Lengthening of an amputation stump by the Ilizarov technique

A case report

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Summary. *A woman, 29 years of age, sustained a below knee amputation following injury and was left with a stump 5.5 cm long. Good soft tissue cover was obtained with a myocutaneous flap using the gastrocnemius muscle and heel pad flap from the injured leg. The stump was then lengthened by 7 cm, to 12.5 cm, using the Ilizarov distraction technique. The patient was able to bear weight on the end of the fixator during the 8 months it was in position. The gap filled with bone and there were no complications. She recovered good function.*

Résumé. *Les auteurs rapportent un cas d'amputation post-traumatique de la partie haute de jambe chez une femme de 29 ans. Le but de l'étude était d'évaluer le résultat de l'allongement du moignon d'amputation réalisé pour améliorer l'ajustage d'une prothèse. Après échec par infection d'une greffe de l'extrémité distale du tibia, le moignon était resté trop court pour permettre l'utilisation d'une prothèse conventionnelle. Les parties molles étaient restées suffisantes grâce à un lambeau musculo-cutané utilisant le muscle jumeau et la coque talonnière. Bien qu'il y eut quelques problèmes de douleurs et d'inflammation sur les fiches, l'allongement osseux obtenu par la technique d'Ilizarov a été finalement un succès permettant une augmentation de longueur de 7 cms (127% d'augmentation). Pendant la période d'allongement, l'appui sur le membre inférieur a été possible.*

Introduction

Fitting a prosthesis can be difficult in a patient with a very short below knee amputation stump. Successful bone lengthening by the Ilizarov technique provides an opportunity to lengthen such a stump, preserving and improving the function of the adjacent joints.

Case report

A woman, 29 years of age, sustained multiple injuries in a motor vehicle accident. She had a soft tissue injury and bone loss in her left lower leg. A high below knee amputation was carried out 4 weeks later because she had developed gram-positive staphylococcus aureus septicaemia after infection of the wound. A gastrocnemius and a heel pad flap, containing the posterior tibial artery and nerve, was used to cover the end of the bony stump which was 5.5 cm long (Fig. 1). After the infection was eradicated, an Ilizarov fixator was applied to the stump, using one full ring with 2 wires proximally and a second full ring with 2 wires distally, 1 cm above the end of the bone. A subperiosteal corticotomy was carried out just below the tibial tuberosity (Fig. 2). Distraction was begun after 10 days at 1/6 mm 6 times a day. The stretched skin was released by small longitudinal incisions made intermittently around each wire. After 4 months, distraction was discontinued when 7 cm of lengthening (127%) had been achieved, the stump being 12.5 cm long. She was able to bear weight on the end of the fixator throughout the lengthening procedure (Fig. 3, 4).

The Ilizarov apparatus was removed 8 months after operation when the distraction gap was completely filled with solid new bone. She then had knee flexion from 0° to 110°. There were no complications apart from slight inflammation at the pin sites.

She has now been fitted with a conventional below knee prosthesis. She can bear weight and take part in normal activities.

Fig. 1. Radiographs of the below knee amputation performed for infection. The stump was 5.5 cm long

Fig. 2. Lengthening of the short stump started after application of the Ilizarov apparatus

Fig. 3. The stump was lengthened by 7 cm to 12.5 cm with good regeneration of bone in the distraction gap

Fig. 4. The patient was able to bear weight on the end of the external fixator during the lengthening procedure

Fig. 5. Radiographs a year after lengthening showed good consolidation of the regenerated bone

Discussion

An adequate below knee amputation stump allows a lower consumption of energy and a more efficient gait using a prosthesis [9, 10]. There have been very few reports of lengthening short stumps in post-traumatic amputations [1, 3, 4, 7]. Good skin and soft tissue cover must be obtained before lengthening to prevent protrusion of the bone through the skin [1, 8]. These tissues must therefore be lengthened before bone distraction by tissue expanders [5] or vascularised myocutaneous flaps [2, 6]. In our case we used a myocutaneous flap using the gastrocnemius muscle and heel pad of the injured leg.

Corticotomy is difficult in stump lengthening using the Ilizarov technique because of the very small space between the proximal and distal ring. The small longitudinal incisions at the pin tracks whenever there was tension decreased the patient's pain. Our patient could bear weight on the end of the external fixator and continue her daily activities during the 8 months the device was in place. She did not develop a flexion contracture of the knee because the longer lever arm enabled her to exercise her knee throughout.

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