Outcomes Following Total Talus Replacement: A Systematic Review

Lindsey Johnson, Albert Thomas Anastasio, Amanda Nicole Fletcher, Stephanie Hendren, Samuel Bruce Adams INTRODUCTION:

The treatment of pathologic changes to the talus and surrounding joints presents a unique challenge to the foot and ankle surgeon. The first report on partial talus replacement was performed in 1997 for sixteen patients with severe comminution or AVN of the talus in an effort to maintain anatomic motion through the tibiotalar joint and restore height to the ankle. These prostheses were machined, medical-grade, 316-L stainless steel talar body replacement with retention of the native talar head and neck. Subsequently, talus replacements have undergone multiple revisions from the first generation talar body prosthesis with a peg into the talar neck and head, to the second-generation model without a peg, and finally to the final third generation implants that replace the talus in its entirety, termed total talus replacement (TTR). The purpose of this systematic review is to review and summarize the literature for unconstrained (no surrounding fusion or replacement) talus replacement and evaluate whether TTR leads to improved clinical and radiographic outcomes and appropriate safety metrics.

METHODS: This systematic review was reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 reporting guidelines. Concepts of talus and arthroplasty were searched in MEDLINE, Embase, CINAHL Complete, and Scopus from 2005-2021. Inclusion Criteria were 1) previous trauma to the talus, 2) post-traumatic or degenerative arthritis to the tibiotalar joint, 3) avascular necrosis of talus, 4) multiple failed prior interventions, and 5) inflammatory arthropathy to tibiotalar joint. Manuscripts in non-English languages or those with concomitant total ankle arthroplasty or revision arthroplasty were excluded. All study designs were eligible, including randomized controlled trials and prospective and retrospective nonrandomized controlled trials and case series, according to the Journal of Bone and Joint Surgery criteria level I–IV. Both the modified Coleman Methodology Score (CMS) and the Methodological Index for Non-Randomized Studies (MINORS) criteria were used to assess the quality of the included studies.

RESULTS:

Twenty-two studies of 191 patients (196 ankles) were included (Figure 1). Nineteen studies utilized third generation implants, two studies used first generation (n=9) and one study used second generation implants (n = 14) made largely of ceramic (n=84), cobalt chrome (n=49), or titanium (n=24) (Table 1). Patient-reported outcome measures were favorable in all described categories with ten studies reporting an average postoperative change of +2.92° of dorsiflexion and -2.05° plantarflexion at final follow-up (Table 2). The most common adverse outcome was adjacent joint arthritis with five studies reporting some degree of postoperative, degenerative changes in the surrounding joints (n=52). The weighted average modified Coleman Methodology Score was 70.55 of a possible 100, indicating a moderately credible study design overall that may be subject to various forms of bias, results of chance, and possible confounders. The average MINORS criteria was 8.82 of a possible 16 for non-comparative studies and 24 for comparative studies (Table 3).

DISCUSSION AND CONCLUSION:

Despite the current limitations in the literature, TTR is becoming more widely used in the setting of talar collapse, given promising early- and mid-term outcomes. It is an attractive option for patients interested in maintaining range of motion through the tibiotalar joint and allows for maintenance of more normal foot and ankle biomechanics. Still, high complication rates, especially adjacent joint arthritis, may remain under-reported in the literature given inadequate longterm follow-up. Regardless, TTR may represent a valuable tool in the armamentarium of the foot and ankle surgeon, and future research should aim to expand upon the indications of TTR, elucidate survivorship and complication rates, and directly compare TTR to existing forms of salvage options for advanced talar pathology.

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