Total Talus Replacement

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Statement of Purpose

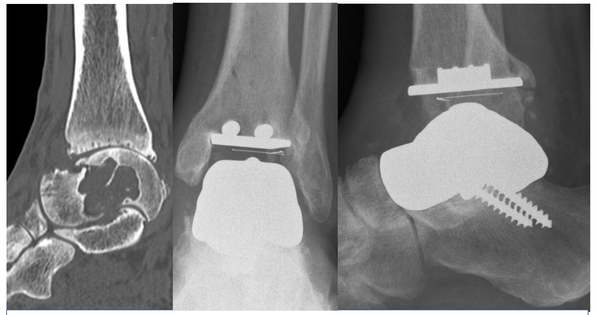
Total talus implants have been used in cases of severe talar degeneration. Ideal material and construct for the 3D printed implants still remains to be elucidated. This case series investigates the use of a cobalt chrome total talus in conjunction with a subtalar fusion and tibial prosthesis in three patients with advanced talar disease.

Literature Review

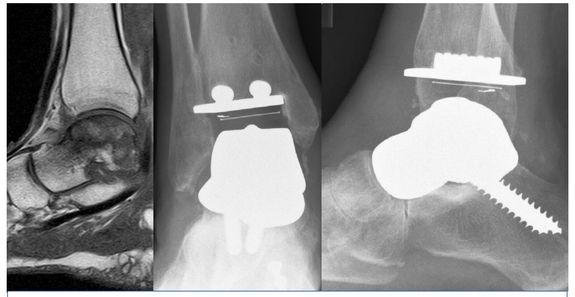
- Harnroongroj et al first described the use of a talar implant[1]. 1st generation implants were comprised of a talar body prosthesis with a peg into the talar neck and head. 2nd generation implants included a talar body without a peg, and 3rd generation implants replace the talus in its entirety[2].
- There is wide variation in design of implants. Most are press-fit into the ankle mortise (unconstrained)[3-8], however some include pre-drilled holes for fusion to the calcaneus or eyelets for ligamentous attachment (constrained)[9-12]. The implants may be designed combined with a tibial prosthesis or in isolation.
- Short to medium term follow up is available for 3rd generation implants; most patients are able to return to activities of daily living with no to minimal pain, and radiographs at final follow up show maintenance of prosthesis position without subsidence[2-12].

Case Series

- Three patients (68-72 yo) with severe post traumatic degeneration of the talus underwent a total talus replacement with subtalar fusion in conjunction with a tibial prosthesis. The talar prosthesis was inserted and fixated to the calcaneus using two 6.5 mm cancellous screws. An appropriately sized polyethylene mobile bearing was inserted. Weight bearing was allowed at two weeks or as dictated by ancillary procedures.
- All implants remained intact one year post operatively. At the most recent follow up, two out of the three ankles had well seated implants without collapse, and had returned to low impact activity. The third patient had loosening of the tibial component and increasing peritalar subluxation, and will require revision.



Case 1: 72M with extensive cystic degeneration of the talus secondary to trauma. **Adjunct procedures**: soft tissue balancing. **Weight bearing:** two weeks. **Clinical follow up:** 12 months; hiking and navigating uneven terrain without pain. **Radiographic follow up:** 7 months.



Case 2: 69F with post-traumatic avascular necrosis of the talus. **Adjunct procedures:** none. **Weight bearing:** two weeks. **Clinical follow up:** 15 months, returned to all activities of daily life. **Radiographic follow up:** 5 months.

Case 3: 68M with post-traumatic avascular necrosis of the talus. **Adjunct procedures:** lateral ankle stabilization, peroneus longus to brevis transfer, plantar release of contracted soft tissue, and dorsal closing wedge arthrodesis at the first tarsometatarsal joint. **Weight bearing:** six weeks. **Radiographs left to right**: pre operative, 6 weeks post operative, 12 months post operative, demonstrating loosening of tibial component and increasing peri-talar subluxation.

Analysis and Discussion

- These results are consistent with current literature on total talus replacement. However, only one study has previously reported on the use of a constrained implant in combination with a tibial prosthesis[2]. This study adds three additional patients with constrained and combined implants.
- This design avoids the potential degradation associated with metal on cartilage wear. Tension on the surrounding soft tissue may also be adjusted by using different sized polyethylene inserts. In addition, the constrained design theoretically allows for more stability of the prosthesis and long-term durability with maintenance of alignment.
- Further research must be undertaken to understand the ideal composition and construct for longevity and function. Total talus replacement is an emerging viable alternative to fusion or amputation in end-stage disease, however remains highly experimental.

References

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