

Morphological Analysis of Tibiofibular Disruption Using CT images in Ankle Fractures with Unstable Syndesmotomic Injury

Su-Young Bae, MD, PhD, Jung-Hwan Lee, MD, Woo-Jin Shin, MD

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Introduction/Purpose: We aimed to investigate the diagnostic value of CT scan and the morphologic pattern of distal tibiofibular disruption associated with fracture-type or concomitant avulsion fractures in cases of ankle fracture with unstable syndesmosis requiring surgical fixation.

Methods: 104 cases images(preoperative plane radiographs and CT axial images) of ankle fractures needed syndesmotomic fixation due to unstable syndesmosis on intraoperative stress test were retrospectively reviewed. We classified ankle fractures by Lauge-Hansen classification and AO-OTA classification. Also, associated tibiofibular avulsion fractures including anterior distal tibiofibular avulsion fractures and posterior malleolar fractures were identified. Classification of posterior malleolar fractures based on Bartonicek-Rammelt classification was conducted. We grouped morphologic patterns of distal tibiofibular disruption which is 10mm proximal to the plafond on CT axial images. We divided them into no diastasis, symmetric diastasis, anterior open, and posterior open according to the diastasis pattern, and no translation, anterior translation, and posterior translation depending on sagittal translation. Chi-square test/Fisher's exact test and adjusted residual analysis were used for statistical analysis.

Results: On LH classification, SER in 78(75%), PER in 18(17.3%), and PA in 8(7.7%). AITFL avulsions were in 37(35.6%) and PM fractures in 58(55.8%). Diastasis patterns were recorded in 30(28.8%) of no diastasis, 41(39.4%) of symmetric diastasis, 3(2.9%) of anterior open, and 30(28.8%) of posterior open. Depending on sagittal translation, 53(51.0%) of no translation, 44(42.3%) of anterior translation, and 7(6.7%) of posterior translation. Neither diastasis nor sagittal translation was revealed by CT in 17.3% of all.

Syndesmotomic morphologic pattern was various in SER [no diastasis (35.9%, AR=2.7), posterior open (35.9%, AR=2.7), and anterior translation (48.7%, AR=2.3)] whereas PER had relatively consistent pattern (symmetric diastasis in 88.9%, AR=4.7). Tibiofibular avulsion fractures such as Charput and PM fracture did not create distinct feature of widening.

Conclusion: In terms of syndesmotomic disruption pattern by CT images, PER fractures tend to show simple symmetric diastasis pattern, but SER fractures have a variety of patterns including normal appearance. Even if associated avulsion fracture do not make certain diastasis feature on static CT images, we still have to be careful not to overlook the syndesmotomic instability. Diagnostic value of static imaging such as CT may not be higher than expected if not accompanied with intraoperative dynamic stress test.