



Case Report

Surgical management of compartment syndrome and the gradual closure of a fasciotomy wound using a DermaClose device

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ABSTRACT

The immediate recognition and timely response of compartment syndrome due to damage caused by penetrating trauma has immense clinical outcomes. The following is a case report of a complicated fasciotomy in a 33-year-old male who suffered a gunshot wound to his left lower extremity and the surgical management leading to adequate limb salvage and recovery.

The unpredictability of damage caused by gunshot wounds (GSW) requires precise emergent decisions from the attending surgical staff in order to prevent further life threatening complications. The following is a case report of a complicated fasciotomy in a 33-year-old male who suffered a GSW to his left lower extremity (LLE). The patient was transferred to the Cook County Trauma Unit after initially presenting to an outside hospital. The patient's condition was stabilized with 2 L of normal saline and 2 units of O-blood due to significant bleeding. X-rays of the left lower extremity revealed a retained missile in the left anterior lower leg. Although hemodynamically stable, the patient developed pain with passive flexion and paresthesia in the left lateral foot. Given the clinical findings, the decision was made to take the patient to the operating room due to developing signs of compartment syndrome with sensory loss.

The patient was taken to the operating room for a four-compartment fasciotomy of the left lower extremity. After a satisfactory release of bulging muscle was achieved, it became evident that large volume bleeding continued from the site of the GSW. Injury to the posterior tibial (PT) trunk in addition to multiple regional veins was noted. The PT trunk, peroneal vein and PT vein appeared to have been ligated from the trajectory of the missile. The vessels were appropriately identified and viable re-attachment allowed for a palpable deep peroneal (DP) pulse, with ligation of the PT trunk leaving no PT signal or pulses at completion of the case.

During post op day one, the open LLE had continued to have a deep active bleeding space in the medial fasciotomy wound site (Fig. 1). The patient was taken to the operating room for wound exploration (Figs. 1 and 2). During the procedure, ligation of multiple venous collateral vessels was achieved allowing for appropriate hemostasis and cessation of the oozing muscle belly, which was occurring from the macerated muscle. Celox and Kerlix were then used to achieve further hemostasis, and the patient was taken to the trauma ICU in stable condition.

Over the course leading up to post op day 7, the oozing muscle belly was well controlled and the open LLE was viable for closure. The patient was taken to the OR where a primary skin closure of the lateral wound was performed (Fig. 3) and two DermaClose devices [DermaClose, Chanhassen, MN, USA] were positioned over the medial wound site due to the large wound size (Fig. 4). Proper attachment of the device was achieved and the patient tolerated the procedure well and was taken to the recovery floor. Over the course of the next week, the stable auto-ratcheting tension from the DermaClose devices approximated the skin edges to a distance where the skin fasciotomy sites could be closed with minimal undermining and tension.

The final closure operation occurred 8 days following the application of the DermaClose system (Fig. 5). The skin edges were

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Fig. 1. Medial incision site POD 1.



Fig. 2. Lateral incision site POD 1.

raised and the fasciotomy wound was closed in a vertical mattress fashion (Fig. 6). The upper aspect of the wound was loosely closed, as there was some mild purulent material draining from this area, which would properly allow for drainage of any remaining purulence. The patient tolerated the procedure well and was taken to the PACU in stable condition.

The case discussed identifies the importance of the systematic approach to managing compartment syndrome. If not acted upon and managed quickly, the devastating complications can lead to irreversible damage to neurovascular soft tissue. Sheridan and Matsen reported normal functioning recovery of 68% when the fasciotomy procedure was performed within 12 h, with a failure rate of 8% if the operation was delayed to after 12 h [2]. In a retrospective review of combat casualties that had undergone fasciotomies in the Middle East, authors found that patients who underwent fasciotomy procedures after air evacuation had higher rates of



Fig. 3. Primary closure of lateral wound site.



Fig. 4. Positioned DermaClose device over medial wound site.

amputation (31% vs. 15%), muscle excision (25% vs. 11%), and mortality (19% vs. 5%) than those who received more immediate fasciotomies in the combat theater [1]. Overall the literature comes to a consensus that fasciotomies that are delayed are associated with poor outcomes. Proper identification and management, even in complex cases such as the one discussed, has exponential clinical and surgical beneficial outcomes.



Fig. 5. Medial wound site after removal of the DermaClose device.



Fig. 6. Medial wound site after complete closure.

Conflicts of interest statement

None.

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