

Hindfoot Arthrodesis for the Elective and Posttraumatic Foot Deformity



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KEYWORDS

- Double arthrodesis • Triple arthrodesis • Hindfoot • Pes planovalgus
- Foot deformity

KEY POINTS

- Isolated, double, or triple arthrodesis have all been studied and recommended for the treatment of elective or posttraumatic hindfoot deformities.
- Hindfoot arthrodesis can be combined with an ankle and/or midfoot procedure in order to restore the overall lower extremity alignment.
- Tendo-Achilles lengthening or gastrocnemius recession and/or tendon repairs and transfers may also be necessary to address at the time of hindfoot deformity correction and alignment.

Isolated or multiple hindfoot arthrodesis procedures have been well studied for the surgical treatment of elective, posttraumatic, and neuropathic hindfoot/ankle deformities. From isolated talonavicular or subtalar joint arthrodesis to double (talonavicular and subtalar) and triple (talonavicular, subtalar, and calcaneocuboid) arthrodesis procedures, the literature supports the impact of these procedures on the realignment and deformity correction of the lower extremity. Similarly, multiple surgical incisional approaches have been described for the double or triple arthrodesis ranging from a single medial or lateral approach to a traditional 2-incision approach for triple arthrodesis. The goal of an isolated, double, or triple arthrodesis is to restore and maintain the hindfoot alignment while minimizing any associated

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biomechanical forces that can result in progressive deformity and painful arthrosis to the ankle and midfoot. In certain cases, hindfoot arthrodesis and alignment can be combined with an ankle and/or midfoot arthrodesis in order to restore the overall lower extremity alignment with or without adjunctive soft tissue procedures.

Isolated talonavicular arthrodesis when indicated has been described in the literature for the correction of rigid and/or flexible pes planovalgus deformities. Camasta and colleagues,¹ in a retrospective review of 51 isolated talonavicular arthrodesis procedures to address the flexible pes planovalgus deformity, concluded that this procedure was safe and effective with a 100% radiographic union and 3.92% of delayed union rates. In another retrospective review of 26 patients by Popelka and colleagues,² isolated talonavicular arthrodesis provided satisfactory results in rheumatoid patients and posterior tibialis tendon dysfunction. In a cadaveric study of 8 specimens by Suckel and colleagues,³ isolated talonavicular arthrodesis was compared with triple arthrodesis in relation to intra-articular peak pressures at the ankle and naviculocuneiform joints. The investigators concluded that triple arthrodesis led to higher peak pressures at the ankle and naviculocuneiform joints that could eventually result in their joint degeneration.³ In another cadaveric study of 10 specimens by Thelen and colleagues,⁴ isolated talonavicular arthrodesis was compared with double arthrodesis on load-dependent motion across the midtarsal joint and was found to have equal motion after arthrodesis with stability at the midtarsal and subtalar joints.⁴ In contrary, Thomas and colleagues⁵ have found in a cadaveric study that complete midtarsal arthrodesis was in favor when compared with an isolated talonavicular arthrodesis and the effects on the subtalar joint pressure.⁵

Similarly, isolated subtalar joint arthrodesis has been advocated for the treatment and alignment of hindfoot deformity. In 1997, Kitaoka and Patzer,⁶ in a retrospective review of 21 patients, have concluded that isolated subtalar joint arthrodesis was effective in hindfoot deformity correction with minimal complications and high union rates. However, they did mention that some patients continued to have postoperative pain when preexisted adjacent joint arthrosis was evident. In another retrospective study of 95 isolated subtalar joint arthrodesis by Davies and colleagues,⁷ 95% of the studied patients had complete osseous union with a single screw fixation. Joveniaux and colleagues,⁸ in a retrospective review of 28 patients with in situ subtalar arthrodesis, achieved osseous union in all cases with minimal arthritic changes in adjacent joints. Yildirim and colleagues⁹ have also retrospectively reviewed the outcomes of an isolated subtalar arthrodesis in 31 patients showing satisfactory results when adjunct bone grafting was used for the arthrodesis procedures. The results of minimal incision surgery for isolated subtalar joint arthrodesis were also studied retrospectively in a series of 76 patients by Carranza-Bencano and colleagues.¹⁰ Radiographic osseous union was achieved in 92% of the cases without any evidence of early wound complications.¹⁰ However, a cadaveric study by Hutchinson and colleagues¹¹ has shown that subtalar joint arthrodesis seemed to significantly alter the ankle loading that could eventually lead to ankle joint pathology.

Double arthrodesis has also been recommended by many investigators for addressing the rigid pes planovalgus deformity. In 2015, Röhm and colleagues¹² have reviewed the double arthrodesis in 84 patients (96 procedures) for the treatment of rigid pes planovalgus deformity caused by posterior tibialis tendon dysfunction and concluded good clinical outcomes with nonunion being one of the most common complications. Berlet and colleagues¹³ have also retrospectively reviewed 20 patients with medial double arthrodesis for correction of hindfoot valgus and concluded improvement of the hindfoot deformity and related calcaneocuboid arthrosis. In another study by DeVries and Schärer,¹⁴ double arthrodesis (20 procedures) was

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