Bilateral Fractures of the Medial Malleoli Without a History of Trauma

Christopher A. Looze, BS, Brian Golden, MD, and Kenneth A. Egol, MD

We report the case of a woman in her late 60s with bilateral fractures of the medial malleolus that progressed to an unstable ankle mortise on one side. Fractures of the medial malleolus without a history of trauma are uncommon injuries, with most described cases occurring in elderly populations. Many stress or insufficiency fractures about the ankle have been described in case reports, but none has presented in our case's unique manner, with simultaneous bilateral injuries or progression to an unstable mortise. The authors have obtained the patient's written informed consent for print and electronic publication of her case report.

Case Report

A woman in her late 60s presented to our hospital emergency department after having persistent ankle pain for 6 months and progressive loss of ambulation. At time of presentation, she was non–weight-bearing on either ankle. Examination revealed the ankles to be swollen and deformed, but there were no signs of an open wound. The woman reported no increase in activity around symptom onset, and she had not engaged in repetitive stress activities. She also denied undergoing any traumatic event in the time leading up to symptom onset.

The patient was referred in by a rheumatologist who had performed a variety of diagnostic tests. Previously, another physician had used a prednisone taper to treat her "difficulty with gait." The patient reported being a long-time smoker. Computed tomography (CT) of the chest indicated emphysema but no evidence of lung carcinoma. The patient reported no history of fractures and had undergone dual-energy x-ray absorptiometry (DXA) to exclude osteoporosis (results were normal). Whole-body bone scan indicated "severe degenerative or inflammatory disease," but no focalities at either ankle were reported. Bone, CT, and positron emission tomography scans revealed no signs of pathology or malignancy. The possibility of peripheral neuropathy with a resulting Charcot joint had been raised, but the patient did not exhibit any signs of peripheral neuropathy, and lower extremity electromyogram was normal. Last, the rheumatologist did not find any evidence of systemic inflammatory arthritis.

On the patient's admittance to our hospital, radiographs of the right ankle showed a trimalleolar fracture, with the medial malleolus having an oblique fracture line with medial displacement (Figures 1A, 1B), plus malunion of the fibula with approximately 25° of varus. A radiograph of the left ankle showed a minimally displaced fracture of the medial malleolus, again with an oblique fracture line (Figures 1A–1C). Diffuse osteopenia was noted in both radiographs.

The patient underwent surgery. The right ankle required a fibular osteotomy and an intra-articular tibial osteotomy at the apex of the deformity to restore joint alignment.

Figure 1. Preoperative (A) anteroposterior radiograph of left and right ankles, (B) lateral radiograph of right ankle, and (C) lateral radiograph of left ankle show bilateral medial malleoli fractures with fracture of lateral malleolus on right.

Mr. Looze is Medical Student, Department of Orthopaedic Surgery, New York University School of Medicine, New York, New York.
Dr. Golden is Assistant Professor of Rheumatology, Department of Rheumatology, and Dr. Egol is Associate Professor of Orthopaedic Surgery, Department of Orthopaedic Surgery, New York University Hospital of Joint Diseases, New York, New York.

Address correspondence to: Kenneth A. Egol, MD, 301 E 17th St, New York, NY 10003 (tel, 212-598-3889; e-mail, kenneth.egol@nyumc.org).

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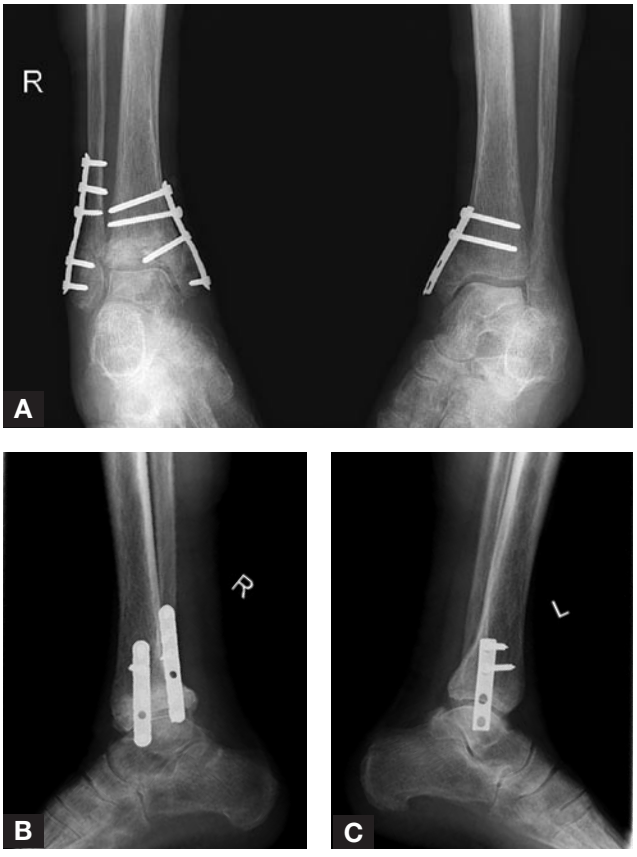

Figure 2. One-month postoperative (A) anteroposterior radiograph of left and right ankles, (B) lateral radiograph of right ankle, and (C) lateral radiograph of left ankle show restoration of joint alignment with plate and screw fixation bilaterally.

Figure 3. One-year postoperative (A) anteroposterior radiograph of right ankle, (B) anteroposterior radiograph of left ankle, (C) lateral radiograph of right ankle, and (D) lateral radiograph of left ankle show complete healing of injury with slight malunion of right distal tibial articular surface and mild degenerative changes on right.

After the joint contour was corrected, a 5-hole one-third tubular locking plate was affixed medially to stabilize the reduced fracture. Laterally, a 6-hole one-third tubular locking plate was affixed to stabilize the fibula (Figures 2A–2C). A 4-hole one-third tubular plate was affixed at the fracture site on the contralateral side as an antiglide device with only 2 of the 4 screw holes filled to prevent progression of deformity and promote bony union.

After surgery, the patient was kept non–weight-bearing for 8 weeks but was allowed to perform ankle range-of-motion exercises. When radiographs showed evidence of bony union (2 months after surgery), she was allowed to return to full weight-bearing. By 6-month follow-up, she was ambulating without an assistive device, and radiographs showed complete healing of the fractures with a slight malunion in the right distal tibial articular surface. At 1 year, she was back to her baseline functional status, and radiographs were consistent with mild degenerative changes on the right (Figures 3A–3D, 4).

Discussion

This case demonstrates a lack of readily identifiable risk factors leading to fracture about the ankle without antecedent trauma. Our patient, who had bilateral unstable fractures of the medial malleoli, had not previously been identified as being at high risk for developing such injuries. In addition, she had been treated for several months leading up to this severe presentation without such a diagnosis. Although the literature includes cases and studies of insufficiency fractures, this presentation remains unique.

Steckel and colleagues[1] reported the case of an athlete who presented with bilateral stress fractures of the medial malleoli within 21 months of each other. This patient was treated with arthroscopy on one side and osteosynthesis and arthroscopy on the other side. Although bilateral, the injuries presented 21 months apart, not concurrently, as in our patient's case. In addition, their patient was involved in repeated stress exercises, and the injuries were classified as fatigue-type stress fractures, whereas our patient had an "insufficiency"-type fracture.

Kaye[2] reported a retrospective study of 12 insufficiency fractures in 11 postmenopausal women. Only 1 of these fractures was an insufficiency fracture of the medial malleolus, excluding the possibility of bilateral presentation. In addition, the patient with the fracture of the medial malleolus had sclerosis of the medial distal tibial metaphysis, which our patient was not noted to have. However, Kaye noted that

Figure 4. At 1-year postoperative clinical visit, patient was clinically assessed as being back to baseline functional status.

treatment of osteopenia is an important element in the treatment of insufficiency-type stress fractures, which is consistent with the finding of osteopenia in our patient.

Stress fractures are commonly divided into 2 subtypes. Fatigue-type stress fractures result from repetitive overload on normal bone, exhausting the normal remodeling process. Insufficiency-type fractures result from normal stresses on abnormal bone.[3] The diagnosis of either type of stress fracture is primarily based on history and physical examination. Often, stress fractures present with an unremarkable radiologic finding, making radiology a confirmatory but not exclusive test.[4,5] Our patient denied engaging in repeated stress activity or increased activity in the time leading up to symptom onset. In addition, she denied having undergone a traumatic event before symptom onset. Radiographs showed an oblique fracture pattern in both ankles, which is less common than the vertical fracture line in most insufficiency fractures about the ankle, adding to the unique nature of this case. As suggested by the literature for radiographically confirmed stress fractures of the medial malleolus, we advised our patient to undergo operative treatment.[5] Patients who undergo open reduction and internal fixation can be expected to return to full activity 6 to 8 weeks after initiation of treatment. Our patient, in concordance with this, was returned to full weight-bearing 2 months after surgery.

The role of bone density in predicting risk for developing fatigue-type stress fractures has been studied in athletic and military populations.[6-9] These studies with their contradictory outcomes did not agree on bone density as an identifiable risk factor. Beck and colleagues[6] and Myburgh and colleagues[9] identified lower bone density as an indicator of susceptibility to stress fracture, but they neither correlated these findings to insufficiency fracture nor set guidelines for evaluating individual cases. Lack of these 2 features renders the results inapplicable to relating the osteopenia noted on our patient's radiographs to her injury. However, Cooper[10] claimed that osteopenia decreases bone elasticity enough to allow fracture from normal activity, which indicates that the finding in our patient is still an attractive feature for identifying risk for developing such an injury, despite the fact that our patient was not diagnosed with osteoporosis on the basis of history and DXA bone densitometry.

The underlying bone abnormality leading to insufficiency fracture in our patient remains unclear, as the causes and predictors of insufficiency fractures have been less extensively studied, and the focus has been on the causes of osteoporosis. Suggested risk factors include but are not limited to female sex, age, postmenopausal hypoestrogenism, short-term steroid use, and osteoporosis.[1,11-13] Many of these risk factors have not been established as primary or secondary and therefore may be highly interconnected. Our patient fits into the female and elderly categories, but neither is stringent enough to be diagnostically significant.

The only relevant finding remains the osteopenia noted on our patient's ankle radiographs. Although she was not diagnosed with osteoporosis, the decreased bone mineral density seen on her plain radiographs may have been significant enough to induce insufficiency fracture.[10] This finding highlights a potential limitation in diagnostic criteria for osteoporosis, as the definition reads "progressive systemic disease characterized by low bone mass and microarchitectural deterioration of bone tissue with consequent increase in bone fragility and susceptibility to fracture."[14] Our patient was found to be negative for systemic osteoporosis (normal DXA score) and yet to have some decreased bone mineral density and increased susceptibility to fracture. In the event that low bone mineral density led to fracture, the diagnostic criteria were too limited.

Transient regional osteoporosis, another possible diagnosis, was in our patient's case not supported by plain radiographs or magnetic resonance imaging, the common confirmatory tests. In addition, this condition has been characterized by its self-limiting nature and has been differentiated from more aggressive disorders, such as osteonecrosis, that can lead to more advanced presentations, as seen in our patient.[15]

Osteonecrosis is an additional possible cause of bone abnormality leading to the fractures in our patient's case. The pathophysiologic causes of osteonecrosis include vascular interruption caused by trauma, thrombotic occlusion, and extravascular compression.[16] Traumatic event was denied by our patient, and therefore vascular interruption was excluded. Thrombotic occlusion and extravascular compression are considered either secondary or idiopathic. The conditions leading to secondary osteonecrosis include bisphosphonate use, corticosteroid use, alcoholism, sickle cell disease and other hemoglobinopathies, Gaucher disease, myeloproliferative disorders, chronic pancreatitis, caisson disease, and radiation, none of which was reported or found in our patient.[17,18] Idiopathic osteonecrosis has been rendered a categorical classification, as most cases initially found to be idiopathic have been identified as caused by thrombophilias or hypofibrinolyses, neither of which was reported or found in our patient.[18] Lack of an identifiable condition leading to osteonecrosis leaves this diagnosis as an improbable but possible cause of underlying bone abnormality in our patient.

Conclusions

This case report illustrates an extreme presentation of bilateral ankle fractures in a woman who had not been identified as being at high risk for developing such an injury and who had not sustained any trauma. Although bone density and bone quality screening is recommended for women who are our patient's age, this case reiterates the importance of evaluating elderly women for decreases in bone density and bone abnormality and their potential causes. In addition, it highlights the need for more readily identifiable risk factors leading to insufficiency fracture and should serve as a caveat for physicians dealing with older women with musculoskeletal pain.

Authors' Disclosure Statement

The authors report no actual or potential conflict of interest in relation to this article.

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