Journal of Biosciences and Medicines, 2021, 9, 76-80
https://www.scirp.org/journal/jbm
ISSN Online: 2327-509X
ISSN Print: 2327-5081

Atraumatic Acute Compartment Syndrome in Isolated Medial Compartment of Foot, A Rare Case Report

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How to cite this paper: How, T.W. and Irwan, B.S. (2021) Atraumatic Acute Compartment Syndrome in Isolated Medial Compartment of Foot, A Rare Case Report. *Journal of Biosciences and Medicines*, **9**, 76-80.
https://doi.org/10.4236/jbm.2021.96007

Received: May 5, 2021
Accepted: June 12, 2021
Published: June 15, 2021

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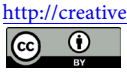

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Abstract

Acute compartment syndrome usually occurs after a traumatic event, typically in association with a fracture, but also from a soft tissue injury such as a direct blow or crush. Acute, isolated, medial compartment syndrome of the foot without a specific major trauma is very rare. I am reporting a rare case with acute compartment syndrome for isolated medial compartment of foot after a traumatic sport event and proper management to prevent long term sequels.

Keywords

Atraumatic, Compartment Syndrome, Medial Compartment

1. Introduction

Acute compartment syndrome usually occurs after a traumatic event, typically associated with a fracture, sometimes from a soft tissue injury such as crush injury or direct blow. The most common scenarios involving fracture, vascular injuries, burns, venous obstruction, reperfusion injury fluid sequestration, or compressive casts. Acute compartment syndrome without trauma or injury is rare. However there are a number of reports in the literature of acute exertional compartment syndrome in which atraumatic exertion leads to abnormal intramuscular pressure [1] [2] [3] [4]. It is important to diagnose and treat the acute compartment syndrome as it is commonly missed especially in the case without trauma or injury to prevent the severe complications.

All the condition mentioned above, the pathophysiologic mechanism involves a vicious cycle of increased tissue pressure, developing ischemia, leading to irre-

versible muscle damage. The compartment syndrome is a clinical diagnosis and thus the diagnostic utility of imaging modalities is limited. The magnetic resonance imaging (MRI) can detect soft-tissue edema, but it cannot differentiated muscle edema in compartment syndrome from soft-tissue injury after trauma. In foot compartment syndrome, long-term complications are weakness, sensory neuropathy and contractures (e.g., quadratus plantae contracture leading to clawing of the toes), in which often lead to multiple future operations and morbidities. Thus, early diagnosis and low threshold for emergency compartment fasciotomies are necessary to avoid the complications.

We report the case of a healthy young male who developed acute exertional compartment syndrome isolated to the medial compartment of the foot after playing futsal with no evidence of injury nor trauma. The diagnosis was based on physical exam, MRI, and compartment pressure measurements. The patient did undergo successful fasciotomy on the day of presentation to the emergency department (ED) and has since completely recovered. We would like to increase awareness of this uncommon clinical presentation in the absence of trauma and present the dramatic radiographic findings.

2. Case Report

A 25 year old gentleman, complaint of left foot pain for 1 day. He had history of futsal playing 1 day prior to the pain. Denied any trauma or injury to the left foot during the sport event. The left foot pain was increasing despite rest, ice, and elevation of the extremity, he presented to an emergency room the next afternoon, approximately 28 hours after the onset of pain. Physical examination revealed a longitudinal tense swelling at the medial plantar arch, with severe tenderness localized to the medial aspect of the foot. Passive extension of the great toe was very painful. The Hoffmann-Tinel sign was positive along the course of the medial plantar nerve. Pedal pulses were intact. X ray showed no fracture and gas shadow seen.

MRI (**Figure 1** and **Figure 2**) done and showed the abductor halluces muscle is thicken and increasing in size. The finding suggestive of a swollen abductor halluces muscle that query tear or intramuscular haematoma.

During the observation, the pain score was increasing from 3 to 6/10. Diagnosis of abductor halluces muscle haematoma with impending compartment syndrome was made. He was advised for exploration and evacuation of haematoma. Intra-operatively, a medial incision was made 1 cm above the plantar skin in line with the first metatarsal and extended 8 cm distal to the origin of the abductor hallucis. As soon as the deep fascia was incised a swollen, bluish-colored muscle (abductor hallucis) herniated into the wound. There was no hematoma, the muscle appeared viable with good contractility, and no debridement was performed. As soon as the patient recovered from anesthesia, He reported dramatic relief of pain. The swelling decreased rapidly and at 3 days after surgery he returned to the operating room where examination revealed red, well-perfused

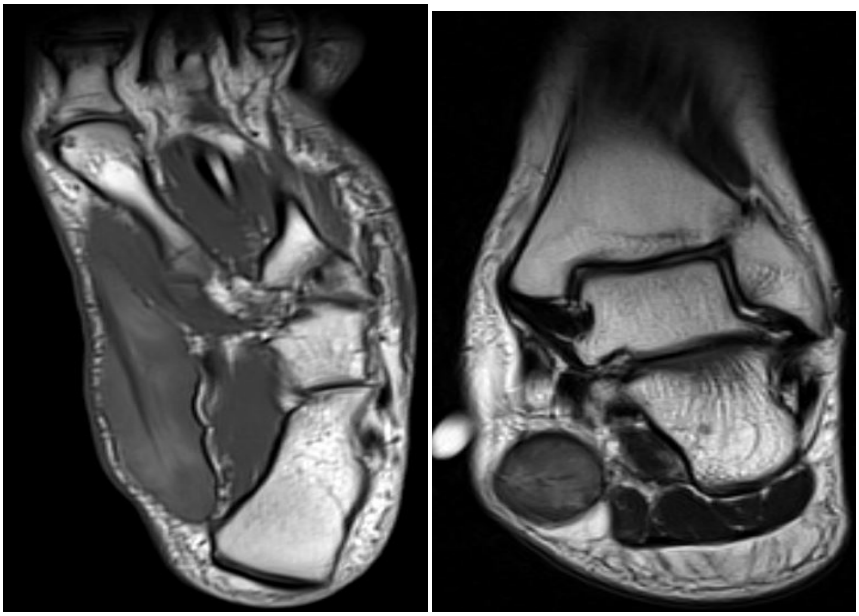

Figure 1. Abductor halluces muscle is thicken and increasing in size.

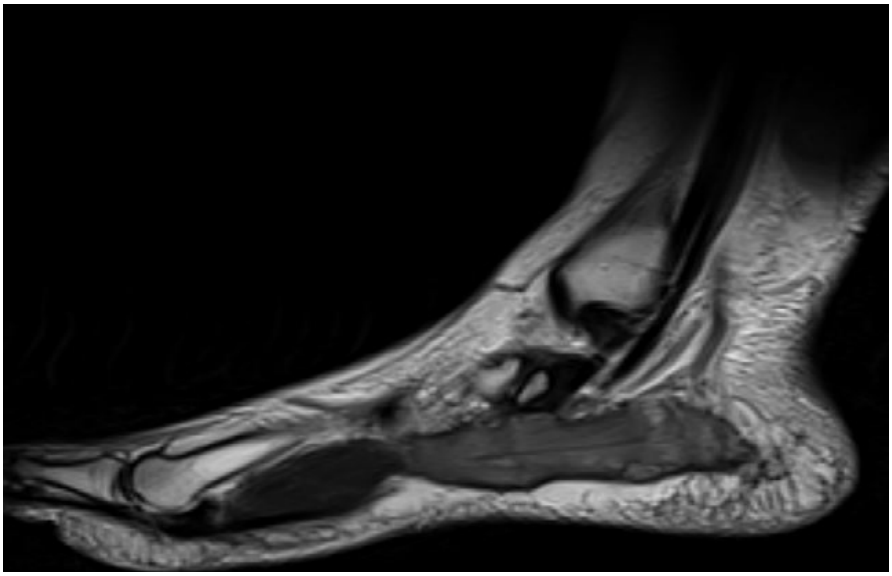

Figure 2. Increase intensity and size over abductor halluces muscle.

muscle with good contractility. However there is no repeat MRI done. The skin was closed without tension. He started partial weightbearing several days after surgery. Suture removal at 2 weeks, at which time he was allowed full weight bearing. At 6 weeks, the patient was able to return to his baseline activity and sport without any pain or swelling. The patient described a full functional recovery.

3. Discussion

Compartment syndrome are commonly happened in leg, extremely rare happened to the foot. Compartment syndrome in multiple compartment of foot

may happened post injury such as crush injury or lisfranc injury but rarely isolated compartment of the foot; even rarer in the absence of trauma. There were four cases reported in the literature of acute exertional medial compartment syndrome of the foot in the absence of trauma or injury [1] [2] [3] [4]. These were case reported occurred after playing basketball, aerobics, a long distance run, and football, respectively.

There are nine compartments of the foot, which are placed into four groups: the intrinsic compartment (the four intrinsic muscles between the first and fifth metatarsals), the lateral compartment (flexor digiti minimi brevis and abductor digiti minimi), the medial compartment (abductor hallucis and flexor hallucis brevis), and central compartment (flexor digitorum brevis, quadratus plantae, and adductor hallucis). Seidel *et al.* showed that the abductor hallucis is the only constant structure in the medial compartment [5].

In compartment syndrome where patient usually presented with 6Ps, pain out of proportion to the injury sustained, palpable swelling, pain on passive stretch test, paraesthesia or hypoesthesia which indicated onset of ischaemic injury to the nerve, paralysis and pulseless. Paralysis and pulseless are the late findings and usually permanent damage happened. In the present of clinical findings consistent with compartment syndrome with delta pressure more than 30 mm Hg, emergency fasciotomies have been warranted [6]. In unequivocally positive clinical findings should prompt emergent operative intervention without need for compartment measurements. Most of the cases of compartment syndrome, simple x ray is enough to provide useful information such as fracture. MRI is not needed and may delay in operative treatment, but it might helpful in aiding diagnosis for this rare condition and paediatric patient whom might not able to give a proper clinical picture of compartment syndrome.

Many fasciotomies approaches have been proposed for an acute compartment syndrome of the foot, with a double-incision technique on the dorsum with or without an additional medial approach depending on the location of the fracture. In the absence of any fracture, a medial approach permits decompression of all compartments with a more rapid release of pressure, as compared with the double dorsal incision, although the latter is easier to perform [7] [8] [9]. In our patient with an isolated medial compartment syndrome of the foot, a medial decompression was sufficient to relieve intramuscular pressure and avoid the late sequelae of compartment syndrome.

4. Conclusion

Although the presentation and localization are unusual, an acute exertional compartment syndrome of the foot should be suspected in the presence of persistent severe pain despite absence of a specific traumatic event. In addition to physical examination and compartment pressure measurements, urgent MRI may be helpful in adding more useful information for the cases in which the diagnosis is in doubt. Emergency decompression is indicated as it may limit any

long-term sequelae, as a delay in presentation or diagnosis may lead to long-term complications and future surgical procedures.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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