Ir Med J; July-August 2023; Vol 116; No. 7; P802
17th August, 2023

Mortise Ankle X-Rays in Surgical Planning and Post-op Recovery

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As with much of orthopaedics, radiography remains the principal evaluation strategy when investigating trauma of the ankle joint. This joint, composed of the tibia, fibula, and talus, is one of the most commonly injured joints and is the most common type of fracture treated by orthopaedic surgeons[1]. Most ankle fractures are malleolar, predominantly involving the lateral malleolus. Patients usually present with unimalleolar fractures but bimalloelar or trimalleolar fractures can develop with more significant trauma. Due to the common presentation of ankle fractures in the Emergency Department (ED) and in outpatient orthopedic fracture clinics, knowledge about proper imaging and radiography can help guide a surgeon's decision to operate versus proceed with conservative management. This, in turn, is critical for patient management and prognosis with regards to post-operative mobility and rehabilitation.

Although ankle injuries are quite common, fractures of the ankle or mid-foot occur in less than 15% of cases that present to the ED[2]. The vast majority of ankle injuries tend to be sprains, but most patients end up undergoing radiography anyways[2]. For this reason, the Ottawa ankle rules were developed in 1992 to try and rule out fractures of the malleolus and mid-foot. This instrument has been validated and modified in several clinical settings and has led to a large reduction in the number of ankle radiographs needed[2]. According to this highly sensitive instrument, radiography of the ankle is required when there is pain in the malleolar region AND any of the following[2,3]:

i) Bone tenderness along the distal 6cm of the posterior edge of the fibula or tip of the lateral malleolus.
ii) Bone tenderness along the distal 6cm of the posterior edge of the tibia or tip of the medial malleolus.
iii) Inability to weight bear for 4 steps (immediately or in the ED).

The initial radiological investigation of a joint, especially when looking for fractures, begins with plain films as this is a quick, cheap, and reliable option[4]. At minimum, an X-ray series should include at least two joints and two views at 90° angles to each other. The ankle joint, however, should include a third view called the internal oblique or mortise view. In this view, the long axis

of the foot is internally rotated 15-20 degrees by the radiographer and the foot is plantar flexed such that the medial and lateral malleoli are at the same height[4]. The mortise view allows for better visualization and examination of the articular joint space between the talus (inferiorly) and tibia/fibula (superiorly), which should be symmetric and no more than 4mm in width[1,3].

Numerous studies have shown that superior radiographic efficiency can not only lead to better use of personnel and reduce financial costs, but also allow for better surgical planning and outcomes post-operatively for patients[5,6]. An audit was undertaken at our institution to see whether surgical planning and post-operative outcomes were influenced by the presence of absence of a mortise ankle X-ray view in patients who suffered an ankle fracture.

In this audit, we analyzed all patients who were referred to Our Lady of Lourdes Hospital's Virtual Fracture Clinic (VFC) following an ankle fracture between January 1st and April 4th 2023 as well as patients who presented to the Outpatient Fracture Clinic (OFC) for follow-up in the same interval of time. We gathered patient clinical information from Pathpoint and used the National Integrated Medical Imaging System (NIMIS) as the imaging system to look at radiological images taken both pre- and post-operatively in the same patient cohort. In total, there were 77 patients in our audit (N = 76; 31 M, 45 F), with one patient being excluded as there was no pre-op X-rays on file. In total, 44 of these patients (58%) received a pre-operative mortise X-ray view along with the standard antero-posterior (AP) and lateral views. The remaining 33 (42%) of our cohort received only an AP and lateral X-ray of the ankle. Of the 44 patients who received a pre-operative mortise X-ray view, 36 (82%) went to theatre for surgery. Compare this to the 7/32 patients (22%) who underwent surgical intervention with only standard AP and lateral X-ray views.
Furthermore, the 43 patients who had surgery were followed up in the outpatient fracture clinic 6 weeks post-operatively. After reviewing patient files, it was revealed that 94% (34/36) who received a pre-operative mortise X-ray view had returned to normal physical activity. Compare this to only 57% (4/7) of those who only received standard imaging and no mortise X-ray pre-operatively.

The results of this audit suggest that the addition of a mortise ankle X-ray view allows for better pre-operative surgical planning, which in turn leads to better results post operatively. This is reflected by the greater number of individuals who went to theatre for surgery with a mortise ankle X-ray as well as an accelerated return to normal physical activity in those who received the 3 views. For this reason, it is recommended that all future patients who present to the institution and who require an ankle X-ray series based on the Ottawa rules receive an AP, lateral, and mortise view of the joint.

Declaration of Conflicts of Interest:
None declared.

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