Long-Term Quality of Life Outcomes of Fragility Ankle Fractures Treated with Retrograde Tibiotalocalcaneal Nailing

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INTRODUCTION:

Fragility ankle fractures have traditionally been managed conservatively, or with open reduction and internal fixation. These options may limit early mobilization in an elderly population during the non-weightbearing period, depending on surgeon protocol. The use of retrograde tibiotalocalcaneal (TTC) nailing is gaining popularity as a less invasive surgical option with the benefit of early mobilization and immediate weight bearing, but a major concern with this intervention is decreased patient function due to fusion of the hindfoot. The EuroQol-5D survey, a survey tool with high compliance in elderly patients, was used in this study to assess health-related quality of life (QoL) after fracture healing in a series of fragility ankle fractures treated with TTC nailing.

METHODS:

With IRB approval, retrospective chart review was performed of 209 consecutive isolated ankle fractures treated with retrograde TTC nailing by fellowship-trained trauma surgeons at a single level-one trauma center from 2016-2021 with minimum 2-year follow-up. The indication for all procedures was stabilization of an acute fracture in a manner that allowed for immediate post-operative weightbearing, without preparation of the tibiotalar or subtalar joints for fusion. Demographics, injury patterns, comorbidities, and complications were recorded from chart review. The Euro-Qol-5D was administered via telephone to assess patient satisfaction.

RESULTS:

142 patients (average 67.6 years) were reached for long-term follow-up (average 34.6 months). Injury patterns included pilon fracture (21.8%), trimalleolar fracture or fracture-dislocation (43.8%), bimalleolar fracture or fracture-dislocation (25.1%), and extra-articular distal tibia fracture (9.3%). Of the injuries, 62.5% were open with average wound size of 33 squared centimeters. Indications for retrograde TTC nail included elderly age, dementia, or poor bone density in addition to obesity (76.3%), diabetes (28.2%), neuropathy (32.8%), and end-stage renal disease on dialysis (21.4%) with average Charlson comorbidity index of 4.6. Complications included surgical site infection (4.2%), osteomyelitis requiring surgical intervention (15.4%), and hardware irritation requiring implant removal (10.2%). Chronic osteomyelitis was treated with antibiotic therapy and either implant removal or antibiotic Enders nail placement, dependent on state of fracture healing. Notably, there were no instances of loss of reduction requiring revision, or of persistent infection requiring below knee amputation. The mean EQ5D score, measuring self-reported QoL by patients at maximum follow-up, was 79.

DISCUSSION AND CONCLUSION:

Fragility fractures surrounding the ankle are common injuries in an elderly population. Conservative management is rarely preferred due to the detrimental effects caused by prolonged immobilization in this demographic. When managed surgically with a post-operative protocol allowing for early mobilization, literature has shown there is a limited negative effect on quality of life; prior reports of EQ-5D average 74, compared to 83 in an age-matched population without injury. However, complications do arise, particularly with more complex fracture patterns and associated open injury. Zalavras et al., created a protocol for deep infection following operative treatment of open ankle fractures and report rates of amputation in up to 42% and mortality up to 11%, with diabetes and elderly age as significant pre-operative risk factors. Increased number and size of surgical incisions place a patient at risk of deep infection, particularly those with risk factors for wound healing complications. For these reasons, at this institution, retrograde TTC nailing without joint preparation has been a standard treatment option for ankle fractures in patients with significant comorbidities, open injury with high infection risk, limited baseline mobility, or elderly age. There are concerns in the literature that retrograde TTC nailing lessens functional outcomes due to loss of tibiotalar motion, but the majority of this data is in relation to procedures performed with formal preparation of the tibiotalar and/or subtalar joints for fusion. In this method, the nail provides a functional fusion while remaining minimally invasive without requiring significant incisions in a population that is prone to infection and wound healing issues. In this cohort, the self-reported quality of life score is only 4 points lower than that of an age-matched cohort that did not have injury. Therefore, with proper patient selection, this study suggests that retrograde TTC nailing is an improved treatment option for geriatric or high-risk ankle fractures with low rates of complication, and that ankle range of motion limitations do not significantly affect self-reported quality of life.