

The Effect of Emergency Department Saline Lavage on Synovial Fluid Composition Following Human Intra-Articular Ankle Fracture: A Randomized Controlled Trial

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Purpose: Posttraumatic osteoarthritis (PTOA) is a frequent, debilitating outcome following intra-articular ankle fracture. Pro-inflammatory mediators present in the synovial fluid fracture hematoma (SFFH) following intra-articular fracture have been linked to cartilage damage that may contribute to the development of PTOA. We performed a randomized controlled trial to determine the effect of percutaneous, saline lavage at the time of emergency department (ED) presentation on the composition of the intra-articular microenvironment at the time of definitive surgical fixation.

Methods: Adult subjects with intra-articular ankle fractures presenting to the ED within 0-24 hours after injury were consented and underwent aspiration of their injured ankle. Patients were then randomized to undergo percutaneous saline lavage (group 1, n = 8) or no lavage (group 2, n = 10) before routine fracture reduction and splinting. Repeat aspiration of the injured ankle was performed when patients returned for definitive surgery. All aspirates were analyzed for the presence of cytokines (interleukin [IL]-1 β , IL-4, IL-6, IL-8, IL-10), matrix metalloproteinases (MMP-1, MMP-2, MMP-3, MMP-10, MMP-13), and the type 2 cartilage breakdown product, CTXII. Final analyte values at the time of surgery as well as the change (Δ) in analyte concentrations between aspirates were compared between groups to determine the effect of lavage.

Results: 18 patients with 18 intra-articular fractures of the ankle were enrolled in this study with a mean age of 49 years (range, 25-69 years). There was no significant difference observed between groups 1 and 2 with respect to the final concentrations or Δ values of any of the measured cytokines, MMPs, or CTXII.

Conclusion: This randomized controlled trial is the first study designed to evaluate the effect of percutaneous saline lavage at the time of injury on the intra-articular microenvironment following human ankle fracture. Our results demonstrate no significant difference between lavage and control subjects with respect to the levels of measured cytokines, MMPs, and cartilage breakdown products.