RESULTS

Complex deformities of the foot and ankle remain a difficult problem even for the most experienced surgeon[114]. Many techniques are available to provide correction. All of these procedures have the potential for a range of complications. The clinician should perform the least invasive procedure that decreases pain and improves function[115].

When poor soft tissues are present, conventional open osteotomy is not possible. Scar tissue from previous surgery can complicate further surgical correction[116].

The Ilizarov technique has been suggested as an option for correction of complex foot deformity[117]. It is less invasive and allows for simultaneous correction of all components of the deformity without resection of bone or shortening of the foot. Soft tissue viability and function can be assessed directly and the rate of correction can be adjusted accordingly[118]. There are two different methods for correction of foot deformities by the Ilizarov technique, with and without an osteotomy.

In 2002, Hosny[119] reported that 23 foot deformities were treated by non-osteotomy technique with the Ilizarov application. The age of the patients ranged from 2.6 years to 49.0 years. All his patients had a plantigrade foot.

Lejman et al.,[120] reported on 34 recurrent clubfeet treated with the Ilizarov technique without additional surgery. The age of the patients ranged from 2.5 years to 14 years. Twenty six results were rated good, 4

fair and 4 poor. On the other hand, many authors recommended a non-osteotomy technique for patients who had a congruous joint with no significant fixed bony deformities and for children younger than 8 years of age, as the incidence of the deformity and recurrence was high in such cases[121].

Herzenberg et al[121] claim that recurrence of deformity is rare in the osteotomy technique, while it is common in the non-osteotomy technique.

In 1993, Paley[122] reported on 25 complex foot deformities treated by Ilizarov distraction osteotomies. He used more than one type of osteotomy, such as supramalleolar, U, V, posterior calcaneal, talocalcaneal neck, midfoot, and metatarsal osteotomies. Satisfactory results were achieved in 22 feet and unsatisfactory outcomes in three.

Herzenberg et al.,[121] reported that in cases with calcaneal deformity with anormal relationship of the forefoot to the hindfoot, supramalleolar osteotomy can correct this deformity. They indicated that U osteotomy is technically demanding and certain structures are at risk.

Kucukkaya et al.,[123] reported that 9 feet with neurologic foot deformities were treated by V osteotomy and the Ilizarov method. A painless and plantigrade foot was obtained in 8 feet. There were no major complications. In this study, there was pain in 10 patients in early follow-up, and in the last follow-up there was no pain. This can be explained if the deformity was severe and the patient could not walk on his feet. After correction, there was abnormal feeling during standing and walking. Also there was marked osteoporosis in the foot. After removal of the frame, the patients underwent a rehabilitation program.

Bradish and Noor[124] presented results of 17 relapsed clubfeet in 12 children, with a mean age of 7.8 years, who were treated with an Ilizarov

frame. All of the patients had undergone previous surgical procedures before their relapse. The surgical intervention consisted of the placement of an Ilizarov frame without concurrent soft tissue release or osteotomies. Correction was based strictly on distraction by way of the frame, was started on postoperative Day 1, and lasted for an average of 4.5 weeks. Based on a grading system that was devised by the investigators, a good or excellent result was achieved in 13 feet. Complications included at least one pin site infection in each foot and one lesser toe contracture.it was noted that the feet that were less mobile preoperatively had a more unpredictable outcome. The investigators hypothesized that this was because the frame produced joint incongruity and the reduction was lost as they returned to their prior position. The investigators acknowledged this as evidence to support distraction through osteotomies in the more skeletally mature population.

In 2002, Kocaoglu et al.,[125] reported results of 23 complex foot deformities (including relapsed and neglected clubfoot) in 22 patients who were treated using the Ilizarov technique. Nine patients were treated with soft tissue releases,whereas the remaining 9 received one of four osteotomy patterns: supramalleolar osteotomy; a ‘‘V’’ osteotomy through the talus and calcaneus; a ‘‘U’’ osteotomy through the subtalar joint; or a midfoot osteotomy. Four others had other deformities.

Correction was started on postoperative Day 2 with mean fixation duration of 5.1 months. Mean follow-up was approximately 2 years. A plantigrade foot was achieved in 21 feet and all patients reported a subjective improvement in gait. Pin tract infections were noted in all patients, but all responded to local care and did not require pin removal. One patient had deformity recurrence and two had a little toe contractures[125].

Grant and Lehman[126] reported their results of treating four clubfeet in three children who were between the ages 4 and 5 years. Two of the feet had been treated surgically earlier. The fixator remained in place for 3 months and was followed by 6 weeks of casting. Although each child experienced at least two episodes of pin site infections, complete correction was achieved in all feet without evidence of recurrence at follow up evaluations.

Weber et al.,[127] described a new method, in 2002, in which an Ilizarov ring fixator stabilized a tibio-calcaneo-naviculo-cuboideal (TCNC) arthrodesis. Six patients who had significant deformities of the talus and foot—three with clubfoot—underwent this fusion procedure after talectomy. The final step in the described procedure is the production of a proximal tibial corticotomy, which is then distracted postoperatively to lengthen the extremity to negate the limb shortening that accompanies the TCNC arthrodesis. The fixator remained in place for an average of 1 year and the patients were followed for a mean of 46 months.All of the patients were full weight bearing at follow-up; two patients were described as satisfactory and the remaining four patients were completely asymptomatic.Not surprisingly, with the length of time in the frame, all patients developed pin site infections; one patient required surgical revision. Other complications were minor and all fusions went on to complete unions.

de la Huerta[128] reported the results on the use of the Ilizarov frame in the treatment of neglected clubfoot in the adult population. Twelve cases in seven patients were treated with gradual correction for an average of 6 months; this was followed by 6 weeks of casting. All

patients could be corrected to a plantigrade foot position and were satisfied with the results[128].

Wallander et al.,[129] examined the use of an Ilizarov external fixator in the correction of 10 idiopathic clubfeet in seven patients after previous surgical intervention had failed. The frame was used for an average of 10 weeks followed by a below the knee cast for 8 weeks. Mean follow-up was 40 months, at which point six patients were satisfied with their outcome. equinus deformity was classified as mild (5–20), moderate (21–29), or severe (> 30); less than 5_ was synonymous with a plantigrade foot. Before treatment, 9 out of 10 feet were severe and 1 foot was plantigrade. After treatment with the Ilizarov technique, 5 feet demonstrated a mild deformity and the remaining 5 were plantigrade[129]. When the patient group was analyzed by using a previously described rating system, 3 feet had fair results and 7 were classified as poor.