Percentage of Articular Surface Debridement is Equivalent in Arthroscopic and Open Ankle Fusions
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Introduction/Purpose: Tibiotalar arthrodesis is a reliable option in the treatment of end-stage ankle arthritis and both open and arthroscopically assisted techniques are well described. When compared head to head, multiple studies have demonstrated advantages of arthroscopic arthrodesis over open fusions including decreased morbidity, and shorter hospital stays while achieving equivalent or increased rates of fusion. It is unclear why arthroscopic fusion may be favorable to open surgery, however, it is hypothesized that patient selection and soft tissue trauma may play a role. No study, however, has evaluated the extent of articular debridement afforded by each technique. The purpose of this study was to evaluate the amount of articular cartilage denuded via open arthrodesis and via arthroscopic arthrodesis with time of procedure evaluated as a secondary measure.

Methods: Six matched sets of fresh frozen cadaver lower extremities were acquired for study. One limb from each set was randomly assigned to open articular debridement while the other limb was assigned to arthroscopic debridement. The duration of each procedure was timed. The tibiotalar joints were disarticulated following debridement and the talus was dissected free of all soft tissue attachments. Photographs of the weight bearing portion of the articular surfaces were then taken and residual cartilage was mapped using ImageJ software. The percentage of the joint debrided was determined by the area of denuded bone divided by the total area of the articular surface to allow for comparison across specimens. The mapping process was blinded to the type of debridement undertaken. Repeated measurements were taken to determine intra- and inter-reliability of the measurements. Student t-tests were used to compare the percentage of joint debrided and differences in time of the procedure.

Results: The average percentage of cartilage debrided in the arthroscopic procedure was 88.99±11.19% for the tibial plafond and 88.84±5.45% for the talar dome. For the open procedure, 82.93±6.91% of the tibial plafond was debrided and 84.08±5.45% of the talar dome was debrided. There were no significant differences of the tibia or talus between the open and arthroscopic procedures (p>0.05). Inter- and intra-reliability were calculated for all measurements with r>0.8. There was a significant difference in the time of the procedure with the arthroscopic debridement taking 50.17±5.57 minutes to complete while the open debridement took 30.67±5.16 minutes to complete (p<0.01).

Conclusion: There were no differences in the percentage of articular surface debrided when comparing arthroscopic versus open arthrodesis of the ankle joint in cadaver specimens. The arthroscopic debridement took significantly longer, however this difference may be offset by a decrease in time required for wound closure. Furthermore, an increased time of debridement may be warranted if it results in decreased wound complications and pain. The results of this study support previous clinical findings that arthroscopic debridement can yield fusion rates comparable to, or better, than open debridement of the ankle joint.

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Figure 1. Comparing the average percent of articular cartilage debrided at the tibiotalar joint in open vs. arthroscopic debridement. No significant differences were observed.