

Radical excision and free flap transfer in chronic lymphedema

F. Schwarzl, J. Huracek, J. Farhadi, G. Pierer

**University Clinic for Plastic and Reconstructive Surgery
University Hospital
Basel, Switzerland**

Address for correspondence:

Prof. Dr. G. Pierer
Univ. Klinik für Wiederherstellende Chirurgie
Spitalstrasse 21
CH-4031 Basel

Tel.: +41 61 265 7349
Fax. +41 61 265 7301
mailto: gpierer@uhbs.ch

Abstract

The case we present is that of a 33-year old woman with a four- year history of a secondary lymphedema of the hand, due to excessive abscesses on the forearm after the use of repeated parenteral drugs lasting several years. We describe an excisional procedure combined with a physiologic reconstruction to restore the function of the forearm and hand.

INTRODUCTION

Abnormalities of lymphatic drainage cause a build-up of lymph fluid in the interstitial spaces and swelling of the involved extremity. No curative technique is presently available in spite of the description of the lymphatic system in the mid 17th century.

Gasparo Aselli or Asellius (1581-1626), a Milanese surgeon and anatomist discovered, apparently by accident, the structures known as the lacteals or lymph vessels on July 23, 1622. Aselli erroneously believed that the "lacteal veins" led to the liver. It was not until Jean Pecquet (1622-1674) discovered the thoracic duct and proved that its lower end, the receptaculum chyli and the ductus thoracicus, were continuous with the lacteals. This entire matter of the anatomical constituents and digestive functions however remained confused and the precise role of the lacteals in lymphatic circulation remained a matter of debate until the work of Olof Rudbeck of Sweden.

In spite of these early observations and abundance of modern research, lymphatic anatomy and the pathogenesis of lymphedema remains unclear. The treatment of lymphedema by medical or surgical means remains a difficult task. This is evident in the variety of surgical treatments extending from drainage by needle holes and stab wounds treated by Lis Franc in 1841, over omental transposition flap to microsurgical anastomosis of the lymphatic.

Primary lymphedema results from congenital maldevelopment of the lymphatic, whereas secondary lymphedema is due to an acquired obstruction of lymphatic drainage.

Lymphedema of the upper limb may develop spontaneously, but it usually develops postoperatively or after radiation. Other causes of secondary lymphedema include:

tumor, phlebitis, recurrent lymphangitis, trauma and a variety of relatively unusual infections (Savage RC ,1993).

This report includes a case of a secondary lymphedema of the upper extremity due to phlebitis and abscess after parenteral drug abuse leading to elephantiasis of the hand. After studying the pathophysiology of the lymphatic system, reviewing the different surgical procedures and integrating the physiology of free flap transfer, the surgical approach will be presented.

CASE REPORT

The case we present is that of a 33-year old woman with a four- year history of a secondary lymphedema of the hand, due to excessive abscesses on the forearm after the use of repeated parenteral drugs lasting several years. She admitted herself for the first time in 1993, in the outpatient clinic with a small abscess on the right forearm.

The abscess was surgically opened and drained. During the following 2 years the patient was seen on an almost regular basis with abscesses on all extremities, due to continuous parenteral drug abuse. In 1995 the patient had developed necrotized infections on her right forearm. An extensive debridement was performed. As a result of the patient continuously injecting into the wounds, skin grafting was not possible. At this time the first signs of lymphedema started to developing in the patient. In 1996 the forearm had developed a severe necrotic infection, involving the entire circumference. Another extensive debridement was performed now followed by mesh-grafting. Due to continuous parenteral drug abuse, the patient developed recurrent phlebitis and cellulitis. In 1998 the patient, readmitting herself at a severe stage into the clinic, suffered a radius fracture of the right arm resulting in a malunion of the distal radius and stiffness of the

radio-carpal joint. The radio-carpal joint was fixed by postinfectious ankylosis in a 70° extension with no pro- and supination. The metacarpophalangeal joints were held in full extension due to a severe contraction of the extensor digitorum communis-muscle and the active flexion of the proximal interphalangeal and distal interphalangeal joints were possible up to 30° in mean . Due to the chronic wounds and scar formation, which extended to her elbow, she developed a contracture with loss of motion in her elbow joint by 90° of flexion. By the year 2000 the lymphedema had progressed to such a point that no further movement was possible in her hand. The skin of the forearm showed multiple ulcers and cellulitis and the hand showed an enormous lymphatic weeping. The patient was unable to perform a grip or pinch (Fig. 1).

There were three goals to achieve for the success of the treatment: first a complete removal of the circular scary tissue of the forearm, second an arthrodesis of the wrist to restore the wrist alignment and stability and finally, a soft tissue coverage to reestablish the lymphatic drainage.

In a first step procedure we excised all skin, scary tissue and chronic wounds (Fig. 2). The volume of the hand decreased due the lymphatic flow of the hand. A pancarpal arthrodesis and an osteotomy of the ulnar head were performed (Fig. 3), followed by coverage of the defect by artificial skin. In a second procedure a free myocutaneous latissimus dorsi flap was elevated and wrapped around the forearm. The anastomosis were performed in the elbow region. Beside the skin island the muscle was covered with split thickness skin graft.

Shortly after the operation we started with intensive lymphatic drainage therapy of the upper arm and physical therapy for the hand and forearm. The size of the hand

continued to decrease so that the patient was able to hold a cup and pin after 2 months. The patient regained a function of the elbow as far as an extension deficit of 30° (Fig. 4 – 6).

DISCUSSION

Although many surgical techniques have been described in the treatment of lymphedema, controversy exists as to which procedure provides consistent long-term improvement. It has to be taken into consideration that long-term improvement is different for the upper extremities than for the lower extremities. The discouraging fact remains that none of these very varying procedures have resulted in complete resolution. The procedures have been classified as either physiologic or excisional in their concept. Physiologic procedures include omental transposition, enteromesenteric bridge and microsurgical anastomosis (lymphovenous, lympholymphatic anastomosis) (Savage RC 185). The excisional therapy includes the Charles procedure, Kondoleon's or Thompson's procedure (Dellon and Hoopes, 1977; Thompson, 1970). But the facts are blurred; physiologic procedures have an excisional component and excisional procedures have a physiologic effect. All these procedures were mainly used in the lower extremities. The main difference to the upper extremities is the restoration of functional elements to the elbow joint and the hand. The above mentioned procedures were evaluated in reference to our patient. Microsurgical anastomosis of the lymphatics is only available to patients in an early stage of lymphedema. Even with complete excisional therapy of the hand and the forearm, the result would have left the patient with a nonfunctional limb. The goal in the treatment of our patient was to restore the function of the arm and hand.

For that reason we performed a radical excision of the entire scar tissue to relieve the circumferential compression, which would improve the intermuscular lymphatic flow. As shown by Pierer (1969), the complete resection is necessary to achieve the relieve of the circumferential compression. To improve the long term effect of the excisional therapy, restoration of the lymphatic flow is necessary. Even though Slavin et al. (1985) showed spontaneous reconnection of the lymphatic in free flap transfer in normal tissue we assumed by wrapping around the arm with a muscle flap we would achieve the same goal. Long-term results of this procedure are not yet available. But the short-term results a very promising.

The excisional therapy is the most effective treatment regime as described by others. The combination with a free flap transfer, gave us the opportunity of a wide excision with coverage of the tendons and bones and the restoration of the lymphatic flow.

REERENCES

Dellon AL, Hoopes JE (1977) The Charles procedure for primary lymphedema. Long-term clinical results. *Plast.Reconstr.Surg.* 60:589-595

Pierer H (1969) [Radical resection in chronic lymphedema. Indications, technics and results]. *Langenbecks Arch.Chir* 325:113-8.:113-118

Savage RC (1985) The surgical management of lymphedema. *Surg.Gynecol.Obstet.* 160:283-290

Slavin SA, Upton J, Kaplan WD, Van den Abbeele AD (1997) An investigation of lymphatic function following free-tissue transfer. *Plast.Reconstr.Surg.* 99:730-741

Thompson N (1970) Buried dermal flap operation for chronic lymphedema of the extremities. Ten-year survey of results in 79 cases. *Plast.Reconstr.Surg.* 45:541-548

Captions to Illustrations

Fig. 1. Nonfunctional hand and forearm due lymphedema

Fig. 2. Circumferential radical excision

Fig. 3. Pancarpal arthrodesis and osteotomy of the ulnar head

Fig. 4. Six months after surgery

Fig. 5. The patient is able to perform a grip

Fig. 6. The patient can use her hand for fine movements