

Long Term Outcome of 24 Tibio-Talar Arthrodesis Using the Méary Technique

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Abstract : *Tibio-talar arthrodesis remains a valid option in the operative management of osteoarthritis in an attempt to restore painless ankle function and stability. The aim of this study is to describe the epidemiological profile, common indications, the popular techniques as well as functional outcome of tibio-talar fusion. We retrospectively reviewed 24 cases of tibio-talar fusion that were managed by the Department of Trauma and Orthopedic Surgery A over a period of 8 years. Fusion was performed for post-traumatic arthritis in 20 patients, inflammatory osteoarthritis in 3 cases and for one patient with sequelae of congenital club foot deformity. Tibio-talar fusion was done using the Méary technique in all 24 cases.*

Keywords: traumatic arthritis, open arthrodesis, Méary technique, tibio-talar joint, screw fixation

Introduction

Tibio-talar arthrodesis has proven to be an effective conservative approach over the years in restoring painless plantar support and correcting foot deformities although ankle replacement also seeks to restore ankle mobility despite modest preliminary results and numerous technical setbacks. Sequelae of ankle fractures represent the most common etiology of post-traumatic arthritis. The authors intend to evaluate long term results and effectiveness of tibio-talar fusion using the Méary technique on subtalar and mid tarsal joints congruity as well as its influence on foot kinematics through a retrospective study of 24 cases managed in the last decade.

Patients and Methods

We conducted a retrospective study of 24 patients who underwent tibio-talar arthrodesis at the Department of Trauma and Orthopedic Surgery A, Hassan II University Hospital, between January 2012 and January 2020. We included in this group all cases of primary and secondary osteoarthritis of the tibio-talar joint as well as sequelae of foot deformities affecting this joint with or without involvement of subtalar and midtarsal joints. Thus we excluded from this group cases of isolated subtalar and midtarsal osteoarthritis. Highlights the indications of tibio-talar fusion in our series (table 1). Preoperative evaluation entailed foot weight bearing plain x-rays, AP and lateral views to assess deformity and integrity of the surrounding joints in all cases. Lab tests notably erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) complete preoperative workup to rule out deep infection. Operative management consisted of ankle arthrodesis using the Méary technique through an anterolateral approach. After careful exposition, debridement and preparation of the joint surfaces, tibio-talar fusion is done using at least two divergent cancellous screws. The foot is fixed between 0 and 5 ° in the horizontal plane, with a slight valgus of 0 to 5 ° and 90 ° of dorsal flexion in the sagittal plane. Stable fixation is performed under fluoroscopy with either two or three 6.5mm cancellous screws divergent on three planes. Only two screws were used for fixation in 20 cases (figure1), whereas in 3 patients tibio-talo-calcaneal cross-screws were supplemented with mid tarsals compression staples. A single (01) patient with sequelae of club foot deformity underwent fixation using 3 cancellous screws. Bone substitutes were used in all cases. Postoperatively the limb is immobilized in a plaster cast for up to 8 weeks. A short circular leg cast with a rocker bottom is applied after wound has healed, and touch-down weight bearing allowed from the sixth week, progressing to weight bearing as tolerated. Follow up was done regularly with routine x-rays performed to assess joint fusion and foot alignment. This is evidenced by the appearance of bony trabeculations at the site of fusion. The American Orthopedic Foot and Ankle Society (AOFAS) scale was used to assess outcome: hind foot pain and overall ankle function.

Results

Fifteen men and nine women with a mean age of 38 years were involved .Only 8 had active nicotine use at the time of fusion .Mean body mass index (BMI) was 27 +/- 3 and 2 patients were overweight (25 < BMI< 29). After a mean follow-up of 40 months (ranging from 15 months to 84 months) most patients (n=19, 80%) had good pain relief with average pain scale of 4 (between 0 and 5) on the visual analogue scale (VAS). We recorded 2 cases of superficial infection which were managed with oral antibiotics with favorable outcome. Generally, fusion was achieved after 9 weeks (from 6 and 12 weeks). A mean valgus position of 3° was recorded after arthrodesis .Gait was normal in 16 patients (67%) with similar stride length compared to the non-operated limb after 14 months. Two patients developed complex regional pain syndrome. However no cases of non-union or revision fusion were observed during

this period. The AOFAS score improved from 36 to 82. Outcome was good or excellent in 62.5%, fairly good in 25% and poor in 12.5% of the cases.

Discussion

Osteoarthritis is the most common joint disease with prevalence estimated around 10% among patients over 60 years. Tibio-talar osteoarthritis is a common complication of traumatic ankle injury [1]. It is a disabling condition that can adversely affect the quality of life of patients [2]. The precarious nature of the ankle vascularization coupled with the superficial nature of the joint predisposes it to degenerative disease after trauma or inflammatory disease. Ankle arthrodesis remains a challenging procedure as the joint surfaces to be fused are small, yet subjected to great pressure during the phases of gait as the main fulcrum of the foot. Several techniques for tibio-talar arthrodesis have been previously described in literature. The authors prefer the technique that was initially described by Méary [3]. It proposes an internal fixation-compression of the tibio talar joint, with screws divergent in two planes, through an anterolateral approach of the ankle. This allows excellent exposure to the anterior ankle joint and additional fixation on the lateral side or the subtalar joints if necessary in order to correct lateral displacement of the talus. An 8cm incision is made just lateral to the border of the tibialis anterior tendon and distal to base of the fifth metatarsal. Care must be taken to avoid damage to the medial dorsal cutaneous nerve. The technique has seen several modifications in literature ranging from number of screws to the use of bone graft or substitutes in an attempt to improve fusion rate [4]. Several approaches for open ankle arthrodesis exist in literature including anterior, transmalleolar and even posterior just to cite a few. In patients with advanced osteoarthritis with or without joint congruity, tibio-talar arthrodesis remains the mainstay of operative treatment [5]. Ankle replacement is gaining popularity as a procedure that seeks to restore ankle mobility though preliminary results have been marred by high revision and infection rates [6]. With recent advances in technology, ankle implants have been in favor in the right patients. Evidence suggests poor outcomes of total ankle implants in young patients with posttraumatic osteoarthritis. In addition to popular concerns about patient selection, limb length shortening is a problem frequently encountered when converting a failed ankle arthroplasty to fusion. Regardless of the fusion technique used, certain standard principles must be adhered to in order to guarantee optimum results: notably a wide cancellous bony apposition between joint surfaces. Secondly, it is expedient that hind foot alignment with the leg is near anatomic to guarantee plantar flexion. Fusion site should be stabilized with rigid internal fixation whenever possible or with stable external fixation providing compression across the site. Common fixation devices include cancellous screws, plates, external fixators and intramedullary nails. Charnley first described the use of an external fixation device for ankle fusion though moderate confidence evidence has shown internal fixation offers a higher resistance to shear stress with lesser risk of failure and nonunion [7]. Cancellous screws remain the most commonly used internal fixation device. Swärd et al. [8] described a screw-construct using two posterior cancellous screws with washers and cancellous bone graft. The 2-screw construct is not commonly used today, as other techniques have been proven to provide more compression at the site [9, 10]. The absolute contraindications for arthrodesis are active ankle infection, Charcot arthropathy and avascular necrosis of the talus.

Arthroscopic arthrodesis is an enticing alternative to open arthrodesis [11]. However, patient selection remains an essential factor that influences functional outcome. It is particularly useful for in-situ arthrodesis though this could be greatly limited by the need to correct varus or valgus deformities or rotational defect through additional direct approach for osteotomy [12]. Subsequent to tibio-talar fusion, there is a compensatory increase in the range of motion of the subtalar and midfoot joints. Degenerative changes of the tibio-talar joint remain the most common lesions and rather less frequent talo-navicular lesions or even rarely calcaneo-cuboid degenerative changes after traumatic ankle injury [13, 14]. In our series, overall outcome is encouraging. However the main challenges of arthrodesis using the Méary technique is wound necrosis hence the need for atraumatic careful dissection of soft tissues with fascial closure paramount in reducing wound complications.

Conclusion

Tibio-talar arthrodesis remains the mainstay of operative treatment for advanced stage osteoarthritis. The Méary technique offers a better exposure of the ankle joint and allows additional procedures on the subtalar and midfoot joints when necessary. This restores painless foot function with satisfactory medium and long term outcomes in most cases when carried out with internal fixation and stable screw fixation.

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Table 1: Indications of fusion

Figure 1: post-operative x-ray AP and lateral views showing two screw configurations

List of abbreviations

AOFAS: American Orthopaedic Foot and Ankle Society

BMI: Body Mass Index

CRP: C-reactive protein

ESR: Erythrocyte Sedimentation rate

VAS: Visual Analogue Scale

Consent to publish:

Written informed consent was obtained from the patients involved in this case series for publication of this article and associated images

Competing interests:

The authors declare no potential conflicts of interest with respect to the authorship, and/or publication of this article.

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All authors contributed either directly or indirectly in the writing and general format of the manuscript

Table 1: Indications for arthrodesis

Bimalleolar fractures	16 cases
Pilon fractures	4 cases
Primary osteoarthritis	3 cases
Congenital foot deformity	1 case



Figure 1