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Research Paper

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KEYWORDS :

Non Salvageable Limb into Salvageable Limb

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ABSTRACT

Crush trauma to the extremities, even if not involving vital organs, can be life threatening. In crush syndrome, the systemic manifestation of the breakdown of muscle cells with release of contents into the circulation, leads to metabolic derangement and acute kidney injury. Although common in disaster scenarios, emergency physicians also see the syndrome in patients after motor-vehicle collisions.

The systemic manifestations post crush injury are also a matter of concer8 months was n apart from the local injuries which are produced after the trauma.

In this case we report a case of a 39 year old gentleman with a crush injury of the left upper limb with ulnar nerve, radial artery and ulnar artery injury who presented to our emergency room. He underwent wound debridement with external fixator application with radial and ulnar artery repair with skin grafting under anaesthesia. On the second sitting three months later, he was taken up for vascularised fibular grafting of the distal radius with T-plate and reconstruction plate fixation. Further wound exploration was done and reconstruction of the flexor pollicis longus and flexor digitorum profundus with autogeous facia lata graft. Groin flap was also made in this sitting.

Release of groin flap was done after one month.

The third sitting after eight months was for performing a tenolysis with flexor digitorum profundus of the middle finger transfer to flexor digitorum superficialis of ring finger, with Palmaris longus transfer to flexor digitorum superficial of middle finger.

Three months later the patient was reviewed and he was noted to have acceptable range of motion and function of the hand.

INTRODUCTION:

Crush trauma to the extremities, even if not involving vital organs, can be life threatening. The term crush injury refers to the damage resulting directly from the crushing force. Conversely, crush of muscle cells with release of contents into the circulation[1,2]. Crush syndrome leading to acute kidney injury (AKI) is one of the few life-threatening complications of crush injuries that can be prevented or reversed3.

Crush syndrome was first described after the Battle of London by Bywaters and Beall in 1941[3]. Patients pulled from the rubble initially appeared to be unharmed, but then these patients developed progressive limb swelling and shock and died of renal failure a few days later[2]. Postmortem examination revealed muscle necrosis and brown pigment casts in the renal tubules[4]. Crush injuries are common in natural disasters such as earthquakes, but emergency physicians more commonly see the syndrome in patients after motor-vehicle collisions, especially with prolonged extrications, as well as in victims of assault[5,6]. Crush syndrome also occurs in patients who compress a part of their own body, such as patients "found down" due to a stroke, intoxication, or mental illness1. Any condition that results in prolonged immobility can result in a crush injury[4,7].

Case Report:

A 39 year old gentleman presented to our emergency room with a crush injury of the left upper limb due to machine injury. Immediately after presentation he was rushed to the operation theater. No x-rays were done pre-operatively as he had presented 3 hours after the injury. There was complete exposure of the dorsal and palmar compartment of the hand and distal forearm. On exploration he was found to have complete cut of the ulnar nerve, radial and ulnar artery with bone loss of distal radius. There was severe contamination. His mangled extremity severity score(MESS) was 12 (Figures 1,2)

In the first sitting under anaesthesia, he underwent aggressive debridement. The staged protocol of management was planned for him. In the first stage, the vascular anastamosis of the radial and ulnar artery and the dorsal vein was performed. Once this was completed, the amputation of the ring finger was performed as it was completely devoid of blood supply as there was blackish discoloration of the entire digit. External fixation of the upper limb was done. Muscle and tendon repair was done of the viable tendons. . (Figures 3,4). Intravenous fluids and blood transfusions were done as per the requirement.

The second stage, three months after the surgery, consisted of vascularised fibular grafting of the distal radius with fixation with a reconstruction and locking plate. There was anastamosis of the graft vessels with the radial and ulnar arteries (Figures 5,6).

The third stage was performed eight months after the index injury. The stiffness of the digits was noted. He underwent tenolysis, with flexor digitorum profundus of the middle finger transfer to flexor digitorum superficialis of ring finger, with Palmaris longus transfer to flexor digitorum superficial of middle finger. He underwent aggressive physiotherapy of the left hand and 3 months after the final surgery he had acceptable range of motion of all the digits of the hand and the wrist.

Discussion:

Because many mangled extremities are borderline cases with an unpredictable prognosis, the decision to amputate or to salvage a limb must be carefully asessed. Unless the situation islife-threatening, the future of a limb should not be decided on the basis of the initial caseevaluation alone[8]. The mangled extremity scoring systems that are currently used were developed more than 15 years ago. Since then, significant advances have been made in surgical techniques

and devices, in the intensive care field, in stabilization methods and in reconstructions, all of which now permit limb salvage in

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the majority of lower limb trauma cases. Unfortunately, although the operation is usually deemed a success, there are cases that require secondary amputation. Failed attempts at limb salvage result in prolonged hospitalization, along with multiple surgical procedures, pain, and psychological trauma[8]. Although most recent studies agree that indications for limb amputation have diminished, there are authors who do not agree with performing a salvage operation for patients with an MESS higher than 7. As the results revealed, there are major differences even among publications in the same year. For example, Elsharawy[9] saved 93.4% of limbs with MESS >7 and Kumar[10] had a salvage rate ten times lower (9.09%), although the number of cases in these studies is almost equal. This can be explained by the inclusion and exclusion criteria, as well as by the different type of studies (prospective versus prospective plus retrospective). In almost all combat studies with a MESS is the most used scoring system, due to its simplicity. Because most soldiers are under 30 years old, shock and ischemic time are the most important factors when calculating MESS in a combat casualty situation. "Life before limb" should be respected when treating severely mangled extremity injuries. In combat situations, lower limb injuries are frequently associated with other organ injuries, which are sometimes life threatening. That explains why some authors prefer to apply a tourniquet on a limb with MESS >7 and amputate in critical situations. Most reports agree with amputations for combat limb injuries with MESS >7.8.

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Images:



Figure 1



Figure 2

Figures 1 and 2: Images of left forearm with wrist and hand showing a mangled upper limb.

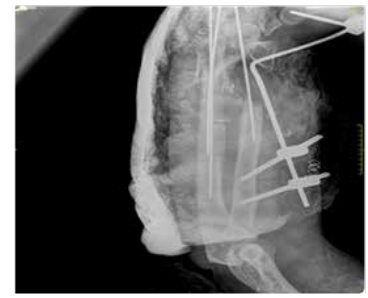


Figure 3

Figures 3: Plane radiograph of the left upper limb after temporary stabilization with K-wires and external fixator application.



Figure 4: Post-operative image after muscle, tendon repair and external fixator application.



Figure 5: Post-operative image after muscle, tendon repair and external fixator application, split skin grafting and anastamosis of the graft vessels.



Figure 6: Antero-posterior and lateral radiographs of the left upper limb after vascularised fibular grafting of radius and plate fixation.