

The Role of Computed Tomography Scans in Surgical Planning for Trimalleolar Fractures

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Background/Purpose: The role of preoperative CT scans in surgical planning for the treatment of trimalleolar ankle fractures is unclear. Often, plain radiographs provide poor estimation of the posterior malleolus fracture pattern and size. This issue is further complicated by the lack of professional agreement on treatment methods relating to posterior malleolar fragments, even when the morphology is well-understood. Due to the complexity of posterior malleolar fractures and the difficulties in evaluating the plain radiographic findings, a CT scan is often helpful. Our hypothesis is that a CT scan will affect decision-making regarding the treatment of trimalleolar ankle fractures, leading to a higher rate of fixation of the posterior malleolus.

Methods: A retrospective chart review was performed, after IRB approval, to generate a web-based questionnaire of 10 distinct trimalleolar ankle fracture cases. Inclusion criteria for the cases consisted of trimalleolar ankle fracture diagnosis, age greater than 18 years of age, presence of preoperative radiographs, and preoperative CT scans. Exclusion criteria were inadequate or missing imaging. The survey first presented the preoperative radiographs, asking the surgeon their operative preference, in addition to whether or not they would order a CT scan prior to performing the desired operation. Subsequently, CT scan images were presented of same patient and changes to the surgeons' treatment plan were evaluated. Choices for operative management included: no fixation, percutaneous anterior-to-posterior fixation, percutaneous posterior-to-anterior fixation, open reduction and internal fixation, or syndesmotomic screw fixation only. The survey was distributed to members of the OTA. Operative preference and effect of CT scan on recommended operation were then analyzed.

Results: A total of 171 orthopaedic surgeons completed the survey for a total observation of 1710 distinct cases. Using radiographs alone, respondents deemed posterior malleolus fixation was required for 938 (54.9%) of the cases compared to 1053 (61.6%) after the CT scan was reviewed ($P < 0.001$). Following evaluation of the radiographs, respondents stated they would order a CT 39.8% of the time. The surgeons' operative plan changed in 442 (26%) cases after review of the CT images. Of the 442 observations in which the operative plans were altered, the surgeon had initially stated that they would not have requested CT 50.2% of the time. After completing the survey, 33 of 171 individuals (19.2%) said that they would be more likely to order CT scans for trimalleolar ankle fractures in the future.

Conclusion: The importance of obtaining CT imaging of trimalleolar ankle fractures is becoming more evident. OTA member surgeons recommended operative fixation of significantly more cases after reviewing CT scans than when based on plain radiographs alone. Our survey shows that in 26% of cases, surgeons would alter their operative plan on

the basis of the advanced imaging. In 50.2% of those cases the surgeon failed to appreciate the benefit of a preoperative CT scan and would not have ordered one after the review of the plain radiographs alone. CT scan appears to be a valuable adjunct in determining the fixation management of posterior malleolus fractures and should be strongly considered when determining the preoperative plan for this fracture.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.