstruction, the saphenous vein on the opposite side. This technique had a greater success rate because it permitted vascular anastomosis outside of the damaged area. One of these surgeries was carried out to retain limb length after a below-knee amputation and to provide the patient with a higher level of functional ability. During the Vietnam War, microvascular treatments were still in their infancy and weren't employed frequently. Early flap failures are frequently the product of inexperience, and all of the flap failures were linked to a rookie surgeon who made critical errors. This lack of experience led to the decisions that led to flap failure. By employing the technique where a senior surgeon assists the junior surgeons during flap procedures, flap failures can be prevented. As a result, the procedure went more smoothly and in less time. This illustrates the importance of a surgeon's training in managing these complex wounds. The screening venous Doppler for each of our new patients will be analysed. Range-of-motion exercises, low-molecular-weight heparin, and sequential compression stockings can all be started by patients within 24 hours of surgery to help prevent thrombosis. These improvements have resulted in an overall success rate of 97%. Early on in the conflict, it took 12 days on average to get from the point of impact to tertiary care facilities (range, 5 to 21 days). After the construction of a specialised medical air lift support system, the amount of time required for transport was decreased to 4 days on

average. Early in the conflict, it was 14 days on average, but by the time of the latter reporting period, it was less than 8 days. The interval between the injury and closure reflected this change. According to our experience, the delay in therapy won't have a detrimental effect on the result. If wound cultures are considered to be positive early in the war, all injured soldiers will get antibiotic treatment before being taken to our hospital. When patients were admitted who weren't already receiving antibiotics, wound cultures were performed. Additionally, exposed or broken bone was cultured. A. baumannii is the most often found organism. Staphylococcus aureus was the second most often cultivated bacteria. Patients received intravenous antibiotics for positive soft-tissue cultures lasting two weeks, and treatment for positive bone cultures lasting six to eight weeks. Treatment was continued if their cultures were still positive at the time of the ultimate bone graft. Bone grafts couldn't be used since the wounds were so seriously infected. Patients were monitored using blood counts, sedimentation rates, and C-reactive protein [16] during antibiotic therapy. In patients with positive bone cultures, antibiotics were continued until the C-reactive protein level was normal for two weeks (6 to 8 weeks). Patients who were treated early in the battle had various antibiotic regimes and extended healing times. These people ought to be more susceptible to getting persistent osteomyelitis. The introduction of negative-pressure therapy has completely altered how extremities trauma is treated (wound vacuum assisted closure). When patients in this group did not undergo wound vacuum-assisted closure, it took an average of 17 days from the time of admission to ultimate closure. [17,18] As the benefits of negative-pressure therapy became more obvious, over 90% of wounds were treated with it. The use of negative pressure therapy in our patient population appears to have improved results, as seen by a decrease in the prevalence of chronic osteomyelitis. [19,20]

5. Conclusion

Extremity wounds from recent wars are complex wounds with wide injury zones and significant soft tissue, muscle, and bone loss. Several of these wounds would have been potentially fatal in the past. Preservation of life and limb is possible thanks to improvements in medical technology and surgical management of these catastrophic injuries. The goal of medical assistance throughout prior conflicts was to prolong the life of badly injured battle casualties. The problem for military medicine is how to successfully rebuild these severed limbs because these severely injured young men and women have a considerably greater survival percentage in today's battle.

6. Recommendations

Below is a summary of this review article's advice.

1. Early evacuation of the injured person from the scene of the collision, a well-equipped extraction squad, and basic first aid to stop bleeding all contribute to reducing the fatality rate for injured soldiers.
2. A global positioning system and advanced telecommunications aid in airlifting the injured soldier to a hospital at base camp.
3. The soldier's shield system and advanced defence armoury will aid in preventing potentially fatal injuries.
4. Early blood transfusion to avoid hypovolemic shock reduces the number of soldiers dying from shock.
5. Antibiotics and antibiotic-coated beads aid in the prevention of wound infection and persistent osteomyelitis.
6. Negative pressure wound therapy (NPWT) functions as a link between sick and healthy wounds for quick wound closure using a free flap or simple skin transplant.
7. Complex reconstruction heavily relies on the adaptation of hybrid reconstructive ladder and regenerative medicine technologies.
8. Early rehabilitation and flap cover encourage the patient to return to his regular life as soon as possible.

7. Source of Funding

None.

8. Conflict of Interest

None.

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Author biography

Bharath Kumar Singh, Senior Resident

Ravi Kumar Chittoria, Professor

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