Compartment syndrome as a complication of a stab wound to the thigh: a case report and review of the literature

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Acute compartment syndrome of the thigh is a rare but potentially devastating condition, in which the pressure within the osseofascial compartment rises above the capillary perfusion gradient, leading to cellular anoxia, muscle ischaemia and death. Early diagnosis and treatment is essential to prevent long term disability. It is most often associated with crush injuries and femoral fracture. We present a previously unreported case of thigh compartment syndrome following a stab injury, treated by emergent fasciotomy.

A fit and healthy 36-year-old man presented to the emergency department of a district general hospital, 20 min after sustaining single stab wounds to the anterior aspect of both thighs. Vital signs were normal and stable on admission, and external bleeding had been controlled with pressure dressings; however, he complained of severe pain in his right thigh which was not controlled with opiate analgesia. On examination he had a 1 inch (2.5 cm) incised wound in the mid anterior thigh. Bleeding had stopped but his quadriceps was tense and severe pain prevented any active or passive knee movement. Distal neurovascular examination was normal and the pain did not improve with removal of the pressure dressing. A clinical diagnosis of compartment syndrome was made and the patient proceeded to the operating theatre. In theatre a line transducer measured right anterior thigh compartment pressure at 50 mm Hg with a diastolic blood pressure of 40 mm Hg. An anterior compartment fasciotomy was performed and dusky coloured but viable quadriceps bulged immediately through the incision. A large haematoma was evacuated and a quadriceps tear repaired. The wound was left open and delayed closure was performed 3 days later. The patient regained full functional use of the limb.

DISCUSSION

The most important factor in the development of compartment syndrome is reduced muscle perfusion, caused by the intracompartmental pressure rising to within 20 mm Hg of the diastolic blood pressure. This results in anoxia and muscle necrosis.^{1,2}

Compartment syndrome often presents subtly and insidiously, making it crucial to have a high index of suspicion, as well as perform serial physical examination if the patient is at risk, as compartment syndrome has been documented to occur up to 4 days after injury.³ Although no firm evidence exists that femoral blocks mask the diagnosis of compartment syndrome in femoral fractures,⁴ these should be administered with caution in suspected cases of compartment syndrome.

The classical clinical diagnosis consists of the six P's: pain out of proportion to the injury, pressure, paraesthesia, paralysis, pulseless, and pallor. Most of these are late signs; however, pain on passive stretching and firmness of the involved compartment are the most reliable early signs. Paraesthesia is also an early sign, though not as reliable, but if present and left

untreated will progress to hyperaesthesia and anaesthesia as nerve ischaemia progresses.⁵ True paralysis is a late sign and is due to nerve injury or irreversible muscle damage. Pulselessness and pallor are very late signs that only occur if intracompartment pressure is raised to an extent that it occludes the arterial circulation, although in trauma patients this most often indicates an underlying vascular injury.

If the clinical findings are equivocal, direct measurement of intracompartmental pressure should be performed. There are several commercially available devices and although a standard 18 gauge needle attached to an arterial pressure transducer and inserted directly into the involved compartment is often used, readings obtained through this technique have been shown to be nearly 20 mm Hg higher than those obtained by commercial kits.⁶

Once the diagnosis of true or impending compartment syndrome is made, all occlusive or circumferential dressings and casts should be split completely and released. The affected limb should not be raised higher than the patient's heart to maximise perfusion while reducing oedema. If after these measures the patient still has evidence of compartment syndrome, emergent complete dermo-fasciotomy of all involved compartments should be performed. Delayed surgical decompression has been shown to increase the incidence of complications.⁷

Acute compartment syndrome of the thigh is associated with considerable long term morbidity; up to 57% of patients suffer from long term functional deficits.⁷ Early decompression has been shown to improve functional outcomes significantly.⁸ It is therefore vital to maintain a high index of suspicion in all at risk patients and to bear in mind the following points:

- Compartment syndrome can occur even when the compartment is open, such as in stab wounds
- Quick diagnosis and early definitive treatment with urgent fasciotomy is essential for good outcomes.

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IMAGES IN EMERGENCY MEDICINE

Intercostal aneurysm causing massive haemothorax

Oshaani Abeykoon, Adrian A Boyle

A 73-year-old man on warfarin for atrial fibrillation presented to the emergency department with a 1 week history of feeling generally unwell, breathlessness and 2 days of right sided chest pain. Symptoms were aggravated on his return flight from Spain. He was found to have a large loculated collection on chest x ray (fig 1). Following a pleural tap he collapsed. Approximately 2 litres of

blood was drained via a chest drain. He became increasingly hypotensive and was transferred to the intensive care unit. Further imaging with computed tomography and angiography revealed an aneurysm of a right intercostal artery which had started to bleed under the effect of anticoagulation (fig 2). Pressure changes during the flight may have aggravated the bleed. The aneurysm was embolised and the

patient was transferred for evacuation of the haematoma. He made an uneventful recovery and was discharged home after a short stay.

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Figure 1 Chest x ray showing a large loculated collection.

Figure 2 Angiogram showing aneurysm of a right intercostal artery.