

Medial Malleolar Stress Fracture in a 60-Year-Old Woman: A Case Report

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Received 2022-07-30; Accepted 2023-03-26; Online Published 2023-08-29

Abstract

Introduction: Medial malleolar stress fractures are rare injuries resulting from excessive and repetitive stress loads on bone. The incidence rate of these stress fractures varies from 0.6% to 4.1% of all stress fractures and has been almost exclusively reported in athletes. Typical clinical presentation is a gradual onset of pain and tenderness at the medial malleolus site with a history of long-term physical activity.

Presentation: A 60-year-old postmenopausal woman with a gradual onset of pain and point tenderness over the medial malleolus and a history of daily walking for several months.

Diagnosis: The initial anterior-posterior and lateral plain radiographs were normal. After the initial conservative medication therapy failed, magnetic resonance imaging (MRI) was obtained. It demonstrated a vertical linear zone of decreased signal intensity originating between the tibial plafond and the medial malleolar junction, which suggested medial malleolar stress fracture.

Intervention: We started treatment with a short leg cast and non-weight bearing for six weeks that failed; open reduction and internal fixation were performed under general anesthesia.

Outcomes: Six months postoperatively, the pain entirely resolved, and the patient returned to her regular daily physical activity and conducted plain radiographs demonstrating complete union, and no complications occurred.

Conclusion: Medial malleolar stress fractures are rare injuries and might be misdiagnosed due to normal initial radiographs. They must be considered in those with gradual onset of pain and point tenderness of medial malleolus, especially with a history of long-term physical activity. Early diagnosis and surgical intervention lead to faster healing and a return to physical activity

Keywords: Stress fracture, Medial malleolar stress fracture, ORIF.

Introduction

Lower extremity stress fractures are familiar in athletes and the military.¹ The distal third of the tibia is the most common anatomic site for lower extremity stress fractures.² Medial malleolar stress fractures are a relatively uncommon disorder that accounts for only 10% of all foot and ankle stress fractures with an incidence rate of 0.6% to 4.1% and has been almost exclusively reported in athletes between the ages of 20-40 years.³ Medial malleolar stress fractures occur due to abnormal weight transmission and torsional forces.⁴

Gradual onset of pain and point tenderness on the medial malleolus site, followed by prolonged symptoms, is the typical clinical manifestation of the medial malleolar stress fracture. Although initial routine radiographs as first-line imaging modality are often normal, a vertically oriented fissure originating from the tibial plafond and junction of the medial malleolus or an obliquely arched radiolucent line through the medial malleolus are characteristic radiological appearance.^{5,6}

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Medial malleolar stress fractures are susceptible to progress to complete fracture, delayed union, or nonunion. Therefore, surgical treatment is often preferred, especially in displacement, failure of conservative management, or a nonunion.⁷

In this study, we presented a case of a unilateral medial malleolar stress fracture in a postmenopausal female following long-term walking. We underwent successful operative management by screw and plate. The patient was informed that data related to the case would be used for submission for publication, and informed consent has been obtained.

Case presentation

A 60-year-old postmenopausal woman was admitted to our orthopedic ward to evaluate gradual-onset pain and point tenderness over the right medial malleolus of her ankle, which was first noticed four months ago. No injury or trauma to the ankle occurred, but she had walked about 5 hours a day for the past six months as a daily exercise. Initial routine anterior-posterior and lateral view radiographs from the ankle were conducted, but no abnormalities compatible with fracture were detected (Figure 1).



Figure 1: Plain radiograph of the ankle (AP and lateral view), demonstrating no abnormality

A magnetic resonance image (MRI) was obtained due to the failure of conservative treatment as the pain persisted despite four weeks of nonsteroidal anti-inflammatory (NSAID) application (Figure 2).

The MRI demonstrated a vertical linear zone of decreased signal intensity originating between the tibial plafond and the medial malleolar junction. MRI findings suggested a malleolar stress fracture. After the diagnosis was confirmed, we started the treatment with a short leg cast and non-weight bearing for six weeks, but no subsequent clinical improvement was observed. Therefore, the patient underwent surgery. The anterior-posterior and lateral X-rays were obtained, and the stress fracture was fixed (Figure 3).

During the six-month follow-up period, pain and point tenderness were resolved, and no complications such as malunion, nonunion, delayed healing, nerve damage, and difficulty in walking were developed.

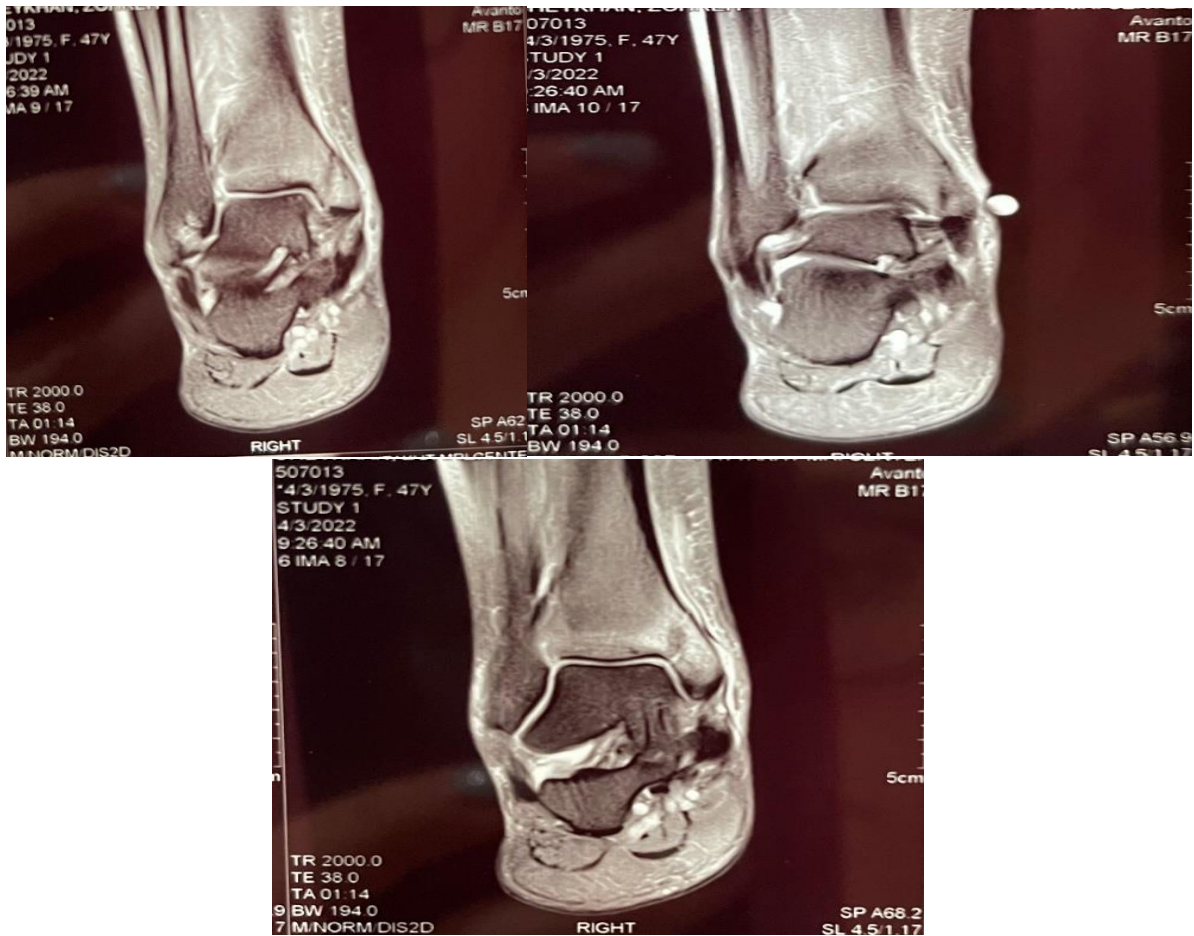


Figure 2. MRI demonstrated a vertical linear zone of decreased signal intensity originated between the tibial plafond and the medial malleolar junction suggesting medial malleolar stress fracture.



Figure 3: The AP and lateral plain radiographs subsequent to the surgical fixation demonstrate that the stress fracture is fixed.

Discussion

Lower extremity stress fractures are a standard incidence in athletes and soldiers and result from excessive and repetitive loads of stress on the bone, which lead to disproportionate bone resorption and formation. This imbalance causes the expansion of microfractures beyond the ability of bone to repair and eventually leads to symptomatic fracture.^{1, 8} A medial malleolar stress fracture is a rare condition with an incidence rate of 0.6% to 4.1% of all stress fractures and occurs almost always in athletes.³

Patients usually have a history of physical activity preceding the symptoms with no history of trauma. Symptoms are often aggravated by physical activity and alleviated by rest. The pain is vague at the ankle site in the early stages. Still, it will become localized to the medial malleolus as the injury progresses without radiation and is often linked with stiffness and swelling.⁹ Shelbourne et al. suggested that medial malleolar stress fractures must be considered in those with chronic or subacute malleolus pain with effusion or a history of worsening the pain with running.¹⁰

First-line imaging modalities for evaluating musculoskeletal injuries and suspected stress fractures are plain radiographs, even though they are insensitive at the early stages.⁶ Radiological characteristics of a stress fracture in the setting of radiographs include subtle linear sclerosis, focal endosteal or periosteal reaction, and fracture through one cortex with the periosteal superimposed response.¹¹ MRI is highly sensitive (100%) but is a second-line modality and is indicated in those whose radiographs are normal, athletes demanding definitive diagnosis, and pain of unknown etiology in which the fracture is demonstrated as a linear hypointense fracture line on T1 and T2-weighted images with adjacent hyperintense tissue.⁶ MRI is recommended if a medial malleolar stress fracture is suspected, and plain radiographs are expected.¹²

The goal of treatment in stress fractures is to decrease the amount of abnormal stress to reach the standard physiologic limit of the bone. The nonoperative choice of therapy is no weight-bearing cast immobilization for usually six weeks if diagnosed and treated early. Still, complete healing can take up to 6 months.^{3, 7} NSAIDs, used frequently in stress fractures due to their effect on inhibition of prostaglandin production as an agent for

normal bone remodeling and healing of the fracture, may interfere with the healing process.⁷ The operative option is indicated in failure of casting, a nonunion, or displacements, and the preferred technique is open reduction and internal fixation, which allows faster healing (four months) and return to activity compared to casting.¹³

Lee et al. reported a 16-year-old athlete with acute onset ankle pain with normal plain radiographs despite subsequent CT-scan and MRI demonstrated medial malleolar stress fracture.¹⁴ They performed open reduction and internal fixation with an arthroscopic method, and the fracture was completely united after three months postoperatively. Menge et al. and Kor et al. demonstrated that operative fixation is the treatment of choice, especially when the patient demands to return to total activity as soon as possible. Percutaneous fixation is recommended if there are no displacements.^{15, 16} Kanto et al. Performed percutaneous fixation with cannulated double-threaded screws on a basketball player with a bilateral medial malleolar stress fracture, and the patient returned to total activity after six months without recurrence.⁵ Shelbourne et al. and Kempainen et al. suggested that the treatment choice in athletes who desire to return to their sports activity is an open fixation with early mobilization. With this technique, the athlete can participate fully for eight weeks.^{10, 12}

In this case report, we present a 60-year-old woman with gradual onset of medial malleolar pain, point tenderness at the medial malleolus site, and a history of long-term walking with normal initial anterior-posterior and lateral view plain radiographs. MRI was obtained, and its findings suggested a medial malleolar stress fracture. The patient underwent open reduction and internal fixation with two screws and a plate. The reason for preferring a surgical approach over a non-surgical treatment was due to shear stress, the high rate of nonunion occurrence following casting, earlier return to normal activities, and lower definitive treatment time. Medial malleolar stress fracture requires a rigid fixation, which cannot be achieved following casting or anchor suture. After six months of follow-up, the pain is completely resolved. Cain's radiographs demonstrated complete union, and the patient returned to her normal activity level without developing complications such as malunion, nonunion, and persistence of the pain.

Conclusion

Medial malleolar stress fractures are rare injuries and can be misdiagnosed. They must be suspected in patients with gradual onset pain or point tenderness over the medial malleolus, especially with a history of long-term physical activity. Initial radiographs may be expected, and an MRI must be obtained if there is a high suspicion of a stress fracture. Early diagnosis and subsequent open reduction and internal fixation lead allow faster healing and return to activity.

Acknowledgments

None.

Conflict of Interest Disclosures

The authors declare that they have no conflict of interest.

Funding Sources

None.

Authors' Contributions

All authors contributed equally to the study.

Ethical considerations

None.

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