

## Improving Diagnostic Accuracy of Ankle Syndesmosis Injuries: A Comparison of Traditional Radiographic Measurements and Computed Tomography-Based Measurements

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**Abstract :** Ankle syndesmosis injuries pose a significant challenge in orthopedic practice due to their potential for prolonged recovery and chronic ankle dysfunction. Accurate diagnosis and management of these injuries are essential for achieving optimal patient outcomes. The use of radiological methods, such as X-ray, computed tomography (CT), and magnetic resonance imaging (MRI), plays a vital role in the accurate diagnosis of syndesmosis injuries in the context of ankle fractures. Treatment options for ankle syndesmosis injuries vary, with surgical interventions such as screw fixation and suture-button implantation being commonly employed. The choice of treatment is influenced by the severity of the injury and the presence of associated fractures. Additionally, the mechanism of injury, such as pure syndesmosis injury or specific fracture types, can impact the stability and management of syndesmosis injuries. Ankle fractures with syndesmosis injury present a complex clinical scenario, requiring accurate diagnosis, appropriate reduction, and tailored management strategies. The interplay between the mechanism of injury, associated fractures, and treatment modalities significantly influences the outcomes of these challenging injuries. The long-term outcomes and patient satisfaction following ankle fractures with syndesmosis injury are crucial considerations in the field of orthopedics. Patient-reported outcome measures, such as the Foot and Ankle Outcome Score (FAOS), provide essential information about functional recovery and quality of life after these injuries. When diagnosing syndesmosis injuries, standard measurements, such as the medial clear space, tibiofibular overlap, tibiofibular clear space, anterior tibiofibular ratio (ATFR), and the anterior-posterior tibiofibular ratio (APTF), are assessed through radiographs and computed tomography (CT) scans. These parameters are critical in evaluating the presence and severity of syndesmosis injuries, enabling clinicians to choose the most appropriate treatment approach. Despite advancements in diagnostic imaging, challenges remain in accurately diagnosing and treating ankle syndesmosis injuries. Traditional diagnostic parameters, while beneficial, may not capture the full extent of the injury or provide sufficient information to guide therapeutic decisions. This gap highlights the need for exploring additional diagnostic parameters that could enhance the accuracy of syndesmosis injury diagnoses and inform treatment strategies more effectively. The primary goal of this research is to evaluate the usefulness of traditional radiographic measurements in comparison to new CT-based measurements for diagnosing ankle syndesmosis injuries. Specifically, this study aims to assess the accuracy of conventional parameters, including medial clear space, tibiofibular overlap, tibiofibular clear space, ATFR, and APTF, in contrast with the recently proposed CT-based measurements such as the delta and gamma angles. Moreover, the study intends to explore the relationship between these diagnostic parameters and functional outcomes, as measured by the Foot and Ankle Outcome Score (FAOS). Establishing a correlation between specific diagnostic measurements and FAOS scores will enable us to identify the most reliable predictors of functional recovery following syndesmosis injuries. This comparative analysis will provide valuable insights into the accuracy and dependability of CT-based measurements in diagnosing ankle syndesmosis injuries and their potential impact on predicting patient outcomes. The results of this study could greatly influence clinical practices by refining diagnostic criteria and optimizing treatment planning for patients with ankle syndesmosis injuries.

**Keywords :** ankle syndesmosis injury, diagnostic accuracy, computed tomography, radiographic measurements, Tibiofibular syndesmosis distance

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