Managing Complications of Percutaneous Surgery of the First Metatarsal

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KEYWORDS

• Percutaneous osteotomy • Minimal invasive surgery • Hallux valgus • Complication • Revision

KEY POINTS

- The percutaneous osteotomy technique, as a treatment option for hallux valgus, has had a high popularity for both patients and surgeons over the past 2 decades in the mainland of China.
- The procedure is performed similarly to what was done in the United States in the 1970s with a linear distal first metatarsal osteotomy but with no fixation.
- Complications of percutaneous surgery of the first metatarsal can generally be predictably corrected with arthrodesis of the first metatarsophalangeal joint.
- In order to provide a stable medial column, arthrodesis should be the best treatment of choice in cases where substantial bone has been lost.

Video content accompanies this article at http://www.foot.theclinics.com.

INTRODUCTION

Hallux valgus is a common forefoot deformity, with adduction of the first metatarsal and valgus deviation of the first metatarsophalangeal joint (MTP). The primary complaints are prominence and discomfort of the bunion, limitation in range of motion of the MTP joint, and associated or subsequent lesser toe problems, such as hammer toe, cross-over toe, metatarsalgia. Treatments include conservative management and surgeries. However, effects of conservative treatment, such as shoes

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modification, using orthotics or insoles, are not so promising and definite, and many patients have to resort to surgery when conservative managements do not work.

Although there are more than one hundred types of surgeries described for the correction of hallux valgus deformity, the goals for treatment remain the same, that is, to realign the first ray, maintain or maximize the range of motion of the MTP joint, and to treat the related deformities of the forefoot. Percutaneous surgery on the forefoot was described by Morton Polokoff[1] in 1945 using fine instruments such as chisels, rasps, and spears. Later Leonard Britton[1] tried to treat hallux valgus deformities with percutaneous first metatarsal opening, closing, and dorsiflexion wedge osteotomies as well as Akin osteotomy. However, it was in the 1970s when minimally invasive surgery of the foot was developed by North American podiatrists.[1,2] With the introduction of minimum incision and percutaneous procedures into the curriculum at Pennsylvania College of Podiatric Medicine in 1974,[3] and low-intensity radiographic imaging scope into the practice,[4] this kind of technique, based on a Hohmann-type metatarsal subcapital linear osteotomy,[5] rapidly became popular. At that time, no internal fixation was used for stabilization of the osteotomy. In the 1980s, Peter Bösch combined this percutaneous osteotomy with an internal axial Steinmann pin fixation technique as described by Lamprecht and Kramer and named this new technique "subcutaneous Bösch technique."[6–8] Most of present percutaneous procedures are modifications of the Bösch technique.

The percutaneous osteotomy technique was introduced into Mainland China in the late 1980s. In the following 20 years, there has been little development or modification, so the surgical procedure being used nowadays in Mainland China is still similar to what was commonly used among the podiatrists in United States in the 1970s, which consists of a linear distal first metatarsal osteotomy through a medial approach, with soft tissue release on the lateral side of the first MTP being rarely used. The osteotomy is performed with a power burr, by perforating the subcapital cortex of the metatarsal, manually breaking, and shifting the distal fragment laterally, with plantar flexing or laterally rotating the metatarsal head according to the actual condition. At the completion of the surgery, the alignment is verified under fluoroscopy; then a compression bandage is used to stabilize the osteotomy and maintain the correction without K-wire fixation.[9] After the surgery, immediate ambulation is allowed with forefoot non-weight-bearing shoes or stiff-soled shoes. The special compression bandages are removed at 6 weeks, and patients are allowed to change into normal shoes after radiographic union is confirmed. This type of preparation of the osteotomy without fixation is similar to other forefoot osteotomies described in the twentieth century, including the Ludloff osteotomy, the Hohmann osteotomy, the Helal osteotomy, and others. All of these osteotomies were demonstrated to have a high incidence of complications and were abandoned in that form. Unfortunately, at present in China, there is still a large group of surgeons who continue to perform the procedure without fixation, and the consequences are unpredictable. There are many complications, such as malunion, shortening, nonunion, and others. It is these complications specifically that the authors discuss in this article.

As an alternative method to more traditional open surgeries, the percutaneous technique has achieved rapid acceptance and popularity by patients and surgeons alike over the past 2 decades. Percutaneous forefoot procedures and minimally invasive surgeries for hallux valgus occupy almost 30% of forefoot surgical cases in China today. The high popularity and acceptance by patients in China are due to their general desire for an improved cosmetic outcome and the perceived minimal invasiveness of the surgery and is magnified by the surgeons' efforts to popularize the advantages of this technique over traditional open surgeries, including shorter surgical time, less