

Role of Lymphoscintigraphy Assisted Lymphatic Vessel Sparing Fibro-Lympho-Lipo Aspiration in Lymphedema

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Abstract

Chronic lymphedema is characterized by the accumulation of fibro-fatty tissue. Traditional excisional and debulking procedures may lead to unacceptable scarring. The liposuction may be done to avoid it. But it may cause damage to pre-existing lymphatic. Lymphoscintigraphy, an imaging modality to diagnose lymphedema, may be used as a guide for liposuction. In this article, we describe the role of lymphoscintigraphy in liposuction in a case of lower extremity lymphedema.

Keywords: Lymphoscintigraphy; Lymphedema; Liposuction; Lymphatic vessel sparing.

Introduction

Lymphedema is characterized by the accumulation of protein-rich fluid in the subcutaneous tissue due to an abnormality in lymphatic drainage. Whether congenital or acquired, once the fluid accumulates it leads to a chronic inflammatory response and stimulates lipogenesis with gradual connective tissue overgrowth and fat deposition. An array of investigations has to be carried out for establishing the diagnosis and classification of lymphedema. Nuclear study (lymphoscintigraphy) is considered one of the main investigations for

diagnosing damaged lymphatics. Management of lymphedema includes conservative and surgical approaches. Liposuction is one of the options for surgical management of lymphedema though, fear always exists of damaging the existing lymphatics, thus worsening of the lymphedema. In this article, we described lymphoscintigraphy-assisted liposuction.

Methodology

This is a prospective case study of a 29-year female patient admitted to the Plastic Surgery department in August 2019, with h/o swelling of the left lower limb for 16 years. The patient was assessed and investigated thoroughly. The patient was diagnosed with chronic primary lymphedema of the left lower limb with secondary skin changes (WHO grade-7). The patient was given standard care as per the International Society of Lymphology (ISL) guideline.¹ As the patient was not willing for any microsurgical or excisional procedure, a decision was made to perform lymphoscintigraphy-assisted liposuction.

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Lymphoscintigraphy was performed in the Department of Nuclear Medicine. For lymphoscintigraphy, 500 microcurie of Tc-99m sulfur colloid (radiochemical purity of Tc-99m sulfur colloid - 98%) was injected intradermally into 1st webspace of left foot followed by 500 microcurie of Tc-99m sulfur colloid subcutaneous injection into 1st webspace of right foot. Static images of bilateral lower limbs and the whole body were acquired immediately after injection, post-exercise, 2 hours (with transmission acquisition), 4 hours, and 24 hours after injection in anterior and posterior views on the 128 x 1024 matrix (figure-1 and 2).

The image was examined and based on dye distribution, liposuction was planned. The power-assisted liposuction was done with 3mm and 4mm cannula (Figure 3). Two sessions of liposuction were done at 3 weeks interval followed by standard care of the limb.

Result

In the left lower limb, the lymphoscintigraphy showed the presence of lymphatic channels mainly in the lower one-third of the leg and sparse lymphatics in lateral and medial borders of the leg

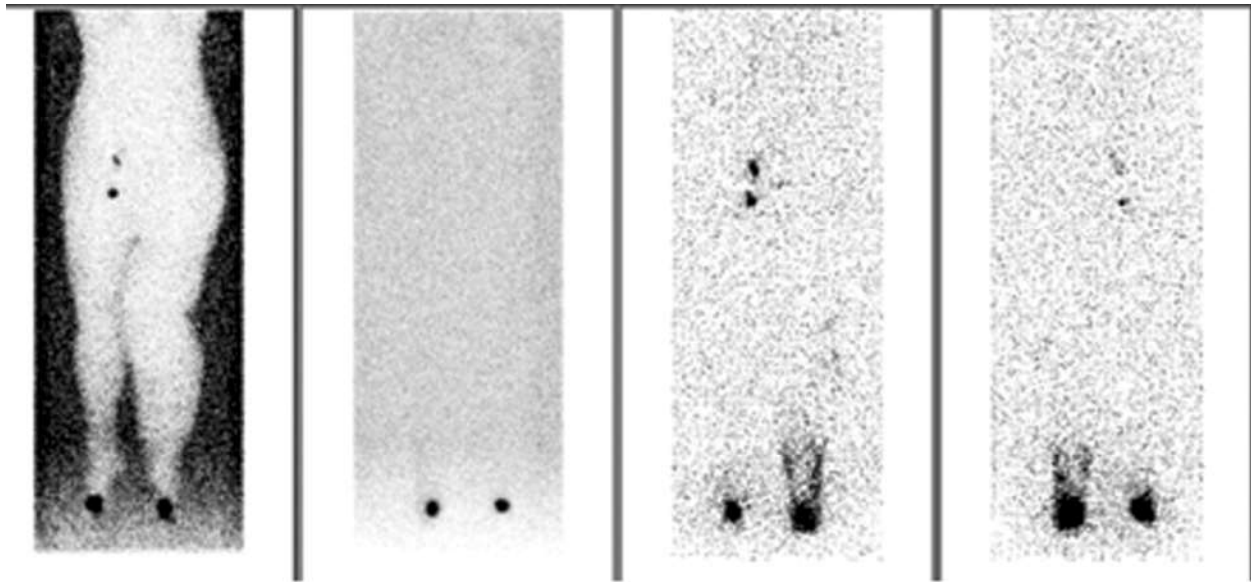


Fig. 1: Lymphoscintigraphy image.

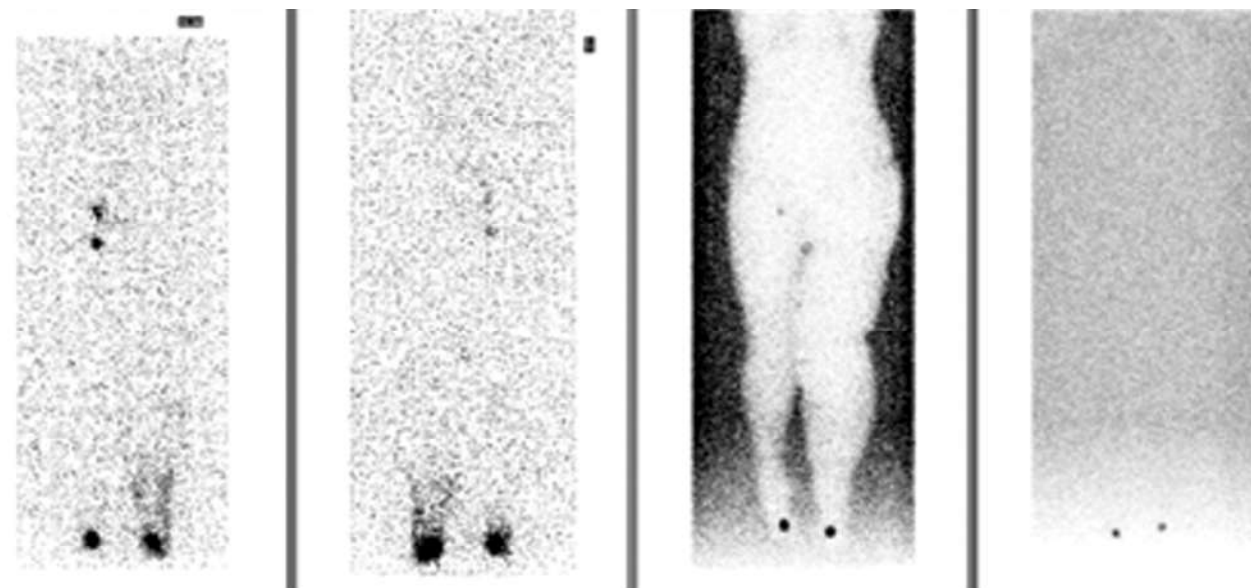


Fig. 2: Lymphoscintigraphy image.

and thigh. So liposuction was planned accordingly. The area, where the lymphatics were present, was marked and liposuction was done in the rest part of the leg. After three sessions of lymphoscintigraphy guided liposuction, there was a good reduction in limb girth. (Figure 4) There was no worsening of lymphedema, signifying no further damage to lymphatics by liposuction.



Fig. 3: Liposucttio after marking the zones.



Fig. 4: Significant reduction in limb volume after liposuction (right) compared to before (left).

Discussion

Lymphoscintigraphy is considered a main diagnostic modality to detect abnormal functional lymphatics. Lymphoscintigraphy can be performed by either macromolecule (albumin, dextran) or colloids (sulfur). Macromolecules have rapid transit and clearance and help in better imaging of the vessels. On the other hand, colloidal suspensions clear more slowly from the injection site, amounts of radioactivity present in the lymphatic vessels at any one time is lesser, thus reducing the ability to visualize these vessels. However, colloidal

particles can better delineate the draining lymph nodes.² Currently, Tc-99m sulfur colloid is the most frequently used agent and was used in our study also. Lymphoscintigraphy is useful in the diagnosis of lymphedema and differentiation of lymphedema causes. It can also grade the severity of the disease. It may also help in assessing the surgical outcome following lymph vessel transfer.² Lymphoscintigraphy has limited temporal and spatial resolution thus poor identification and localization of individual lymphatic channels.³ For preoperative imaging and planning, a high-resolution dynamic 3D magnetic resonance imaging (MRI) can be used which detects the location and number of individual lymphatic channels for surgical planning.⁴ Various dyes are currently used intraoperatively for better visualization of lymphatic channels.^{4,5}

Liposuction is a less invasive procedure to remove the excess fibro-fatty tissue in patients with chronic lymphedema.⁶ It avoids large scars and other morbidities associated with the excisional procedures.⁷ But liposuction may cause damage to existing lymphatics.⁸ Intraoperative Indocyanine green (ICG) dye and blue patent violet (BPV) dye has been used for avoiding such damage.⁹ This technique require specialized camera and dye which may not be available in all centre. As most of the lymphedema patient has undergone lymphoscintigraphy as diagnostic work-up, we have used lymphoscintigram for mapping the lymphatics and choosing the port site and area for liposuction.

Though the image of lymphoscintigraphy may not be of high quality, with proper planning, satisfactory images can be obtained and lymphatic channels may be visualized, especially in an early stage of the disease. We have followed up with the patient for a month, but no worsening of lymphedema was noted. Long-term follow-up is required to see the final result of our study.

Conclusion

Chronic lymphedema is characterized by the accumulation of fibrous and fatty tissue along with lymphatic fluid. Liposuction may help in reducing the bulk of the limb. Intra-operative ICG and dye study are better in guiding the surgeon about the area of liposuction, lymphoscintigraphy may also help in decision making. This is a single case study, a large multicentric study is needed to substantiate our finding.

Declarations

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