

Planning Correction of the Varus Ankle Deformity with Ankle Replacement

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KEYWORDS

• Ankle • Arthritis • Deformity • Replacement • Varus

The technology and techniques of total ankle replacement have improved significantly over the last few decades. With these advances, the indications for ankle replacement have similarly expanded. Previously, ankle replacement was primarily indicated for patients with minimal coronal plane deformity. This excluded many patients from ankle replacement, because the most common pathology leading to ankle replacement is posttraumatic arthritis and this is frequently associated with a varus deformity.¹

Increasingly, indications are beginning to include patients with coronal plane deformity. Previous recommendations have been to limit ankle replacement to a coronal deformity of less than 10°. Some reports have documented a higher failure rate in larger deformities. Coetsee² reported a 50% failure rate with conversion to an ankle arthrodesis in 3 years for the group of patients with preoperative varus of 20° or more. He recommended primary arthrodesis in this patient group. The latter report, however, detailed the results of treatment of the Agility prosthesis, which in our opinion is unsuitable for accurate correction of a varus deformity. With the latter prosthesis, there are only 2 sizes of the polyethylene, which is inadequate, and as we will see, is integral to the correct decision making and balancing of the ankle joint.² Wood and colleagues^{3,4} found a higher incidence of edge loading of the polyethylene in patients with a preoperative deformity of 15° or more. They recommended that a coronal deformity of 15° or more be considered a relative contraindication to ankle replacement. The increased failure rates in these studies may be due to an inadequate correction of alignment and ligamentous balance intraoperatively, leading to edge loading of the polyethylene and premature implant failure.

The authors have nothing to disclose.

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Foot Ankle Clin N Am 17 (2012) 103–115

doi:10.1016/j.fcl.2011.11.005

1083-7515/12/\$ – see front matter © 2012 Elsevier Inc. All rights reserved.

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With correction of alignment of the foot as well as the ankle, and ligament balance in patients with a varus deformity, it is our opinion that the outcome should not be different, even in deformities of larger magnitude. Kim and associates⁵ found similar outcomes between patients who had a varus deformity of 10° to 22° and those with neutrally aligned ankles. Hobson and co-workers⁶ found no difference in clinical outcomes between patients with a varus deformity of 11° to 30° and those with a varus deformity of 10° or less. They concluded that patients with a hindfoot deformity of up to 30° can expect to have similar outcomes, but cautioned that attention must be paid to obtaining a neutral alignment and a stable ankle with the ankle replacement.⁶ One has to be careful, however, between the latter reference to hindfoot deformity of up to 30, and that of the ankle. Furthermore, one must distinguish between a 30°, which is intra-articular (in the ankle and associated with a defect of the distal lateral tibia), and that where there is severe tilt of the ankle with greater contracture of the deltoid ligament. This statement, therefore, depends on how the measurements of deformity are obtained.

There have been many developments and techniques that have allowed successful correction of larger varus deformities. A wider range of modularity in the polyethylene insert thickness in current implant designs has allowed a larger insert to be used during replacement to compensate for the larger gap after a neutralizing distal tibia bone cut. Various osteotomies superior to, inferior to, and at the level of the ankle joint are available for angular correction. There have also been advances in the soft-tissue releases and reconstruction to obtain ligamentous balance intraoperatively. An approach to operative planning in the varus ankle and the use of these techniques are discussed herein.

ASSESSMENT

Both a physical examination and a series of radiographs are routinely performed in the clinical assessment. The gait of the patient and the mechanical axis of the lower limbs are examined. Any deformity at the level of the knee and the presence of any varus in the tibia is noted. This is particularly important in the patient who has symptomatic knee arthritis associated with deformity, whether varus or valgus, because the correction of the latter deformity significantly affects the more distal deformity. For this reason, deformity correction must always commence proximally. Contribution to the deformity from the hindfoot and any forefoot-driven hindfoot varus is examined. The range of motion of the ankle, subtalar, and midfoot is tested. It is also important to note the soft-tissue status of the ankle region and the circulatory status. Ankle replacement in the presence of varus deformity frequently requires supplementary procedures, which may involve separate incisions. Hence, one should note the presence of scars that may complicate the surgical approach, as well as the peripheral pulses. If there is any doubt regarding the vascularity, it is advisable to perform noninvasive vascular studies before proceeding.

We routinely obtain weight-bearing radiologic studies with orthogonal views of both ankles as well as forced passive weight-bearing dorsiflexion and plantarflexion views. It is important to assess the magnitude as well as the character of the varus deformity. The varus deformity may be above the ankle joint, that is, as a result of a posttraumatic malunion of the distal tibia, at the level of the ankle joint or below the ankle joint at the level of the hindfoot or forefoot.⁷ A deformity above the ankle joint is frequently due to a varus malunion of the tibia or developmental tibia vara. Deformity at the level of the ankle joint may be associated with either a congruent or incongruent joint.^{4,5} A congruent joint is one in which there is intra-articular varus from erosion of the medial tibial plafond, typically from chronic, repetitive ankle instability.

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