

Computed Tomography is the New Gold Standard for the Diagnosis of Acute Isolated Syndesmotic Injury

Alexander Kunde, James Turner Vosseller¹, Arne Kienzle, Henrik Constatin Backer²

¹Jacksonville Orthopaedic Institute, ²Charite Berlin

INTRODUCTION: Acute isolated syndesmotic injuries have a high potential of being misdiagnosed at initial presentation. Unstable high ankle sprains can cause consequential damage such as chronic pain and instability of the ankle and can lead to an early onset of osteoarthritis if not diagnosed or treated properly. Current guidelines lack objective and standardized diagnostic criteria that can be used to reliably identify a potentially unstable isolated rupture of the syndesmosis. Although MRI is the current gold standard in non-invasive diagnostics, it is not always available immediately and can be much more expensive than other radiographic methods. This study aimed to determine cut-off values for conventional radiography and computed tomography for the diagnosis of acute isolated syndesmotic ruptures.

METHODS:

A matched case-control study was conducted searching our trauma database between 2009 and 2021. All patients presenting with acute isolated syndesmotic injuries who underwent surgery were included. Exclusion criteria consisted of incomplete records, patients without a syndesmotic injury, or a concomitant injury.

The control group included healthy patients who had no injury to the ankle joint and underwent conventional radiography or computed tomography for other reasons. In the period of interest, a total of 63 x-rays and 17 CT scans met inclusion criteria. On mortise view the medial clear space (MCS), the tibiofibular clear space (TFCS), and the tibiofibular overlap (TFO) were measured 10mm above the tibial plafond. CT scans were reconstructed to generate a standardized axial view 10mm above the plafond. In total six distances and one angle were measured to quantify posterolateral translation and external rotation of the fibula.

The statistical part of the study consisted of two steps. First, a two-sided t-test was applied to analyze significance which were set to $p < 0.05$. In a further step, a receiver operating characteristic curve was used to determine cut-off values for the most significant parameters.

RESULTS:

Based on the 63 x-rays, the MCS was found to be most significant with a mean value of 3.63 ± 1.06 mm in the experimental group and 2.70 ± 0.62 mm in the control group ($p < 0.001$). An area under the receiver operating characteristic curve (AUC) of 0.77 was calculated and an upper cut-off value of 3.39mm was found to have the highest diagnostic accuracy showing a sensitivity of 90.5 % and a specificity of 36.5 %.

The CT scan showed much higher diagnostic value. The sum of the three individual interosseous distances showed a significant posterolateral translation of the fibula. The experimental group presented a mean value of 20.63 ± 2.45 mm compared to 15.04 ± 2.56 mm in the control group ($p < 0.001$). The receiver operating characteristic curve revealed an AUC of 0.95 giving a sensitivity of 94.1 % and a specificity of 88.2 % for a cut-off value of 17.95mm.

DISCUSSION AND CONCLUSION: CT scans have a high predictive value when measuring the sum of the syndesmotic distance in suspected injuries and should be obtained in the emergency room. We established new cut-off values to reduce misdiagnosis and help clinicians in interpretation.