



A rare case presentation of rhabdomyolysis progression to acute compartment syndrome in an IV drug user with a surgical treatment using vessel loop closure technique

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Statement of Purpose & Literature Review

Compartment syndrome is defined as an elevation of the interstitial pressure in a closed fascial compartment that results in microvascular compromise.¹ It is well documented that acute compartment syndrome (ACS) of the lower extremity is frequently caused by a traumatic event. However, ACS not resulting from a high energy impact, instead from a drug overdose, prolonged limb compression, and rhabdomyolysis has been minimally reported in current literatures^{2,3,4}. This case report addresses our diagnosis and surgical approach using vessel loop “shoe lace” closure technique for ACS resulting from a rare consequence of rhabdomyolysis and multi-drug overdose.

Case Study

A 27 year old male patient with the history of polysubstance abuse and chronic hepatitis C was brought to the ED after being found lying in the park with altered mental status. Upon physical exam, the patient’s left lower leg was edematous, erythematous, with pain out of proportion. Pedal pulses and peripheral sensation were absent. Left leg circumference was double that of the contralateral leg. The leg was firm and non-compressible with increased intracompartmental pressure. Radiographic evidence was negative for fractures or emphysema. Lab results, consistent with the rhabdomyolysis, showed elevated myoglobin(24000), Lactic acid(11.3), Creatine Kinase(41484), WBC (32000), Cr and BUN. Patient tested positive for cannabinoids, cocaine, and opiates. Based on the clinical presentation, supporting radiographic, and laboratory evidence, the diagnosis of ACS secondary to rhabdomyolysis and possible ischemic trauma (due to prolonged pressure on LLE under the multi-drug overdose status⁵) was made.

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Surgical Procedure

A dual incision technique was used for multicompartiment release of the left leg. Upon the incision the muscle bellies herniated from the incision site. The fascia overlying the gastrocnemius muscle was incised exposing the muscle belly. The interval between the gastrocnemius muscle and soleus was opened exposing the soleus and releasing the superficial posterior compartment. The deep posterior compartment was opened by detaching the soleal bridge. This was done to avoid any additional residual muscle compression. Copious amount of fluid was encountered without purulence. The second incision, was placed laterally over the fibula. The anterior compartment was released. The peroneal muscle bellies were then released at the intermuscular septum. All muscles of the anterior and lateral compartments appeared viable. Both incision sites were irrigated with 2 liters of 1% betadine solution. A sterile dressing was placed on the left leg. The wound edges were re-approximated and tensioned using staples and vessel loops using a “shoelace” technique.

An additional fascial release of the thigh compartments were conducted a day later to release the increased compartment pressure in the thigh. Upon the lateral incision laterally starting at the gluteus medius and maximus proximal to the greater trochanter of the femur and extended to the superior access of the lateral femoral condyle copious amounts of tissue fluid was released. There was no pus or hematoma noted. The fascia over the vastus lateralis was released, and vastus lateralis was then reflected off the intermuscular septum bluntly. This released the anterior compartment. The fascia over the gluteal muscles was also released. Hamstrings were then finally released posteriorly at the level of the intermuscular septum. The second 2nd incision was placed medially. The fascia of the medial aspect of the hamstrings was released. There was no pus or hematoma noted. The entire release was irrigated with a total of 3 liters of 1% betadine solution. The wound edges were tensioned using a “shoelace” technique.

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Results

The patient was evaluated as an inpatient every other day for wound check and sterile dressing change. The wound edges were re-approximated and re-tensioned at each concurrent procedure with vessel loops in a “shoelace” technique. After each concurrent procedure there was improvement noted in edema, pain, ROM, and laboratory values. The patient was discharged to a skilled nursing facility. Patient returned to clinic a month later. The two thigh incisions, as well as the lateral leg incisions had healed without incidence at 2 months post op. Additional surgical wound debridement of the medial skin incision with dressing change was performed at 4month post operatively, which also fully epithelized 1.5 months post the last wound debridement. Delayed primary closure was not performed due to the inadequate soft tissue coverage. At the 14 months post op follow up, the patient was noted to remain fully healed without additional complications.



Image 1: Initial fasciotomy showing increased muscle pressure.



Image 2: Closure using a “shoelace” technique.



Image 3: Subsequent re-tensioning of the vessel loops with wound washout.



Image 4: Fully healed fasciotomy sites.

Analysis & Discussion

Acute compartment syndrome is a devastating condition which may result in the loss of limb⁶. The clinicians can diagnose the ACS accurately when the clinical presentation, history of past medical history and possible etiologies of trauma are thoroughly reviewed^{7,8,9}. This case report highlights ACS resulting from a rare consequence of rhabdomyolysis and multi-drug overdose. Our surgical principles and techniques for this case are presented. Our closure technique, using vessel loops in a shoelace fashion allows for gradual re-approximation of the wound edges with the ability to allow the incision site to drain. Multiple tensioning adjustments are needed to keep the continuous pull along the wound edges. The use of the shoelace techniques allows for delayed primary closure without the use of a skin graft. At the same time it allowed and inexpensive way to heal the wounds by normal skin coverage via secondary intention.

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