TITLE: Total Ankle Replacement for Management of Hemophilic Arthropathy

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INTRODUCTION:
Hemophilic arthropathy is a progressive disorder marked by extensive chondral destruction. The ankle is one of the most common joints to be affected, and end-stage changes often manifest by early adulthood. The historical standard treatment is ankle arthrodesis, which is associated with effective pain relief but may lead to accelerated degeneration of the subtalar and midtarsal joints. The use of total ankle replacement (TAR) may mitigate these effects, but only a few reports of its use exist. Critics of TAR in hemophilic patients point to concerns regarding implant loosening and unacceptably high infection risk, which are largely extrapolated from early experience with knee replacements. The objective of this case series is to evaluate function, pain, range of motion, and radiographic implant survival in patients undergoing TAR for end-stage hemophilic arthropathy. Additionally, we describe our technique of talar component fixation with polymethyl methacrylate to mitigate a potential complication of implant subsidence secondary to talar avascular necrosis, which we believe is an often overlooked aspect in the pathogenesis of hemophilic arthropathy.

METHODS:
All eight patients and ankles that underwent TAR with a cemented Scandanavian Total Ankle Replacement, STAR™ prosthesis (Small Bone Innovations; Morrisville, PA) by the senior author for end-stage hemophilic arthropathy were reviewed. High-level factor replacement protocols were followed for the first 2-weeks postoperatively. Patients’ pain levels were assessed preoperatively and postoperatively using the visual analog scale (VAS). Postoperative function was assessed using the AOFAS Ankle-Hindfoot Scale and Short Musculoskeletal Functional Assessment (SMFA) outcomes. Preoperative joint destruction was evaluated using the Kellegren-Lawrence and Pettersson radiographic scoring systems. Implant stability was assessed by comparison of the first postoperative weight-bearing radiograph to the most recent radiographic series obtained during this study and using previously described criteria.

RESULTS:
The median patient age was 41.4 (range, 17.6 – 65.6) years at the time of surgery. The median follow-up duration was 16.2 (N=8; range: 2.0 – 64.7) months. The median preoperative and postoperative VAS was 7.5 (N=8; range, 4 to 10) and 2.5 (N=8; range: 1 to 4), respectively. The median change in VAS was 5.5 (N=8; range: 1 to 8). The median postoperative AOFAS ankle-hindfoot score was 75.5 (N=8; range, 41 to 92). The median postoperative SMFA Dysfunction and Bothersome Index values were 16.9.
(N=8; range, 8.1 to 28.7) and 20.8 (N=8; range, 2.1 to 31.3), respectively. The median ankle arc of motion was 22.5 degrees.

The median Preoperative Pettersson Ankle Classification was 13 (N=8; range, 12 to 13). The median preoperative Kellgren-Lawrence Score for the ankle was 4 (N=8; range, 3 to 4). One patient (N=1; 14%) developed worsening subtalar arthritis as quantified by a change in 1 point in the Kellgren-Lawrence Score. Using the previously described criteria for loosening, one (N=1; 12.5%) patient demonstrated talar component loosening, and none demonstrated tibial component loosening. There were no complications reported.

**CONCLUSIONS:**
TAR in patients with hemophilic arthropathy results in functional outcomes consistent with those reported in patients without hemophilia undergoing TAR, improves postoperative pain levels, and is without significant increased complication risk.