Operative Technique

Interposition Arthroplasty and Biological Augmentation of Hallux Rigidus Surgery

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KEYWORDS

• Interposition arthroplasty • Hallux rigidus • Surgical technique • Biologics • Amniox

KEY POINTS

- Interposition arthroplasty represents an effective alternative to joint arthroplasty for patients with grade 3 or 4 hallux rigidus.
- Grade C evidence supports the use of interposition arthroplasty for hallux rigidus.
- New techniques of biological augmentation propose unique solutions to perform interposition.

INTRODUCTION

Hallux rigidus is a common condition afflicting the first metatarsophalangeal (MTP) joint, caused by local degenerative changes, with resultant pain, synovitis, and restricted range of motion of the hallux MTP joint.[1–3] As the process advances, dorsal and dorsolateral osteophytes become evident clinically and radiographically (**Table 1**). This final common pathway may be the result of several individual pathologies including posttraumatic, inflammatory, and primary arthritides.[4] Many nonoperative modalities have been advocated for symptom control, including shoe modification, nonsteroidal antiinflammatory medication, local corticosteroid injection, and activity modification. Surgical care is recommended for cases refractory to conservative management. Many procedures have been described for treatment of this condition, which can be broadly characterized as joint preserving and joint sacrificing. Joint preservation options include cheilectomy, osteotomy, and combined cheilectomy with

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Table 1
Clinical-radiographic system for grading hallux rigidus

Grade	Dorsiflexion	Radiographic Findings	Clinical Findings
0	40°–60° and/or 10%–20% loss compared with normal side	Normal	No pain; only stiffness and loss of motion on examination
1	30°–40° and/or 20%–50% loss compared with normal side	Dorsal osteophyte is main finding, minimal joint-space narrowing, minimal periarticular sclerosis, minimal flattening of metatarsal head	Mild or occasional pain and stiffness, pain at extremes of dorsiflexion and/or plantar flexion on examination
2	10°–30° and/or 50%–75% loss compared with normal side	Dorsal, lateral, and possibly medial osteophytes giving flattened appearance to metatarsal head, no more than one-quarter of dorsal joint space involved on lateral radiograph, mild to moderate joint-space narrowing and sclerosis, sesamoids not usually involved	Moderate to severe pain and stiffness, which may be constant; pain occurs just before maximum dorsiflexion and maximum plantar flexion on examination
3	≤10° and/or 75%–100% loss compared with normal side. There is notable loss of MTP plantar flexion as well (often ≤10° of plantar flexion)	Same as in grade 2 but with substantial narrowing, possibly periarticular cystic changes, more than one-quarter of dorsal joint space involved on lateral radiograph, sesamoids enlarged and/or cystic and/or irregular	Nearly constant pain and substantial stiffness at extremes of range of motion but not at midrange
4	Same as in grade 3	Same as in grade 3	Same criteria as grade 3 but there is definite pain at midrange of passive motion

Weight bearing and anteroposterior and lateral radiographs are used for radiographic assessment.
From Coughlin MJ, Shurnas PS. Hallux rigidus. Grading and long-term results of operative treatment. J Bone Joint Surg Am 2003;85-A(11):2073; with permission.

osteotomy. Joint sacrificing surgeries include arthrodesis, arthroplasty options with nontissue implant, resection arthroplasty, and interposition arthroplasty. Various levels of evidence are provided in the literature for these individual procedures (**Table 2**).[5]

Each of the surgical options offers unique advantages and disadvantages. Joint preservation surgery allows for preservation of motion, with improvement of pain in many patients; however, this operation does not address the fundamental degeneration, and therefore, pain recurrence is commonplace. Arthrodesis, contrarily, removes the motion and pain at the site of disease but causes alteration of gait[6] and is associated with complications such as malunion, nonunion, shortening, and transfer metatarsalgia.[7] Despite these shortcomings, most studies of outcomes for first MTP fusion have a high success rate.[8–10] With these considerations, hybrid procedures such as interposition arthroplasty and nonbiological implant arthroplasty can preserve