Recent Advances in Foot and Ankle Surgery in Mainland China

Correction of Severe Foot and Ankle Deformities

Yuan Zhu, MD, Xiang-yang Xu, MD*, Bi-bo Wang, MD

KEYWORDS

• Foot ankle deformity • Severe • Staged surgery • Varus ankle • Ankle arthritis

KEY POINTS

- Foot and ankle physicians in China encounter quite a large amount of severe deformities.
- The preoperative assessment is critical, including where the deformity lies, whether there exists multiplanar deformities, and how much muscle strength there is.
- A staged procedure is a safer way to correct deformities in the presence of severe soft tissue contracture.
- Periarticular osteotomy combined with soft tissue balancing can be used in treating severe varus ankle arthritis, including stage IIIb cases and patients with talar tilt of more than 10°.

THE SITUATION OF SEVERE FOOT AND ANKLE DEFORMITIES IN PRESENT CHINA

Foot and ankle surgery is a young yet dynamically developing specialty in China. The Chinese Foot and Ankle Society was established in 1992, and several foot and ankle centers emerged afterward. With the accumulation of professional knowledge and surgical skills, the scope and volume of foot and ankle surgery have been growing rapidly in the past decades. The advances and experiences in foot and ankle surgery in mainland China are presented in the form of severe ankle and foot deformity correction.

Because there is a large population in China, foot and ankle problems widely exist in various forms and stages. Unfortunately, they were largely neglected in the past when most people were striving for basic life necessities. It is not uncommon to see patients suffering from ankle and foot pain and deformity for as many as 20 to 60 years, mainly because of a poor economic situation and/or lack of proper medical treatment.

The authors have nothing to disclose.
Shanghai Ruijin Hospital, Shanghai Jiaotong university school of medicine, 197 Ruijin Er Road, Shanghai 200025, China
* Corresponding author.
E-mail address: xu664531@hotmail.com

Foot Ankle Clin N Am 21 (2016) 237–247
http://dx.doi.org/10.1016/j.fcl.2016.01.003 **foot.theclinics.com**
1083-7515/16/$ – see front matter

Because the economy in China has grown considerably in the past 30 years, more and more of those patients have the ability to pursue ways to improve their quality of life. They are willing to undergo surgery to correct their long-time deformity to relieve the pain and improve their function as well as appearance.

There are several causes of severe foot and ankle deformity. Trauma is the main cause of severe ankle and foot deformity.[1,2] Some trauma is the result of improper reduction and fixation; others are results of not having any treatment at all. Besides trauma, neuromuscular diseases, such as poliomyelitis, tethered cord syndrome, Charcot-Marie-Tooth (CMT) disease, spinal cord injury, stroke, also cause severe ankle and foot deformity and loss of function. New cases of polio have disappeared in China recently, but there are still many adult patients suffering with residual lower limb deformities due to polio from decades before.

CLINICAL EVALUATION OF SEVERE FOOT AND ANKLE DEFORMITIES

A weight-bearing physical examination is an important method for evaluating the deformities of the foot and ankle.[3,4] In this position, the physician can observe the hindfoot varus/valgus, the twist of the midfoot, and the real height of the foot arch. The deformity may not be isolated to the foot and ankle, so the physical examination should include the whole affected lower limb and compare the affected with the unaffected side. If there has been prior trauma or surgery proximal to the ankle level, the whole alignment of the affected extremity should be inspected and measured carefully. Every single muscle tendon across the ankle should be evaluated carefully, and the muscle power should be recorded so that the muscle balancing plan can be made preoperatively in detail. Active and passive range of motion of the ankle, subtalar joint, as well as the joints of the midfoot should be examined. The authors use the anterior drawer test to evaluate the stability of the ankle.

Weight-bearing radiography is a fundamental radiologic examination.[3–9] In the case of deformities proximal to the ankle level, weight-bearing full-length radiographs from hip to ankle should be obtained. As to the evaluation of hindfoot alignment, the authors recommend the Saltzman hindfoot axis view.[10,11] Computed tomographic (CT) scan with image reconstruction is useful to determine the rotational deformity of the talus, the details of the bony structures, or whether the old fracture has healed. MRI can be used to show the range of the involved articular cartilage.

THE SURGICAL TREATMENT OF SEVERE FOOT AND ANKLE DEFORMITIES

Treatment strategy is summarized as follows. (1) An attempt is made to preserve the ankle if possible. Indications of preserving the ankle lie in that the articular cartilage remains greater than 50% according to MRI; the range of motion of the ankle reaches at least 10° dorsiflexion and 30° plantar flexion. The deformities can be corrected by realignment procedures. (2) Osteotomy or fusion of the Chopart joints may correct the cavovarus deformity, hindfoot malalignment, and midfoot adduction from multiplanes. (3) If the articular cartilage is severely impaired or unbalanced, muscle strength is ill-fated, and the joint-sparing procedure must be abandoned.[12,13] **Fig. 1** (case 1) shows the correction of a severe pes equino-cavovarus case. (4) For those with very severe varus or valgus deformity, an external fixator can be used to correct the deformity in a tender and gradual way in order to protect the neurovascular bundle before the definite procedure. Staged surgery is a safer way of handling severe or complex deformities. Cases in point are shown in **Figs. 2** and **3** (case 2 and case 3).

The sequence of the procedures of correcting the severe equinocavovarus deformity of the foot and ankle is usually performed by: (a) release of the medial and