

Pearls and Pitfalls for a Surgeon New to Ankle Replacements

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KEYWORDS

- Total ankle replacement • Ankle arthritis • TAR • Prosthesis • Mobile bearing
- Fix bearing • Pitfalls

KEY POINTS

- Surgeon learning curve, patient selection, and implant choice are the key elements for a successful total ankle replacement (TAR).
- High-volume reference-center should play a role in the training of new surgeons.
- Bone-stock loss, deformity, and patient's age are not absolute contraindications for TAR, but they are the main parameters in the decision-making process.
- The most common approach is the anterior and it provides the best exposure of the ankle joint. Lateral approach can be more demanding, but provides a direct exposure of the center of rotation of the ankle joint.
- Mobile-bearing TAR has accommodative movement, but it requires perfect balance with soft tissues and bony procedures.

INTRODUCTION

The first total ankle replacement (TAR) was similar to an inverted total hip replacement and was performed by Lord and Marotte in 1970.¹ However, first-generation TAR designs had unacceptably high complication and failure rates.^{2,3}

After 3 implant generations, numerous modifications in their design, and different surgical approaches, TAR now represents a reliable alternative to fusion.^{4,5} TAR long-term results compared with those of ankle fusion continue to be one of the most debated topics in foot and ankle surgery.^{6,7} A recent systematic review of intermediate and long-term outcomes comparing TAR with arthrodesis showed comparable risks of early complications and long-term failure for both procedures.^{8,9} Newer

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studies reported implant survival rates from 70% to 95% for follow-up from 2 to 12 years.¹⁰⁻¹³

These encouraging recent data are supported by gait analysis findings. For instance, it has been proved that a mobile-bearing TAR more closely resembled normal gait when compared with gait patterns of patients with arthrodesis.¹⁴ The principle behind both joint-preserving surgeries and TAR is that restoring the joint to a near-normal state, may improve ankle function, but also delay the onset of peritalar complex arthritis.¹⁵ Three main factors play a role in the final outcome: the surgeon, the patient and the implant itself.

DISCUSSION

The Surgeon

In the past decade, there is an ongoing debate between surgeons supporting ankle fusion, and surgeons supporting TAR. Many comparison studies between fusion and TAR have been designed and published, but it is extremely difficult to find a clear definitive answer from these studies.^{16,17} In fact it is very challenging, if not impossible to design and perform a true prospective randomized fusion versus TAR study.

A proper approach is to accept that there are patients eligible for TAR and others are candidates for ankle fusion, with a limited mismatch area between the 2 groups. New studies are needed to clarify these boundaries.

Nonetheless, the enthusiasm toward TAR is tempered with caution, as a comparison of international registry data with clinical study results has found that implant designers reported significantly lower revision rates compared with those data reported in the registries.¹⁸

On the other side, nondesigner studies, reporting less encouraging results, are often affected by low-volume issues, and surgeon learning curve.¹⁹⁻²¹

The role of the operative learning curve in TAR has been investigated by various scholars and has produced contradictory results. Some findings did not show any evidence of a learning curve in TAR,^{22,23} and others showed a reduction in perioperative complications and revisions with the increase of expertise.^{19,20,24-26} Most of the studies have compared consecutive series of TAR cases to determine if a learning curve was present from the initial to more recent procedures.^{27,28}

The practice of a young surgeon approaching TAR may be more affected by studies designing an ideal cutoff around which clinical and radiological outcomes can be considered stable and reliable.²⁹ Further studies are needed to determine how to structure surgical training to limit complications and optimize final results.

The epidemiologic features of ankle arthritis may suggest identifying reference centers both for the treatment of this pathology and for specific training for the surgeons involved in its treatment.³⁰ It is a principle that had inspired health policy in many other medical specialties (obstetrics, for instance), successfully reducing risks and complications for patients.³¹

In particular, the role of high-volume reference centers in the training process is not only limited to the surgical-technique learning curve, but is also extended to the chance for a young surgeon to be exposed and deal with minor and major complications that may occur after TAR implantations.

Minor complications are those that are manageable without further surgery and risk-system failure, whereas major complications are those that require additional surgery and lead to implant failure.^{16,32} According to this classification, medial impingement, articular stiffness, delay in wound healing, and intraoperative fractures can be counted among minor complications. Aseptic loosening, deep infection, implant mobilization,

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