

SHORTENING OF THE CALCANEUS TREATED WITH ILIZAROV'S METHOD

J. LAMMENS

The author reports the case of a sixteen year old young lady with heel shortening, due to a growth arrest of the calcaneal epiphysis, secondary to its septic involvement by a heel puncture. At the age of sixteen a lengthening according to Ilizarov's method was performed, using progressive distraction of an osteotomy of the calcaneal tuberosity.

The result was satisfying with a cosmetical improvement, a painless function and a more comfortable shoe fitting.

Keywords : calcaneus ; shortening ; Ilizarov.

Mots-clés : calcaneum ; raccourcissement ; Ilizarov

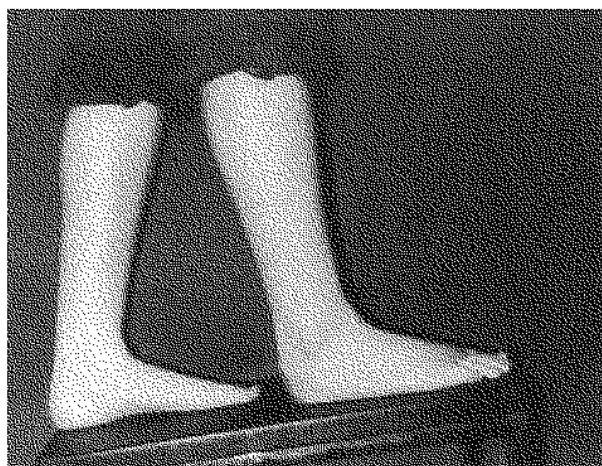


Fig. 1a. — Shortening of the heel bone due to septic involvement of the growth plate.

Calcaneal shortening due to direct septic involvement of the epiphysis is very uncommon. Iatrogenic inoculation due to a heel puncture is even more exceptional. We report such a case leading to severe calcaneal shortening, and its treatment by distraction using Ilizarov's method.

CASE REPORT

A 16-year-old girl was referred for a right hind-foot deformity. Immediately after birth she developed a deep infection of the heel due to routine heel puncture for screening for metabolic diseases. She was treated with intravenous administration of antibiotics. No surgery was performed.

During growth an arrest of the calcaneal epiphysis became obvious, resulting in a short heel bone (fig. 1 a). Although cosmetically acceptable for the patient, she had difficulties with shoe fitting and heel pain when walking long distances. As skeletal

maturity was reached, an Ilizarov procedure was performed with osteotomy of the calcaneal tuberosity through a medial approach (fig. 2). The frame was applied on the leg with the foot in maximal inversion to avoid soft tissue tension on the wound. Distraction was started on the fourth day at a rate of 4×0.25 mm per day. Lengthening and subsequent upwards correction of the tuberosity took 40 days. In the meantime the foot was progressively corrected to neutral position. A stirrup fixed to the frame allowed walking without weightbearing on the foot. After correction the frame was kept in place for another 6 weeks and removed at 82 days post-

Department of Orthopedic Surgery, U.Z. Pellenberg, Weligerveid, 1, B-3212 Pellenberg, Belgium
Correspondence and reprints : J. Lammens



Fig. 1b. — Clinical appearance after lengthening.

operatively. The foot was then protected in a below-knee brace allowing weightbearing until full maturation of the distracted area, which was achieved at four months after the operation (figs. 3, 4). Physiotherapy was performed for three months, resulting in a perfectly mobile foot without any restriction. At follow-up 9 months after the operation shoe fitting was without problems, the cosmetic appearance was markedly improved and the patient was free of pain during long distance walking or running (fig. 1b)

DISCUSSION

Screening in the newborn for metabolic diseases such as phenylketonuria (Guthrie's test) by means of a heel puncture is accepted as safe and reliable worldwide. Septic complications seem to be uncommon, and when they occur, they are superfi-

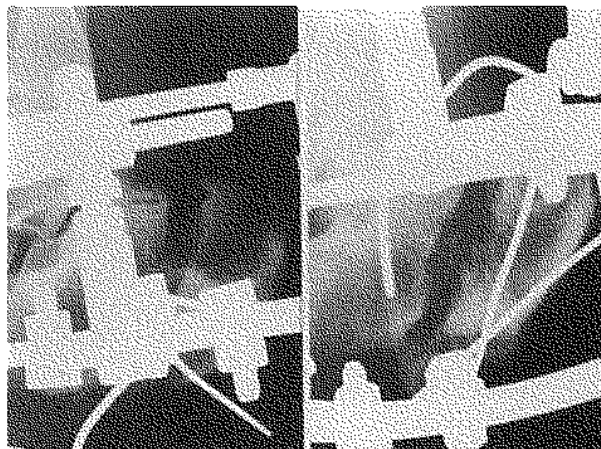


Fig. 2. — Osteotomy of the calcaneal tuberosity and Ilizarov fixation (radiograph at one centimeter of distraction).

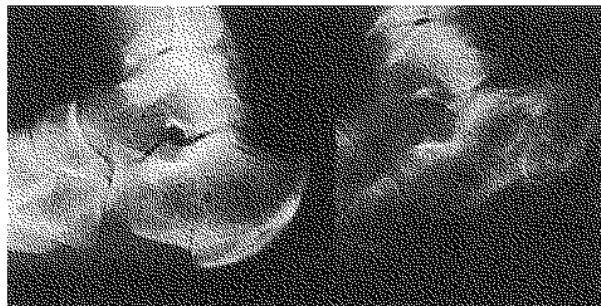


Fig. 3. — Lateral radiograph of preoperative appearance (left) and at follow-up nine months postoperatively (right).

cial without further consequences (10). However, on a few occasions, as the literature reports only sporadic cases, deep infections can occur, leading to destruction of the growth plate of the calcaneal tuberosity and resulting in deformity and shortening of the heel (2, 3, 7, 9, 10, 11, 12).

To our knowledge treatment options for heel shortening have not been described extensively in the English literature. Corrective osteotomies, such as the Dwyer or Evans technique, have been widely used for clubfoot sequelae, but mainly to correct rather than lengthen the heel (4, 5, 6).

Some lengthening of the lateral border is obtained by the Evans procedure, using a lateral open wedge with a cortical graft, but it does not lengthen the entire calcaneus (6).

Foot osteotomies using Ilizarov's distraction device are well-established procedures for very

severe equinovarus foot deformities. They include a "U"-shaped osteotomy through the calcaneus and talar neck or a "V" shaped osteotomy. The latter has a posterior limb cutting across the back of the calcaneus from just behind the talocalcaneal joint to the anterior part behind the calcaneocuboid joint, from where the anterior limb converges through the neck of the talus (8). A modification of this technique using only the posterior limb but placing it even more posteriorly allows a simple oblique osteotomy of the tuberosity.

With the Ilizarov device simple lengthening with daily increments of 4 x 0.25 mm is possible, exactly as in normal limb lengthening, avoiding more aggressive surgery such as bone grafting. Moreover it permits varus/valgus and translational or rotational control.

Although weightbearing was not allowed the patient remained ambulatory with a stirrup fixed to the two tibial rings keeping the foot unloaded. Wound protection was also optimal as the foot was initially put in supination to avoid skin tension and could easily be corrected afterwards with the Ilizarov device.

The progressive distraction with neohistogenesis of bone and soft tissue has proved to be a safe and reliable technique, avoiding the many complications of older methods of acute lengthening. This calcaneal lengthening was based on the same principle and can be regarded as a modified application of bone lengthening, leading to a complication-free, cosmetic and functionally acceptable end result.

REFERENCES

1. Abril Martin J.C., Aguilar Rodriguez L., Albinana Cilveti R. Flatfoot and calcaneal deformity secondary to osteomyelitis after neonatal heel puncture. *J. Ped. Orth.*, 1999, 8-B, 122-124.
2. Borris L.C., Helleland H. Growth disturbance of the hind part of the foot following osteomyelitis of the calcaneus in the newborn. *J. Bone Joint Surg.*, 1986, 68-A, 302-305.
3. Canale S.T., Manugian A.H. Neonatal osteomyelitis of the os calcis : A complication of repeated heel punctures. *Clin. Orthop.*, 1981, 156, 178-182.
4. Dwyer F.C. Osteotomy of the calcaneum for pes cavus. *J. Bone Joint Surg.*, 1959, 41-B, 80-86.
5. Dwyer F.C. The treatment of relapsed clubfoot by inser-

- tion of a wedge into the calcaneus. *J. Bone Joint Surg.*, 1967, 45-B, 67-75.
6. EVANS D. Calcaneovalgus deformity. *J. Bone Joint Surg.*, 1975, 57-B, 270-278.
7. Goedberg I., Shauer L., Klier I., Seelen-Grund M. Neonatal osteomyelitis of the calcaneus following a heel pad puncture: A case report. *Clin. Orthop.*, 1981, 158, 195-197.
8. Grant A.D., Atar D., Lehman W.B. The Ilizarov technique in correction of complex foot deformities. *Clin. Orthop.* 1992, 280, 94-103.
9. Leftridge C.A. Osteomyelitis of the calcaneus secondary to heel pad puncture: A case report. *J.A.M.A.*, 1977, 69, 507-508.
10. Lilien D.L., Harris V.J., Ramamurthy R.S., Pildes R.S. Neonatal osteomyelitis of the calcaneus. Complication of heel puncture. *J. Ped.*, 1976, 88, 478-480.
11. Nelson D.L., Hable K.A., Matsen J.M. Proteus mirabilis osteomyelitis in two neonates following heel puncture. *Am. J. Dis. Child.*, 1973, 125, 109-110.
12. Uhren R., Curtis P. Calcaneal osteomyelitis of the newborn: A case report. *J. Fam. Pract.*, 1980, 11, 809-810.

SAMENVATTING

J. LAMMENS: Verkorting van de calcaneus behandeld met de methode van Ilizarov

De auteur bericht over een hielbeenverkorting bij een zestienjarige jongedame tengevolge van een groeistop van de calcaneaire epifyse, die optrad wegens een geïnfecteerde hielpriktest vlak na de geboorte. Op de leeftijd van zestien werd een verlenging verricht met de methode van Ilizarov via een osteotomie ter hoogte van de tuber calcanei. Het resultaat was bevredigend met een esthetische verbetering, een pijnloze functie en het gemakkelijker aanpassen van schoeisel.

RÉSUMÉ

J. LAMMENS: Raccourcissement du calcaneum traité par le méthode d' Ilizarov.

L'auteur rapporte le cas d'une jeune fille de 16 ans souffrant d'un raccourcissement du talon, suite à un arrêt de croissance du calcaneum, suite à un sépsis secondaire à une ponction à ce niveau.

A l'âge de 16 ans un allongement selon la méthode d'Ilizarov fut faite en utilisant une distraction progressive d'une osteotomie de la tubérosité calcanéenne.

Le résultat fut satisfaisant avec une amélioration esthétique, un fonction indolore et un chaussage plus comfortable.