#1767

The Importance Of Fibular Clamp Position On Syndesmotic Reduction

David J. Hak

Denver Health / University of Colorado, Denver, United States

keywords:Syndesmotic Malreduction, Clamp Position, Open Reduction And Internal Fixation

Introduction: Several recent clinical studies have highlighted the difficulty of achieving an anatomic syndesmotic reduction in Weber C ankle fractures. While numerous clinical and biomechanical studies have investigated various controversies regarding the syndesmosis, none has examined the effect of clamp position on the accuracy of syndesmotic reduction.

Objectives: The purpose of this study was to investigate how varying clamp placement on the fibula effects the accuracy of syndesmosis reduction in simulated Weber C ankle fractures. We hypothesized that anterior and posterior clamp placement would malrotate the fibula and cause syndesmotic malreduction.

Methods: Weber C (AO/OTA 44C2.1) fractures were simulated in 20 fresh frozen cadaveric ankles by osteotomizing the fibula 10 cm proximal to the ankle joint, and sectioning the deltoid, distal tibiofibular and interosseous ligaments. The ankles were randomized to syndesmotic reduction using large pointed tenaculum clamp with the tine placed either at the mid-axis of the fibula, 5 mm anterior to the mid-axis, or 5 mm posterior to the mid-axis. The position of the medial tine was standardized in all groups. A fourth group consisted of manual syndesmotic reduction with direct pressure. Optimal syndesmotic reduction was confirmed with fluoroscopy and the position of the fibula secured by internal fixation.
AP, mortise and lateral radiographs were taken both prior to fracture creation and after syndesmotic reduction. Standard measurements were made to assess the relationship of the syndesmosis and ankle. CT scans were obtained of the ankle following syndesmotic reduction and the accuracy of the reduction assessed. A line tangent to the incisura surface was used to locate the anterior and posterior facets of the tibiofibular joint and the distance between the anterior and posterior facets and the fibula was measured.

Results: All of the reduction methods provided syndesmosis reduction to within 2mm difference between the fibula and the anterior and posterior facets of the tibial incisura as measured on CT scan. Posterior tine position on the fibula resulted in an external malrotation deformity in 20 % of cases. Mid-axis fibular tine placement resulted in a low rate of malrotation deformities, which were both internal and external deformities. Anterior fibular tine placement resulted in 1 internal malrotation deformity. Fibular tine placement in the anterior third of the fibula provided the smallest average difference between the anterior and posterior tibiofibular distances at the incisura (0.2 mm for anterior placement, 0.4 mm for mid-axis placement, and 0.5 mm for posterior axis placement). Manual pressure reduction of the fibula produced the highest average difference between the anterior and posterior tibiofibular distances at the incisura (0.8 mm).

Conclusions: Reduction of Weber C (OTA 44C2.1) fractures using a large pointed tenaculum clamp appears to provide accurate reduction of the syndesmosis in the majority of cases regardless of fibular tine position. Posteriorly placed fibular tine position can produce an external rotation malreduction of the syndesmosis in 20 % of cases and should be avoided as this malreduction is difficult to identify on fluoroscopic imaging alone.