International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

Impending Compartment Syndrome in Blunt Leg Trauma Without Fracture: The Importance of Clinical Supspicion

Dr. Nikhitha Saisri Velinedi[1], Dr. Sheshagiri V[2], Dr. Arunodhaya S[3], Dr. Pramod BM[4], Dr. Vijay Kumar S[5]

[1] Post Graduate Student, Department of Orthopedics, JSS Academy of Higher Education and Research, Mysore; ORCID ID: 0009-0004-3749-9631

[2] Professor, Department of Orthopedics, JSS Academy of Higher Education and Research, Mysore; ORCID ID: 0000-0002-5607-8005

[3] Associate Professor, Department of Orthopedics, JSS Academy of Higher Education and Research, Mysore; ORCID ID: 0000-0003-2619-6665

[4] Assistant Professor, Department of Orthopedics, JSS Academy of Higher Education and Research, Mysore; ORCID ID:0009-0007-0228-0375

[5] Senior Resident, Department of Orthopedics, JSS Academy of Higher Education and Research, Mysore; ORCHID ID: 0000-0001-6652-9714.

OPEN ACCESS

Corresponding Author:

Dr. Nikhitha Saisri Velinedi
Post Graduate Student,
Department of Orthopedics, JSS Academy of Higher Education and Research, Mysore; ORCID ID: 0009-0004-3749-9631

Received: 05-02-2026
Accepted: 19-02-2026
Available online: 06-03-2026

ABSTRACT

Introduction: Acute compartment syndrome is a limb-threatening emergency most commonly associated with long bone fractures. But it may rarely occur after isolated soft tissue injury without any bony involvement, which can delay recognition and management. Early diagnosis remains primarily clinical and requires a high index of suspicion.

Case Presentation: A 23-year-old male presented with severe left leg pain and swelling after blunt trauma sustained in a road traffic accident. The pain was disproportionate to clinical findings and unrelieved by analgesics. Examination showed tense, tender calf with marked pain on passive stretch and feeble distal pulses. Radiographs showed no fracture. Ultrasound showed intramuscular hematoma in the medial head of the gastrocnemius muscle. Based on clinical findings, a diagnosis of impending compartment syndrome was made. The patient underwent emergency four-compartment fasciotomy. Intraoperatively, edematous but viable muscle tissue and organized hematoma were identified, and clots were evacuated. Postoperatively, distal perfusion improved, and subsequent split-skin grafting was performed with good functional recovery.

Conclusion: Compartment syndrome can develop in the absence of fracture following blunt soft tissue trauma. Classical clinical features—particularly pain out of proportion and pain on passive stretch—should prompt urgent intervention irrespective of radiological findings. Early recognition and timely fasciotomy are critical to prevent irreversible neurovascular damage and ensure limb salvage.

Keywords: Compartment syndrome; Blunt trauma; Fasciotomy; Intramuscular hematoma; Fractureless presentation.

INTRODUCTION

Compartment syndrome is a serious and limb-threatening condition caused by increased pressure within a closed osseofascial compartment. This elevated pressure compromises local tissue perfusion, leading to ischemia, irreversible muscle necrosis, and nerve damage if not promptly treated. Though traditionally associated with long bone fractures, especially of the tibia, it can also occur after isolated soft tissue trauma like crush injuries, contusions, or reperfusion injuries—without any associated bony injury [1]. The inelastic nature of fascial boundaries amplifies the effects of even minor bleeding or edema. If the intracompartmental pressure surpasses the capillary perfusion threshold, ischemia ensues. Prompt clinical diagnosis and urgent decompression via fasciotomy are crucial to prevent complications such as Volkmann's ischemic contracture or limb loss [2].

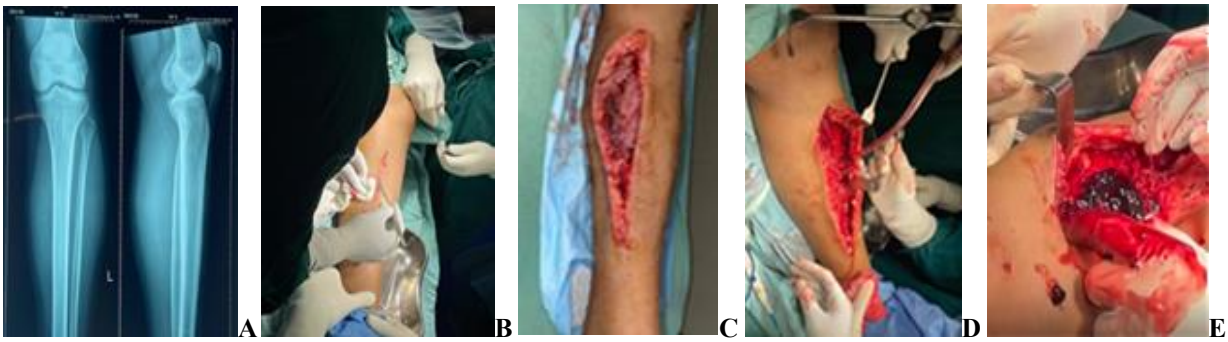
CASE PRESENTATION

A 23-year-old male presented to the emergency department with complaints of severe pain and swelling in the left leg following an alleged history of road traffic accident. The patient complained of pain; which was **disproportionate** to the apparent injury and was not relieved with analgesics. He was unable to bear weight on the affected limb. On examination, the **left calf** was tense and tender, particularly over the medial aspect. **Passive stretch pain** was markedly positive. **Peripheral pulses** in limb were **feeble**. There were no open wounds or signs of fracture. **X-ray of the left leg** revealed **no fractures (Figure A)**. **Ultrasound surface scan** showed findings which were suggestive of **intramuscular hematoma** in the **medial head of the gastrocnemius muscle**.

Diagnosis: The clinical diagnosis of **impending compartment syndrome** was made based on:

- Disproportionate pain
- Tense compartment
- Passive stretch pain
- Feeble distal pulses
- Imaging showing intramuscular hematoma

Treatment and Outcome: The patient underwent **emergency fasciotomy** under spinal anesthesia. Two incisions were made on the medial and lateral aspects of the leg, each measuring approximately 10 cm in length releasing all the 4 compartments. Intraoperative findings included edematous and contused muscle without necrosis, blood clots were evacuated from the medial head of the gastrocnemius muscle. After release the compartments were left open and cuticell dressing was done. Double antibiotics were started and daily dressing, enzymes and limb elevation were given. Pulses returned to normal within 24 hours. The muscles appeared healthy on Post op day 4 and decision was taken to post the patient for SSG coverage of the fasciotomy sites.



A) Pre-operative X-ray; B) Incision was made over the medial and lateral aspects of the leg; C) Compartment opened; D) Evacuation of blood clots from medial head of gastrocnemius muscle; E) Post Operative Day 2 Dressing

DISCUSSION

This case shows an uncommon presentation of compartment syndrome in the absence of fracture. Intramuscular bleeding following blunt trauma can elevate compartment pressures, leading to neurovascular compromise [3,4]. Early clinical signs such as pain out of proportion and stretch pain are crucial for diagnosis [5]. Imaging may aid but should not delay surgical intervention.

Delayed diagnosis of compartment syndrome can lead to irreversible ischemic injury to muscles and nerves, often within 6 to 8 hours of onset. The absence of fracture can lead clinicians to underestimate the severity of soft tissue damage, resulting in missed or delayed diagnosis. In the absence of fracture, soft tissue injuries such as muscle contusions and vascular compromise due to blunt trauma can generate sufficient pressure to precipitate compartment syndrome [6]. In such scenarios, reliance on compartment pressure measurements alone may be misleading, particularly when pain is masked by analgesics.

Furthermore, this case underlines the utility of bedside ultrasound in identifying hematoma and guiding clinical suspicion [7]. Though advanced imaging such as MRI can visualize compartmental edema, its availability and time constraints make it unsuitable for acute decision-making in emergency settings. A high index of suspicion, along with serial clinical assessments, remains the gold standard for diagnosis in atypical cases.

This report contributes to the limited literature on compartment syndrome without bony injury and encourages clinicians to maintain vigilance in similar presentations. Emergency care teams should be trained to detect subtle signs and initiate fasciotomy even in non-classical presentations.

CONCLUSION

Impending compartment syndrome can occur even in the absence of a fracture, and this case serves as a timely reminder that clinical judgment must always supersede radiological findings. The absence of bony injury should not lull clinicians into a false sense of security when classical symptoms like pain out of proportion, tense swelling, and passive stretch pain are present. Prompt recognition, coupled with a low threshold for fasciotomy, is critical in salvaging limb function and avoiding devastating complications. Through this case, we underscore the importance of maintaining a high index of suspicion in blunt trauma cases—where the threat may be hidden beneath an intact bone but brewing within a confined compartment. Early intervention remains the key to transforming a potential disaster into a limb-saving success story. High suspicion and immediate decompression are key to preserving limb function in cases of compartment syndrome without fracture.

REFERENCES

1. Matsen FA, Krugmire RB. Compartmental syndromes. Surg Gynecol Obstet. 1978;147(6):943-9.
2. Mubarak SJ, Owen CA. Compartment syndromes and Volkmann's contracture. Philadelphia: WB Saunders; 1981.
3. Tiwari A, Haq AI, Myint F, Hamilton G. Acute compartment syndromes. Br J Surg. 2002;89(4):397-412.
4. Rorabeck CH. The treatment of compartment syndromes of the leg. J Bone Joint Surg Br. 1984;66(1):93-7.
5. Elliott KG, Johnstone AJ. Diagnosing acute compartment syndrome. J Bone Joint Surg Br. 2003;85(5):625-32.
6. Whitesides TE, Haney TC, Morimoto K, Harada H. Tissue pressure measurements as a determinant for the need of fasciotomy. Clin Orthop Relat Res. 1975;(113):43-51.
7. Via AG, Oliva F, Spoliti M, Maffulli N. Acute compartment syndrome. Muscles Ligaments Tendons J. 2015;5(1):18-22.