

Case Report:

The Isolated Effect of Vascularized Lymphatic Vessels Only Transfer in Treatment of Chronic Symptomatic Lymphedema

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ABSTRACT

Introduction: Lymphedema surgery is changing nowadays to be more physiological and involves various lymphatic tissue transfers for advanced stages.

Case: 44 year-old man with lymphedema (Campisi stage: III) treated exclusively by Vascularized Lymphatic Vessels Transfer (VLVT) resulted in decrease in limb size and cessation of cellulitis and lymphorrhea. Effects were sustainable with no major complications at 6 months.

Conclusion: VLVT is a suggested promising technique and should be compared with existing options for advanced lymphedema treatment.

Key Words: *Isolated – Vascularized – Lymphatic – Transfer – Lymphedema.*

INTRODUCTION

The lymphedema is a pathological disabling condition resulting from malfunction of the lymphatic system and manifests as swelling, recurrent infection and skin changes at the affected body part [1]. Although many countries do not have accurate statistical measures of such a condition, an estimated five to ten million Americans suffer from lymphedema nowadays [2]. The lymphedema is a potential handicapping condition due to the increase in weight and size of the affected limb as well as decrease in its immunity [3]. Lymphedema patients were offered compression, physical therapy [4], de-bulking procedures [5] and other non-physiological procedures as the mainstay of treatment. These traditional modalities could temporary improve the size but not infection or disease progress [4]. Since 1967, an experimental lymphovenous bypass has been tried [6]. However, it did not become a popular clinical practice until 1990th when Koshima was able to produce an effective functional bypass to drain the lymphatic fluid out

of the limb [7]. Since then, the reconstructive lymphatic Microsurgery started to gain popularity and many developments in that field rendered many lifelong lymphedema conditions into a treatable disease. The proved efficacy of reconstructive lymphatic procedures nowadays changed the gold standard treatment for lymphedema to be more surgical and physiological [8]. Previously, it was believed that the lymphatic vasculature played a passive role by transporting antigen-presenting cells and soluble antigens to regional lymph nodes. However, the most recent studies show that lymphatic endothelial cells regulate immune responses more directly. They control the entry of immune cells into lymphatic capillaries, present antigens on major histocompatibility complex proteins, and modulate antigen-presenting cells [2]. Thereafter, a physiological lymphatic reconstruction shall largely replace the previous practice.

Case Report

A 44 years old active gentleman was referred to us from a vascular surgeon complaining of recurrent attacks of cellulitis, trans-cutaneous Lymphorrhea and intractable swelling despite the maximum conservative measures for left lower leg and foot lymphedema. Taking history and examining the patient, we encountered a 23-year lasting lymphedema (ISL stage: IIB-Campisi stage: III) following multiple attacks of cellulitis at 19 years of age. A hard slightly pitting edema with lymphorrhea sites from upper calf is seen no current cellulitis Fig. (1). An ICG scan revealed a dermal backflow pattern (star-sky appearance with diminished lymphatic velocity). We decided, with the patient's agreement, to operate of the patient's lymphedema doing a free lymphatic tissue transfer. We recommended preoperative maximum decon-

gestive therapy to facilitate the surgery and to give us a clue about the expected decrease in the limb size after fluid component removal but the patient was in-compliant. Another ICG scan was done for the donor leg which confirmed that the lymphatic tree is normal.

Pre-operatively, a superficial circumflex iliac artery perforator flap (SCIP) flap was designed on right groin (Fig. 2).

Intraoperatively, under (epi-dural) anesthesia, a 15 X 6cm flap was raised containing lymphatic channels only and no lymph nodes (the horizontal group of superficial inguinal lymph nodes were identified under magnification and preserved). In order to include maximum lymphatic vessels, all tissues above the deep fascia were harvested in supero-lateral part of the flap and most of tissues deep to Scarpa's fascia and lymph nodes were preserved in the inferomedial part (Fig. 3). The SIEA (superficial inferior epigastric artery) and SCIV (superficial circumflex iliac vein) were anastomosed to the posterior tibial artery (end to side) and a superficial vein respectively. This was a deviation from the original plan due to vascular dominance by intraoperative selective clamping test. A skin paddle was left for monitoring at the time of inseting. Post-operative strict limb elevation, a course of antibiotics and LMWH was administered, dangling at 5 days, non-weight bearing walk at one-week followed by partial then full weight bearing at 21 days. Although the distal 3 cm of the flap required debridement and 2ry sutures as a day surgery procedure after 4 weeks, no other complications were noticed on donor or recipient sites.



Fig. (1): Pre-operative measurements of left lower leg 10 and 15cm above medial malleolus.



Fig. (2): Left-pre-op. marking donor site (initially planned as SCIP flap).



Fig. (3): Top: Intra-op. flap raised (●=Thin part of the flap, ★=Thick flap part, ◆=Deep surface of the upper medial part of flap rolled) SIEA=Superficial Inferior Epigastric, SCIA=Superficial Circumflex Iliac Artery. Bottom: After flap inset with tube drain.

RESULTS

The patient lost 5cm of leg circumference at 10th post-operative day (Fig. 4). No single attack of cellulitis or lymphorrhea happened post-operative further improvement of skin quality and stable leg circumference (of less than pre-operative) without regular physiotherapy or effective compression at 6 months post-operative (Fig. 5).



Fig. (4): Ten days post-operative measurements of left lower leg.



Fig. (5): Six months post-operative without compression.



Fig. (6): Sponge action of the flap by day 3 (very swollen flap and limb deflation begins) the flap lymphatics power resulted in suction of blood from underneath resulting in bruises.

Table (1): Pre-operative, 10 days & 6 months postoperative results of the studied cases.

	Pre-operative	10 days post-operative	6 months post-operative
• Cellulitis	• 1-2 attacks per month with antibiotic course every month in the last 2 years	• NON	• NON
• Lymphorrhea	• Continuous daily soaking and bad odor for the last 2 years	• NON	• NON
• Measure 10cm above medial malleolus	• 38cm	• 33cm	• 34cm
• Measure 20cm above medial malleolus	• 38cm	• 33cm	• 36cm
• Skin tension and elasticity	• Tense skin lost elasticity	• Improved	• Stable improved

DISCUSSION

Due to recent advances in lymphedema surgery, many procedures can be combined with the conservative management to result in a better outcome and the physiological and non-physiological procedures would be combined as well [8,14]. In our case, free lymphatic issue transfer was chosen because of preexisting lymphatic destruction due to previous attacks of cellulitis [15]. As active collection and propulsion of lymphatic fluid is done by lymphatic tubules [16], we hypothesized that the lymph nodes have no superior role over the lymphatic vessels in resolving the lymphedema problem physiologically and mechanically, yet can have a higher morbidity theoretically. Improvement of lymphedema through providing healthy lymphatic vessels with its collective and secretive properties has been reported before [17]. Although some might argue that we accidentally have taken the superior-lateral superficial inguinal lymph node with the flap, we preserved all lymph nodes that we could see to avoid any morbidity and this isolated lymph node inclusion is not expected to be responsible for the results that we could achieve. In this transfer, the whole flap acts as a sponge which sucks the fluid from the limb ant through it into its pedicle by its homeostatic activity (Fig. 6). Uniquely, this case demonstrates the isolated effect of the vascularized lymphatic vessel transfer because no other modality was employed and the patient has not been compliant to compression at any stage.

Conclusion:

Because of its reasonable results and lower donor site morbidity, lymphatic vessel only transfer needs to be studied more and compared with lymph nodes transfer for cases of advanced lymphedema.

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