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A new assessment for syndesmosis injury – The 'Chertsey test'

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ABSTRACT

Introduction: If a syndesmosis injury is not detected, or not treated appropriately, it can lead to pain and arthritis. Various techniques have been described to look for the presence of a syndemosis injury. If concern is raised regarding malreduction, the most recognised way of checking accuracy of the reduction (of the fibula into the incisura) is bilateral postoperative ankle CT scans. This not only exposes the patient to further radiation, but can normally only be done once the surgery is completed and so if adjustment is needed, this requires a further operation, encompassing further surgical risks.

We developed a simple assessment, which both gives accurate intra-operative demonstration of an injury to the syndesmosis and also can check how well the fibula has been reduced (if required), without the need for further radiological investigation or surgical intervention.

The objectives were to test how easy it was to perform the test and apply it to a number of different ankle fractures.

Methods: Peri-operatively, 2–4 ml of contrast medium was injected into the ankle joint in cases where there was concern about injury to the syndesmosis. If there was a 'positive' test, and a 'blush' of dye leaked into the surrounding soft tissues, then fixation of the syndesmosis was performed (as per the surgeon's preferred technique). After fixation was completed, a further injection of contrast medium was injected to see if the fibular had been anatomically reduced into its incisura. The test was performed on 15 ankles.

Results: There were no difficulties in performing the test and no complications reported. The test clearly demonstrated where there had been an injury to the syndesmosis and also confirmed the accurate reduction of the fibula when there had been stabilisation of the syndesmosis.

Conclusions: It has proved to be an easy and reliable adjunct to ankle fixation surgery and may have further indications.

Introduction

Injury to the syndesmosis occurs with a variety of ankle trauma and may require operative fixation. It is known that if a syndesmosis injury is not detected or not treated it leads to pain and arthritis [1]. Syndesmotic injury may be detected either by clinical testing or radiologically. Many fixation methods have been described, and currently there is no consensus on the best technique. What has been shown is up to 40% of fixations have a degree of malreduction [2]. We describe a simple technique, which both gives accurate intra-operative assessment of injury to the syndesmosis and also can check how well the fibula has been reduced, if required.

The syndesmosis is a fibrous articulation between the distal tibia and fibula. The fibular sits in a shallow groove of the tibia called the incisura and is held firmly by three strong ligamentous complexes: that of the anterior and posterior, as well as the interosseous ligaments.

There is a small recess of the ankle joint vertically into the syndesmosis (recessus tibiofibularis) which is almost always present and varies in size but can be up to 25 mm [3–5].

The type of ankle injury which is most associated with disruption of the syndesmosis is the pronation external rotation or pronation abduction type resulting in a high fibula fracture; either a Weber C or Maissonneurve pattern. It can also arise from a supination external rotation injury associated with a lower, Weber B fracture [6,7]. Rarely, there is complete disruption without bony injury [8].

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It is not known what degree of syndesmosis injury will result in symptomatic instability. It is also unknown how much the normal range of movement in the syndesmosis joint is, which means that all syndesmosis tests are subjective to a degree, as there is no clear end-point of a test.

Assessments can be divided into pre-operative and intra-operative ones. The main pre-operative ones are based on analysis of the post-injury radiographs. These may demonstrate an obvious injury with a clear widening of the syndesmosis. However, many injuries are subtle and either require comparison radiographs with the non-injured side or looking at specified radiographic criteria [9]. More recent studies have shown these criteria are poor at predicting syndesmosis injury. It seems radiographs alone are not enough to determine the need for transsyndesmotic fixation. Nielson et al. showed, the level of fibular fracture does not correlate reliably with the integrity or extent of the interosseous membrane tears and advocated the importance of intra-operative testing [10].

The most frequently described intra-operative tests are the 'external rotation technique' (when the foot is held in a plantigrade position then externally rotated resulting in opening of the syndesmosis if injured) and the hook, or Cotton, test (when a tool such a metal hook is placed over the fibula and traction applied both laterally and in the anteroposterior planes). Cadaveric studies have shown the hook test to be more reliable and a force of 100 N is deemed sufficient to demonstrate injury [11]. How to easily replicate this force this in vivo has not been explained. This lack of an adequate assessment for syndesmosis injury means the operating surgeon will not know how much traction to apply to the fibula nor how much fibula translation is abnormal. This may explain why Stark et al. found syndesmotic instability in 39% of 238 unstable Weber B supination-external rotation lateral malleolar fractures they tested, after anatomical bony fixation [12].

Methods

Patients had standard post injury radiographs first of all and then proceeded to surgery when their soft tissues were deemed appropriate by the operating surgeon. In this first example, the pre-operative radiograph displays a medial malleolar fracture but no obvious radiographic evidence of syndesmosis injury (Fig. 1). With the patient on the operating table, typically supine with a sandbag under their ipsilateral buttock, an AP radiograph is taken in the standard fashion with the leg internally rotated by about 15 degrees to give a 'mortice' view. In this example the medial malleolus has been reduced and fixed with two partially threaded cancellous screws (Fig. 2). A fine gauge needle (in our example a 22G spinal needle) is inserted into the lateral aspect of the ankle joint under Image Intensifier guidance and 2–4 ml of opaque contrast injected. If there has been disruption to the syndesmosis, a 'blush' of contrast is seen tracking up the syndesmosis, highlighting the extravasation of synovial fluid into the syndesmosis (Fig. 3). If no injury has occurred, the radio-opaque contrast collects only in the

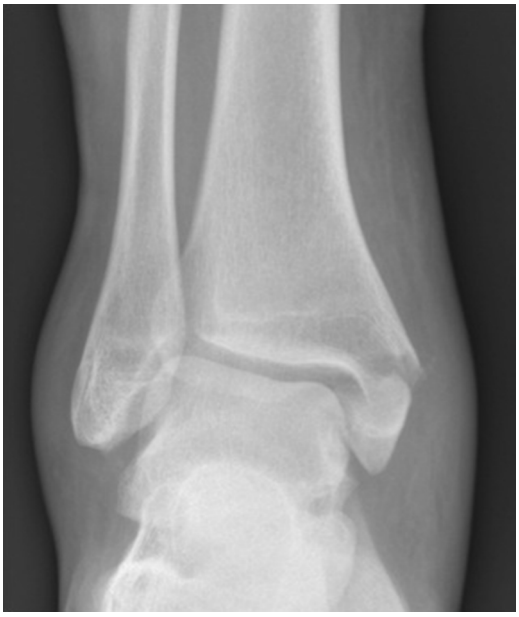

Fig. 1. Fracture of medial malleolus.

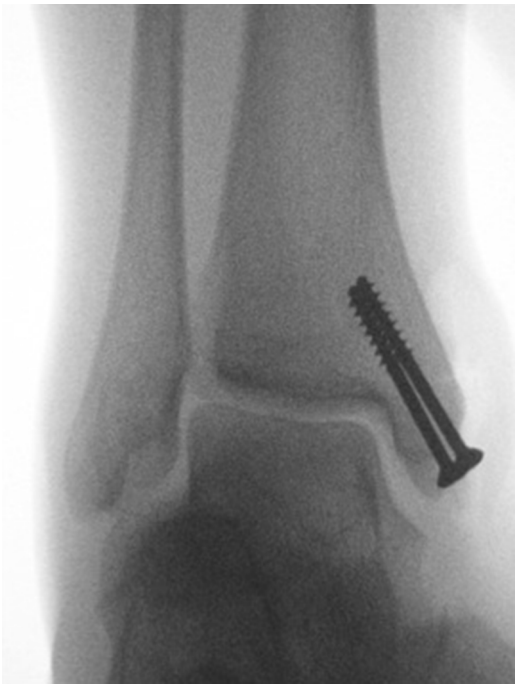

Fig. 2. Intra-operative image showing medial malleolus fixed with partially threaded screws.

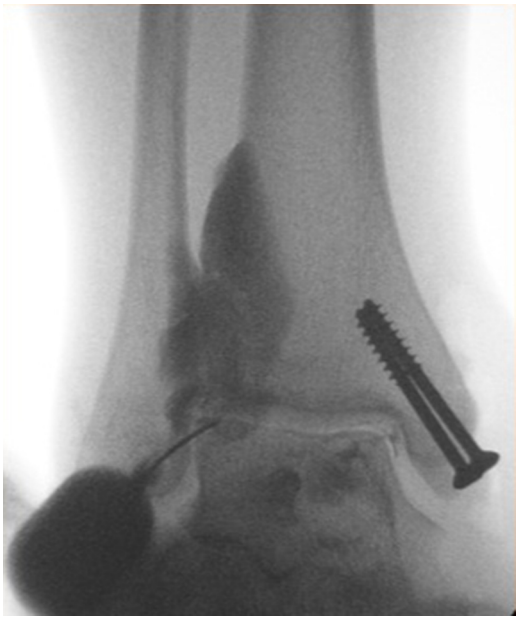

Fig. 3. Extravasation of intra-articular contrast demonstrating a positive 'Chertsey test'.