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Journal of Muscle Health

Research Article

Surgical Reconstruction and Rehabilitation of Post Burn Trophic Ulcers and Cicatrixes Calcaneal Area of the Foot

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Submitted: 02 June 2017

Accepted: 04 September 2017

Published: 06 September 2017

Keywords

• Achilles tendon; Unhealing trophic ulcers

Abstract

The Achilles tendon is a tough band of fibrous tissue that connects the calf muscles to the heel bone (calcaneus). In Central Asia, and particularly in Uzbekistan, many episodes of burns take place at homes because of using sandal heaters. In sandal burns feet contact with burning coal takes place and the burn can affect subcutaneous fat, fascia, muscles and even bones that sometimes caused the development of unhealing trophic ulcers and a challenging complex specific pathology of the weight bearing motor apparatus. Thirteen patients have been operated on under our observation for prolonged unhealing ulcers and cicatrices located in the Achilles tendon zone. The patients were after cicatrices dissection, L-form plastic surgery was performed.

Good results were achieved in 11 cases, grafts were viable, sensibility was preserved and no marginal necrosis was noted. However complete graft adoptation and it is good getting to a place occurs in 2-3 months. During this period patient must not wear common shoes, pressing on the graft.

INTRODUCTION

The Achilles tendon is a tough band of fibrous tissue that connects the calf muscles to the heel bone (calcaneus). The Achilles tendon is the largest and strongest tendon in the body.

Skin defects of the Achilles tendon after burn trauma present difficult problems. This movement allows us to stand on our toes when walking, running, or jumping. Despite its strength, the Achilles tendon is also vulnerable to injury, due to its limited blood supply and the high tensions placed on it.

Reconstruction of soft tissue defects of calcaneal region and posterior heel is demanding because of their osseous or tendinous bed, poor vascularization, and constant area movement.

In Central Asia, and particularly in Uzbekistan, many episodes of burns take place at homes because of using sandal heaters [1-3]. In sandal burns feet contact with burning coal takes place and the burn can affect subcutaneous fat, fascia, muscles and even bones that sometimes caused the development of unhealing trophic ulcers. Coverage of soft tissue defects with the following formation of cicatrix is often complicated by unhealing trophic ulcer remains a challenge for both the orthopaedic and the plastic surgeon.

Lateral calcaneal flap was introduced by Grabb and Argenta in 1981 [4]. Good results were achieved by Amarante S. et al. [5], with plasty of defects in the area of Achilles tendon and with skin-fascial graft on the distal base from medial surface in malleolus.

In L- form ski-fatty graft, the grafts were viable, preserved sensibility that is rather important because the patient saves displaced from mechanic trauma in the natural way that is impossible in Italian plastics [6].

MATERIAL AND METHODS

13 patients (8 men and 5 women, aged 9 to 61 years) we treated with prolonged unhealing ulcers and cicatrixes, located in the Achilles tendon zone in Samarkand Burn Centre, Uzbekistan. The causes of the trophic ulcers development were: sandal burns (in 11 patients), the sulfuric acid burns (in 1 patient), and electro trauma burns. Ulcers sizes were from 1, 0-3, 5 to 4-5 sm. in diameter. All patients had undergone operation before (2-4 times) but unsuccessfully. The donor area, where the skin and fatty graft had been taken from, had the following features.

Operative procedure

After cicatrixes dissection a deep wound, 5-11 sm. In length, takes place. For orientation we divided the posterior surface of the calcaneal tendon area into three parts: calcaneal, ankle, supramalleolaris areas. Large wound surfaces can be closed by long L-form graft. Posterior crural surface above the achilles tendon is its base, between distal and middle third of the leg. The graft is directed laterally and forward, its posterior border is the margin of cicatrixes and its anterior one is about 2 sm. forward from the talus apex. Then the graft passes to the lateral surface of the foot under the angle about 90^0 along the foot margin. The graft width is 5-6 sm, length -18-20sm, Of them the vertical part makes 13-14sm, horizontal 5-6 sm. Part correlation is 3.1, 2.1,1.1. According to the spread of tissues defect the graft planned with

the surplus in length on 4-5sm. as it contracts after mobilization and when the graft covers the calcaneal tendon and the calcaneus it is fixed in the condition of some extension on width for the account of length. The graft mobilisation was started from its apex; penetrating at once to the fascia covering the muscles by means of the incision and strictly along the fascia the graft was raised up to superior distal third of the ankle joint. With this the terminal branches of artery fibularis were being crossed and the other that penetrated into the graft on the foot from the side of the planta in the zone of the ankle joint and higher from the side of the tendon of long fibular muscle, where their number is less than on the foot, the graft was mobilisated be placed above the achilles tendon. Graft sensitivity is provided by the calf nerve, rete venosum plantare, arterial blood supply is collaterial due to a thick network making up the base of the graft through long post-fibular muscle, moving away from artery tibialis anterior and also along anterior border of the pointed muscle, a little more distal of the artery tibialis branch. Depending on the area and localization of the defects, cicatrixes and ulcers, the L-form graft was placed on the wound surgace, either longitudinally or under the angle when its vertical part, laying across, closed the wound distal zone. The medial margin and the end of the graft were connected with the proper wound margin by one or two rows sutures and by means of the lateral margin of the graft, the lateral surface of the achilles tendon was closed and it was fixed by catgut sutures to the fascia through the subdermal layer. The donor wound was closed with a thick transplantad of split skin; bandage in the condition of compression was being fixed by means of stretched sutures.

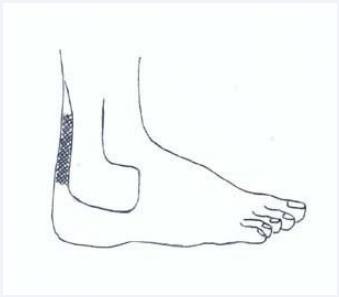

Figure 1 Ulcerating cicatrix in the area of the achilles tendon zone. The borders of the L-form skin fascial graft have been pointed out.

Figure 2 L-form skin- fascial graft from the inferior third of the crus and foot has been mobilized.

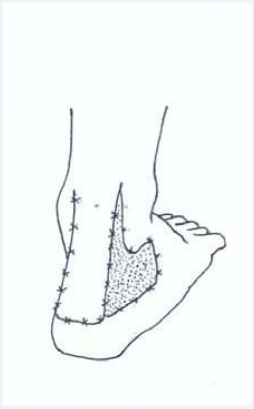

Figure 3 After ulcerating cicatrices dissection the wound was covered by mobilized skin-fascial graft.

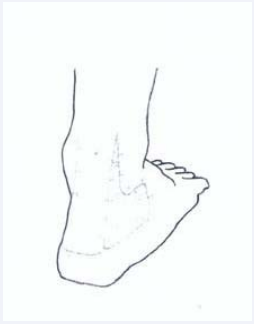

Figure 4 The result of the achilles tendon plastics by means of L-form skin-fascial graft.

RESULTS

According to our observations we received a good result and no complications. The grafts were viable, preserved sensibility and marginal necrosis was not noticed. Gradually the operation efficacy improves, as the cicatrixes become softer, the fossa behind the external talus where the graft is taken from is filled in. There was noted marginal necrosis of the part, of external talus adjoining to ulcer because of the tissue changes only in one patient. The necrotised area was removed and the wound was closed by split skin and it did not influence on a good result of the operation. Within the second week, the dorsal plaster bar was applied, and the sutures were removed on the postoperative day 11. Later the patient was recommended to make easy passive and active movements in the ankle joint. At 2-month postoperative follow-up, the graft was in a good condition, sensibility was good and elastic mixture of skin did not create a surplus. All patients are able to wear shoes and no restriction concerning leg movement has been observed. Follow-up of the patients ranges between 6 months and 5 years.

DISCUSSION

In spite of a large number of the used methods the problem of elimination of defects in the area of Achilles tendon is not solved to the end. This movement allows us to stand on our toes when walking, running, or jumping. Despite its strength, the Achilles

tendon is also vulnerable to injury, due to its limited blood supply and the high tensions placed on it.

As a rule it is impossible to eliminate them by means of local tissues plasty [7-10]. In L- form ski-fatty graft, the grafts were viable, preserved sensibility that is rather important because the patient saves displaced from mechanic trauma in the natural way that is impossible in Italian plastics. The high percentage of patients who underwent the post burn reconstructive surgical treatment indicates poor effectiveness of conservative methods of therapy used today. A permanently maintained system of burn rehabilitation reduces disablement among patients who recovered. Controlling the dynamics of scar change development makes it possible for patients to escape severe post-burn effects, which can be prevented only by reconstruction/rehabilitation surgery. The patients may resume their work in 1,5 months after the operation. However complete graft adaptation and it is good getting to a place occurs in 2-3 months. During this period patient must not wear common shoes, pressing on the graft.

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Cite this article

Shakirov BM (2017) Surgical Reconstruction and Rehabilitation of Post Burn Trophic Ulcers and Cicatrixes Calcaneal Area of the Foot. J Muscle Health 1(2): 1007.