Abstract

Background: Degloving is a potentially serious injury in which an extensive area of skin is torn from its underlying attachments and thereby deprived of its blood supply.

Case Report: Negative pressure wound therapy (NPWT) was used for the treatment of extensive degloving of left lower limb in an obese patient with co-existing fractured femur.

Conclusion: NPWT can provide an excellent alternative to traditional wound care for large surface area wounds and circumferential wounds before skin grafting. It can convert a non-operable wound to an operable wound with a healthy granulated wound bed ready for grafting.

Key Words: Degloving – Graft – Femur – Fracture – Negative pressure wound therapy.

Introduction

DEGLOVING injuries are potentially serious, in which an extensive area of skin is torn from its underlying attachments and thereby deprived of its blood supply [1]. Besides the possibility of injury to other structures, there may be a problem with viability of the skin involved [2]. The most common causes for degloving injury are high velocity motor vehicle crashes and occupational accidents, which can result in tremendous avulsion of the skin and subcutaneous tissues [3].

Hemodynamic instability, lengthy repair of orthopedic or vascular trauma, and/or other associated life-threatening injuries frequently delay expedient intervention by the plastic surgeon. Consequently, large degloving injuries can be problematic for the plastic surgeon in regards to treatment and closure. In the past, these wounds have been treated with repeated serial debridements and painful dressing changes with the eventual placement of split thickness skin grafts on the compromised tissues. Grafting these chronic fibrotic wound beds often results in only partial graft take and/or graft contractures [3].

Negative Pressure Wound Therapy (NPWT) has been extremely successful in the treatment of acute and chronic wounds and has been reported as a method for securing full and split thickness skin grafts in degloving injuries [4,5].

In this case report NPWT was used for the treatment of extensive degloving of left lower limb in an obese patient with co-existing fractured femur.

Care Report

A male Saudi, 18 years old, student at King Khalid University was referred to Aseer Central Hospital from a peripheral Hospital, on 17/12/2007 as a case of road traffic crush injury of the left lower limb with fractured femur that occurred 2 days before referral. The patient was admitted to the emergency room, where he was thoroughly examined. He was obese and his vital signs were stable. The ambulance trolley was heavily soaked with foul discharge.

Local examination revealed edema of the left lower limb, with extensive badly sutured wound without drainage, extending from the groin near the genitalia horizontally then anteriorly, laterally, and posteriorly to reach the back of the distal part of the thigh with extension over the front of the upper part of the leg. Along this extensive suture line there is an area of variable width of vascularly compromised skin, dark in color most probably necrotic.
On any minimal pressure, a big amount of foul discharge was oozing between the sutures, denoting extensive fat necrosis and infection. Radiological examination of the left lower limb showed comminuted fracture at the junction between the middle and the lower third of the femur, with a butterfly fragment (Fig. 1).

The patient was taken to the operating room (OR). Under general anesthesia, the sutures were removed and a suction tube was inserted inside the wound where big amounts of lyzed fat with blood and earth particles with very foul odor were sucked out of the wound. Then, the rest of the sutures were removed and the wound was widely opened and explored. All devitalized skin, subcutaneous tissues, muscles and fascia were removed as much as possible and homeostasis was secured. Exploration of the wound showed extensive degloving of the anterior, lateral, and posterior surfaces of the left thigh with minimal degloving of the medial side (Fig. 2). Degloving also extended to the left buttock with avulsion and partial crushing necrosis of the lateral part of the gluteus maximus muscle (Fig. 3).

The wound was thoroughly & repeatedly lavaged with normal saline, hydrogen peroxide, and betadine, then packed with eusol packs. The edges were approximated with sutures using prolene size 2 mounted over plastic tubes. Calcaneal skeletal traction was applied & suitable weight was attached to it.

The patient was taken repeatedly to the OR for debridement and change of dressing under general anesthesia since the patient could not stand pain as the fracture was not fixed yet. There was no attempt for the degloved skin to adhere to the underlying tissues due to the instability and shearing movements, despite the repeated application of sutures and pressure dressings.

Four weeks after the accident, the wound became clean with good coverage of antibiotics. The patient was taken to OR where fixation of the fracture was done with an interlocking nail (Fig. 4). Immediately after fixation of the fracture, the NPWT was applied and the patient was taken to his room in the ward where the NPWT tube was connected to suction system according to the recommended instructions for applications (Fig. 5). NPWT dressing has been applied 3 times in a period of 10 days. All the degloved skin became adherent after the first dressing (Fig. 6). The quality of the granulation tissue became better and ready for skin grafting after almost 2 weeks from the start (Fig. 7). Skin grafting was then performed with success (Fig. 8).
Fig. (4-A): Anterior view of the left femur showing fracture fixation using intramedullary interlocking nail.

Fig. (4-B): AP and Lateral views of the left femur lower end.  

Fig. (4-C): Left femur AP and lateral views a few months later showing good callous formation in the site of the fracture.

Fig. (5-A): The suction tube and the sponge pieces used for NPWT.

Fig. (5-B): Left thigh after patronizing the sponge pieces to fit the wound.

Fig. (5-C): Sealing of the sponges with transparent adhesive sheets.
Fig. (6-A): Left thigh lateral view. Wound bed became healthy and degloved flaps became adherent after first NPWT dressing.

Fig. (6-B): Anterior view of the left thigh after first NPWT dressing.

Fig. (7): Left thigh on day of skin grafting showing healthy granulation tissue.

Fig. (8-A): Left thigh a few weeks after skin grafting operation.

Fig. (8-B): Left thigh several months after skin grafting.

Ansari et al. [6] reported that the toll of road traffic accidents in the Kingdom of Saudi Arabia (KSA) is quite high. Every hour, one person is killed and 4 become injured because of road traffic accidents. As a result of increasing number of patients able to survive traumatic events with large surface area of skin and soft tissue injuries, the need for effective coverage of these large defects is also increasing.

Our patient is a very common example of these injuries. This patient has been managed using NPWT, in which topical continuous negative pressure is applied to the wound. It consists of a sponge better with a pore size ranging from 400-600mcm in diameter. This sponge is cut to the appropriate dimensions to fill the entire wound. Suction is then applied to the sponge after it is covered with adhesive drape to create an airtight seal. This suction can be adjusted in intensity and frequency. The
most common settings are between 125 to 200mmHg negative pressure and either continuous or intermittent. The direct effects of this system are to stimulate the formation of granulation tissue in several ways. The negative pressure applied to the wound removes interstitial fluid high in cytokines, collagenases, and elastases, which are known to inhibit fibroblast development and proliferation [7-9]. Furthermore, this interstitial fluid has been shown to decrease tissue perfusion through its mechanical occlusion of local capillary blood flow [8].

NPWT proved to have several advantages. Edema is controlled, bacterial counts are reduced, perfusion is increased, and wound vascularity is improved. All these advantages contribute in graft take and wound closure [10]. Moreover, in patients with large surface area open wounds, NPWT dressing has eliminated the need for frequent cumbersome, painful dressing changes and can result in excellent skin graft take because of the increase in granulation tissue to the wound bed.

Even with irregular surface contours in our patient, late contractures and hypertrophic scarring could be minimized, due to the advantage of NPWT, which contributed to reduced healing by secondary intention and the contraction needed to achieve wound closure.

Conclusion:

NPWT can provide an excellent alternative to traditional wound care for large surface area wounds and circumferential wounds before skin grafting. It can convert a non-operable wound to an operable wound with a healthy granulated wound bed ready for grafting.

References