Management of Osseous and Soft-Tissue Ankle Equinus During Total Ankle Replacement

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KEYWORDS

• Arthroplasty • Complications • Fixed bearing polyethylene insert • Prosthesis • Surgery

KEY POINTS

- At the time of total ankle replacement, correction of osseous equinus involves anterior tibiotalar cheilectomy and correction of soft-tissue ankle equinus involves either tendo-Achilles lengthening or gastrocnemius recession.
- After joint resection for the specific total ankle replacement system used, the posterior ankle capsule and deep crural fascia are resected followed in more severe deformities by release of the posterior portions of the medial and lateral collateral ligament complexes.
- Ankle dorsiflexion is primarily controlled and restricted not by a single structure but rather by the interaction between most of the ankle ligaments and posterior periarticular capsule structures.
- Further research on this topic is required as combined osseous and soft-tissue ankle equinus is infrequently encountered and more meaningful data are needed to help guide treatment.

INTRODUCTION

Obtaining functional alignment of a total ankle replacement, including physiologic sagittal plane range of motion, is paramount for a successful outcome.[1–9] Soft-tissue ankle equinus correction with either tendo-Achilles lengthening or gastrocnemius recession and posterior ankle capsule release and, in more significant contractures, medial and lateral collateral ligament complex release after osseous joint

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resection, has been described to achieve physiologic sagittal plane range of motion during primary and revision total ankle replacement.[6,10–19] However, correction of severe osseous equinus has only infrequently been discussed and specifically through surgical technique description for the Agility Total Ankle Replacement Systems (DePuy Orthopaedics, Warsaw, IN, USA).[15–18,20]

LITERATURE REVIEW

Queen and colleagues[21] published a study examining the differences in outcomes between patients who underwent concomitant superficial posterior muscle compartment lengthening with total ankle replacement and those who received total ankle replacement alone. In their prospective, nonrandomized study, they examined a total of 229 patients, with 37 undergoing concomitant gastrocnemius recession, 22 undergoing concomitant triple hemisection percutaneous tendo-Achilles lengthening, and 170 undergoing total ankle replacement alone. They compared patients' preoperative status to their 1-year postoperative status with regard to patient-reported outcomes, physical performance, and lower extremity gait mechanics. They found a significant improvement in the superficial posterior muscle compartment lengthening group for most variables between the preoperative and 1-year postoperative scores and that this improvement was greater than that seen in the isolated total ankle replacement group. The investigators point to the possibility that use of concomitant superficial posterior muscle compartment lengthening with total ankle replacement can achieve better postoperative hindfoot position and thus may increase implant longevity by more closely approximating normal ankle anatomy.

DeOrio and Lewis[19] found that a Strayer-type gastrocnemius recession performed in tandem with total ankle replacement resulted in a significant and reproducible increase in dorsiflexion regardless of the results of intraoperative Silfverskiöld test on 29 consecutive patients. They highlight the preference for a gastrocnemius recession over a tendo-Achilles lengthening because of potential push-off and plantarflexion weakness with the latter.

In an anatomic study published in 2011, Gérard and colleagues[22] investigated the effect of ankle collateral ligament release on dorsiflexion, specifically following section of the posterior deep deltoid and the posterior talofibular ligament. In 18 cadaveric specimens, they found a mean increase in ankle dorsiflexion following isolated deep posterior deltoid ligament versus posterior talofibular ligament to be 7.45° versus 3.5°, respectively. They concluded that if following gastrocnemius recession or tendo-Achilles lengthening, persistent restriction remains in ankle, the next step should involve release of the deep deltoid ligament.

SURGICAL TECHNIQUE

Under general anesthesia with a popliteal and saphenous nerve blockade, an anterior ankle incision is made overlying the extensor hallucis longus tendon and the junction between this tendon laterally and the tibialis anterior tendon maintained within its sheath medially was developed and carried down to the underlying tibia and talus. Resection of scar tissue and inflamed synovium allows direct visualization of the ankle joint. Following wide resection of the global anterior ankle osteophytes and removal of any deep retained hardware, ankle dorsiflexion is usually improved but not enough to allow for total ankle replacement to proceed. Therefore, a tendo-Achilles lengthening or gastrocnemius recession is performed.[23]

For the tendo-Achilles lengthening, multiple anatomic considerations have led to the use of incisions placed at 2, 5, and 8 cm proximal to the Achilles tendon insertion as