Original Article With Video Illustration

The Posterior Impingement View: An Alternative Conventional Projection to Detect Bony Posterior Ankle Impingement

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Purpose: The purpose of the current study was to clinically evaluate the diagnostic value of the new posterior impingement (PIM) view in the detection of an os trigonum, compared with the standard lateral view, using computed tomography (CT) as a reference standard. **Methods:** Three observers, 2 experienced (orthopaedic surgeon and radiologist) and one inexperienced (resident), independently scored 142 radiographic images for the presence of an os trigonum. The diagnostic performance was assessed using the computed tomographic scan as the reference standard. Accuracy, sensitivity, specificity, positive predicted value (PPV), and negative predicted value (NPV) were calculated. **Results:** The PIM view had significantly superior accuracy compared with the lateral view for each observer: orthopaedic surgeon, PIM view = 90 versus lateral view = 75 ($P = .013$); radiologist, PIM view = 80 versus lateral view = 64 ($P = .019$); resident, PIM view = 90 versus lateral view = 79 ($P = .039$). The mean sensitivity and specificity of the lateral view for all observers was 50% and 81%, respectively. For the PIM view, this was 78% and 89%, respectively. The PPV was 50% for the lateral view and 70% for the PIM view. The NPV was 84% for the lateral view and 93% for the PIM view. **Conclusions:** The PIM view has significantly superior diagnostic accuracy compared with the conventional lateral view in the detection of an os trigonum. In cases of symptomatic posterior ankle impingement, we advise that a PIM view be used instead of or in addition to the standard lateral view for detection of posterior talar pathologic conditions. **Level of Evidence:** Level II, development of diagnostic criteria on basis of consecutive patients with universally applied reference gold standard.

Posterior ankle impingement is a common pathologic condition that can be divided into bony and soft tissue impingement.[1-8] Bony impingement is caused by an enlarged posterior talar process (Stieda process) or an os trigonum.[9] The os trigonum is the most common cause of symptomatic posterior ankle impingement,[10,11] Surgical treatment of bony impingement is effective if the correct diagnosis is made.[3,5,6,10-21] Frequently, however, the pathologic process causing impingement is not found on lateral radiographs. This may result in a delay in treatment or may require additional more expensive imaging studies.[7,22-25]

The standard lateral radiograph has been used as the primary diagnostic tool in symptomatic posterior ankle impingement.[22,24,26,27] Diagnosing an os trigonum based solely on clinical examination and conventional radiographs creates a challenge because of superposition of surrounding tissues (distal fibula and posterior talar ridge) in the posterior region of the talus.[22,25,27,28] The current method to avoid false-negative diagnoses is additional assessment with more advanced imaging such as computed tomography (CT), magnetic resonance imaging (MRI), and technetium bone scanning.[11,13,22,24,26,28,29] These additional techniques, although they have increased diagnostic value, do have their own set of disadvantages—increased costs and increased radiation—and are more time-consuming.[30] An alternative conventional imaging method with an altered beam direction may provide superior diagnostic accuracy compared with the

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Fig 1. Conventional standard view of the ankle of a 21-year-old female patient. Note how the posterior talar facet is not clearly distinguished.

Fig 2. Posterior impingement (PIM) view of the ankle (same patient as Figure 1). The posterior talar facet is clearly distinguishable (black arrows), evidently showing an os trigonum (white arrow).

standard lateral view (Fig 1), with fewer disadvantages than with advanced imaging (CT/MRI). Based on anatomic studies and a CT-based calculation model performed at our institution, the os trigonum is expected to be best visualized with a lateral 25° external-rotation oblique view of the ankle. This posterior impingement (PIM) view (Fig 2) was designed to have the beam perpendicular to the posterior talar ridge (and possible os trigonum). The purpose of the current study was to clinically evaluate the diagnostic value of the new PIM view in the detection of an os trigonum compared with the lateral view, using CT as a reference standard. Our hypothesis was that the PIM view has higher diagnostic accuracy compared with the conventional lateral view in the detection of an os trigonum.

Methods

This trial was designed and conducted according to the Standards for Reporting of Diagnostic Accuracy (STARD) guidelines and was approved by the Medical Ethical Committee of our institution.[31]

Patients

All consecutive patients, 18 years and older, who visited our outpatient clinic between December 2010 and September 2011 with clinically suspected soft tissue or bony posterior ankle impingement, also known as the os trigonum syndrome, were eligible for participation (all patients at risk). Suspicion of the os trigonum syndrome by our senior staff, experienced foot and ankle surgeons, is based on the following: among other clinical tests, it is standard to evaluate whether the posterior impingement test (sudden passive hyper–plantar flexion of the ankle) is positive; furthermore, patient complaints are evaluated (pain on hyper–plantar flexion) consisting of retrocalcaneal pain aggravated on walking, running, and forced hyper–plantar flexion.[6,12,20,32]

The required imaging for inclusion consisted of a lateral view, a PIM view, and CT of the affected ankle. Data were collected prospectively, creating a database with all images of included patients. The study was conducted retrospectively, and images were independently scored for the presence of an os trigonum. An os trigonum was defined as an osseous structure located posterior to and separate from the lateral tubercle of the posterior talar process and in the same sagittal plane as the lateral tubercle of the posterior talar process. If any osseous structure was identified on CT as bridging, this was defined as an enlarged posterior talar process instead of an os trigonum. One experienced orthopaedic surgeon (C.N.v.D), one experienced musculoskeletal