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Fasciotomy in Compartment Syndrome of Upper limb: A Case Report

Robin Shrestha^{1*}**Abstract**

Acute compartment syndromes of the upper arm following trauma is even though a less common complication, it certainly is an orthopedic emergency that requires prompt diagnosis and intervention, typically via surgical decompression by fasciotomy. I report a 45 years old factory worker with compartment syndrome after trauma treated with fasciotomy. The limb was saved and wound was closed serially by shoelace technique. At 6 months follow up visit, the patient was asymptomatic with 30 to 150 degrees of active range of movement on examination. In this article I emphasize on early identification and management of acute compartment syndrome.

Keywords: Fasciotomy, Compartment Syndrome, Upper Extremity.

Introduction

Acute compartment syndrome is a condition where increased osseo-fascial compartment pressure leads to vascular and neurological compromise, eventually to muscle ischemia and subsequent necrosis if left untreated. It is an emergent condition requiring prompt intervention in order to save the functions of the limb. The patient typically presents with one or a combination of clinical features like severe pain, paresthesia, pallor, absent pulses, or poikilothermia. The most common causes include trauma, arterial injury, crush injury, limb compression and burns. This case report discusses a 45 years old patient with early diagnosis and prompt intervention in the form of fasciotomy of compartment syndrome of right upper limb resulting in preservation near normal function of the limb.

Case presentation

A 45 years old paper factory worker sustained crush injury of right upper dominant hand in a machinery belt and presented in emergency room of Morang Sahakari hospital, Morang, Nepal with significant swelling, pain and deformity of right upper limb.

The patient was alert and oriented with GCS 15. On examination the limb was tense and swollen with abrasion and echymoses over arm and forearm and limited range of motion. The vitals of the patient including the oxygen saturation of the right limb were within normal limits. Complete neurological examination was not possible due to pain, although sensations were intact. Laboratory investigations included a normal complete bloodcount, prothrombin time/partial thromboplastin time, renal function, and an elevated creatine kinase. Anteroposterior (AP) and lateral X-rays of the right humerus, elbow and forearm showed no fractures.

The patient was admitted for observation and treated for pain control with ice compression and limb elevation at the heart level. After 8-10 hours of injury, the severity of pain and swelling in the right arm and forearm increased severely which was not relieved with injectable analgesics. On physical examination blisters were visible around volar aspect of elbow. Radial pulse was palpable, and pain was out of proportion on elbow and wrist flexion and extension. A clinical diagnosis of compartment syndrome of right upper arm and forearm was made.

The patient was taken urgently to the operating room for a fasciotomy of right upper arm and forearm. A longitudinal incision was made starting from the volar aspect of the of the wrist extending to the medial aspect of elbow which then cross the elbow crease and run along the lateral border of the biceps finally in the deltopectoral groove. Fasciotomy released the fascia of the superficial layer, the deep layer that contained the pronator quadratus, and the deep flexor compartment. The dorsal compartment and the mobile extensor wad were released without the need for a dorsal incision. The biceps and tripiceps compartments of the arm were decompressed through the same incision and all the muscle were found viable. A second look surgery was performed after 24 hours to debride any necrotic tissue and determine closure plan.

The wound was closed serially by shoelace technique with the help of foley catheter and without skin grafting. Postoperatively, on exam his right arm and forearm appeared soft with intact sensation and pulses. Special care was taken to ensure functional rehabilitation was started soon. All the joint range of motion returned to near normal in 3 months except of elbow where the ROM ranged from 45 to 140 degrees. At 6 months of follow up visit patient could perform all of his daily activities and his range of movement was 30 to 150 degrees.



Figure 1 Skin incision in upper arm and forearm compartment syndrome

Discussion

Upper limb compartment syndrome is a surgical emergency most commonly caused by trauma or other injuries leading to increased pressure in the muscle compartments of the arm or forearm. Early recognition of symptoms like severe pain, paresthesia, and swelling is critical, as timely fasciotomy can prevent permanent muscle and nerve damage.¹ It not only is common cause for permanent functional damage and amputation but also a common cause of litigation in orthopedic surgery.^{2, 3}

Compartment syndrome results from increased intra-fascial space pressure to a point where capillary perfusion necessary for tissue viability is compromised in ischemia and necrosis by impeding venous outflow initially and finally, arterial flow.^{4,5,6} It presents as pain out of proportion to injury and not relieved with analgesics, tense muscles and pain with passive muscle stretch with altered sensation and palsies in the later stages.^{4,5,7}

Although many methods have been used for measuring the intra-compartment pressure, it is not necessary when the diagnosis is unequivocal. The normal intramuscular pressure is between 0 and 8 mm Hg and as the pressures rises to around 20 mm Hg, capillary blood flow gets compromised and clinical findings associated with acute compartment syndrome starts appearing.^{4,5,8,9,10} After fasciotomy, the wound may be closed by primary or secondary skin closure, serial wound closure with shoelace technique, skin grafting or flap coverage, although not one method is considered superior to the other.^{11,12,13}

Many authors have mentioned no major complications while some have described soft tissue infection, bone infection, amputations and renal failure while others have mentioned loss of sensation around the wound margin, limb swelling and hypertrophic scars.^{14,15,16,17} In this case, the patient had loss of range of motion at extremes, swollen limb and hypertrophic scar.

Conclusion

Compartment syndrome of the upper limb is a serious condition that occurs when increased pressure within muscle compartments of the arm and forearm impairing circulation and nerve function, potentially leading to permanent damage if left untreated. Hence timely done fasciotomy will save the limb and its functions to its near normal conditions.

Conflict of interest

The author declares no conflict of interest.

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