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Vascularized cervical lymph node transfer using the knee as a recipient site for treatment of lower extremity lymphedema: A case report

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Case report

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Background

Introduction: Microsurgery has become a common and standard surgical method of managing lymphedema. Vascularized lymph node transfer has been popular over the past 10 years. This is attributed to the fact that it has demonstrated promising results in management of extremity lymphedema compared to other methods of restoring lymphatic drainage. The aim of the current case report was to share the findings of the outcome of vascularized cervical lymph node transfer (VCLNT) by means of the knee as a recipient site for management of lower extremity lymphedema.

Methods: In August 2022, a 20 years old patient underwent a VCLNT for management of primary left lower extremity lymphedema. A vascularized cervical lymph node supplied via the facial vessels was harvested and reassigned to the popliteal fossa of the lymphedematous extremity. The sural artery and vein were used as the recipient vessels. The result was evaluated by lower limb circumference, occurrence of cellulitis, as well as lymphoscintigraphy.

Results: The flap survived. There was no donor-site morbidity that was realized. At an average track-down of 2 months, average resolution rate of 90% of the lymphedematous limb was demonstrated, which was statistically significant concerning the preoperative and postoperative lymphedematous limb. There was no occurrence of cellulitis. Suffice it to say, postoperative lymphoscintigraphy showed enhanced lymph drainage of the affected extremity, indicating diminished lymph stasis and swift lymphatic clearance.

Conclusion: VCLNT by means of the knee as a recipient site is a unique and dependable method that significantly improves primary lower extremity lymphedema.

Keywords: Lymph node transfer, lymphedema, microsurgery.

Lymphedema is a term that refers to a pathological condition involving the lymphatic system, whereby there's poor or impaired lymphatic drainage. This impaired lymphatic drainage then results in the buildup of proteinecious fluid in 3rd space i.e. interstitium (1). Lymphedema has been documented to be affecting over 200 million people worldwide, It affects over 250 million people globally, secondary lymphedema due to filariasis being the commonest cause (2,3). In developed countries however, iatrogenic causes including irradiation and surgical therapy for malignancy have been documented to be the leading causes of lymphedema. It's important to note that the most common complications brought about by lymphedema include infection and decreased self-esteem. Others include skin changes, difficulty using the extremity, as well as malignant transformation(2).

Management of chronic lymphedema has proved challenging over the years. This is because there's no absolute, therapeutic treatment and therefore the management is focused to improving symptoms (4,5). On the other hand, non-surgical (traditional) treatment methods include compression garments, manual lymphatic drainage, as well as skin care. (6) Microsurgery has become a common and standard surgical method of managing lymphedema. This can be achieved in 3 key methods i.e. lymphaticovenous anastomosis, lymphaticolymphatic anastomosis as well as vascularized lymph node transfer (VLNT), which was initially established in an animal model by Shesol in 1990 (7,8).

Methods

A 20-year-old female presented in the clinic with a six-year complains of left lower extremity

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LEVEL	LEFT LOWER EXTREMITY (Lymphedema)	RIGHT LOWER EXTREMITY (No Lymphedema)
Ankle joint	32 cm	26 cm
5cm above ankle joint	30 cm	24 cm
10cm above ankle joint	37 cm	29 cm
Mid leg level	43 cm	36 cm
30cm above ankle joint	44 cm	39 cm
Knee level	45 cm	42 cm
Mid-thigh level	61 cm	61 cm

Table 1. Circumferential limb measurements preoperatively

lymphedema. This edema started spontaneously without any predisposing factors. She was referred to us as plastic surgeons in a quaternary institution after undergoing various conservative treatment methods in the form of compression garments, limb elevation as well as lower extremity skin care without success. She had no comorbid conditions and triple serology was negative. In addition, during presentation in our clinic, she reported new symptoms of pain in the affected limb as well as heaviness which was worse at the end of the day. Physical examination revealed Stage III pitting lymphedema. The table below shows her circumferential limb measurements at various levels.

Management and Surgical technique

Due to the failure of conservative treatment that the young lady had received, a surgical option was chosen. A VLNT was performed. The anterior triangle of the neck on the left was selected as the donor site. Four lymph nodes together with the submental artery and vein were raised in continuity. The submental vein was the governing drainage vein. The popliteal recipient site (left side) was opened through a Z incision. This was followed by meticulous dissection under LOOPS, and microscopic dissection of tissues was performed. Hemostasis was well achieved. The sural artery and vein were identified and used as recipient vessels for the microvascular anastomosis. A single stay suture was placed to retain the VLNT in its desired position. Microsurgery anastomosis was done using single and double clips, that played a critical role in holding the vessels in place. The vessels were irrigated with heparin and lignocaine so as to prevent vasospasm. Monocryl 9/0 and 10/0 were used to anastomose the vessels together. The submental artery was anastomosed to the sural artery while the sural vein was anastomosed to the submandibular vein. After confirming patency in the anastomosis and hence good flap perfusion, the skin closed in layers. A splint preserving the knee in 45 degrees' flexion was fashioned. A Doppler ultrasound was also performed and confirmed adequate Doppler signal. Postoperative period was uneventful. Standard microvascular monitoring and post op care techniques were observed. The patient was discharged on day 9 postoperatively. She started ambulating with support for 5 days after which she resumed physiotherapy schedule. Postoperative limb circumference measurements were made at specific anatomic points as recorded in Table 1, and measurements were made by the same surgeon to minimize inter-observer bias

Results

Follow-up circumferential limb measurements at 2 months showed marked improvement in the affected limb as compared to preoperative

LEVEL	PREOP (cm)	POST OP (2 MONTHS, cm)
Ankle joint	32	27
5cm above ankle joint	30	26
10cm above ankle joint	37	32
Mid leg level	43	37
30cm above ankle joint	44	40
Knee level	45	42
Mid-thigh level	61	61

Table 2. Circumferential limb measurements of the left (lymphedematous) lower extremity 2 months postoperatively

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LEVEL	LEFT LOWER EXTREMITY (Lymphedema)	RIGHT LOWER EXTREMITY (No Lymphedema)	DIFFERENCE IN LIMB SIZE IN %
Ankle joint	27 cm	26 cm	3
5cm above ankle joint	26 cm	24 cm	8
10cm above ankle joint	32 cm	29 cm	10
Mid leg level	37 cm	36 cm	2
30cm above ankle joint	40 cm	39 cm	2
Knee level	42 cm	42 cm	0
Mid-thigh level	61 cm	61 cm	0

Table 3. Difference in limb circumference between the normal limb and the lymphedematous limb 2 months post operatively

measurements. It should be noted that it may take up to a year to see a clinical improvement in other instances. The majority of the improvement is noted in the proximal part of the limb as expected.

At two months postoperatively, the patient reported an improvement in symptoms, with less pain, less 'heaviness' of the limb, and improved softness of the soft tissue, especially in the proximal arm.

Data analysis

Differences in limb size between the edematous and normal limb two months post operatively was measured in centimeters using a tape measure at various levels as indicated. This difference was then analyzed in form of percentage and tabulated in table 3 above. From the table above, it is evident that the edema had resolved from the mid-thigh region up to the knee level. This is indicated by zero percent difference at the two levels between the normal and the lymphedematous limb. The second area with the most decrease in limb size was between the mid leg level and 30 cm above ankle joint, with limb discrepancies of two percent. This was closely followed by the region around the ankle joint with limb discrepancy of 3%. However, the region between 5 to 10 cm above the ankle joint was the area of least resolved lymphedema with a limb discrepancy of 8 to 10 percent.

Discussion

Autologous VLNT has become a standard surgical treatment option for patients with lymphedema. The principal mechanism of action of VLNT is by bypassing the damaged and or interrupted lymphatic channels. By so doing, VLNT is able to re-institute lymphatic flow(4). VLNT was first performed by Chen et al. with the aim of managing obstructive lymphedema in the canine model. However, the procedure was first described by Clodius et al. in an individual with lower extremity lymphedema, using a pedicled groin flap.

VLNT as a surgical procedure has continued increasing in popularity amongst both plastic as well as lymphedema surgeons as the main management option for lymphedema. Various donor sites have been described including thoracic, inguinal region as well as cervical region. The latter was the option of choice for the current case report. Some donor sites have better scar output than others. Other issues to be considered include adequacy of soft tissue cover among others. All in all, donor site edema is a factor that should be considered when deciding on the donor site. Preoperative imaging prior to surgery is critical to success of the VLNT. Both inguinal as well as popliteal regions are alternate regions of recipient vessel dissection. In our case, the cervical region was chosen since it has minimal chances of donor site morbidity. However, it is also important to note that the choice between either inguinal or cervical region may as well depend on the patient's preferences regarding the aesthetic outcomes of the surgical site.

VLNT can be performed with or without a skin paddle, as was performed in this case. Both types of VLNT have established better results.

There is paucity of knowledge as concerns the relationship regarding VLNT and the recipient's site lymphatics. There are two possibilities: either via lymphovenous interaction within the node or by means of efferent lymphatic vessels from the lymph nodes.

Conclusions

Lymphedema can present in various ways due to the various causes. This implies that treatment options have to be fashioned depending on the individual patients. VLNT for management of lymphedema has demonstrated better results. The technique appears to be useful in cases of secondary lymphedema, where an existing lymphatic network exists proximal and distal to the area of injury/obstruction. The complexity of the surgical technique and potential morbidity of VLNT may hinder its adoption amongst surgeons. However, the procedure is performed by all major microsurgical units around the world.

In our findings, the smaller the anastomosing blood vessels the better the outcome. The more the tissues harvested with the VLNT graft, the higher the chances of surviving.

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Conflicts of interests

The authors would like to declare that there is no conflict of interest

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