

Lymphoscintigraphy in the evaluation of lower extremity lymphedema: local experience

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ABSTRACT

Objective: To review our local experience in the use of lymphoscintigraphy to evaluate lymphedema of the lower extremities.

Design: Retrospective case series.

Setting: A local regional hospital in Hong Kong.

Patients: Images and records of all patients presenting to our hospital with suspected lower limb lymphedema from 1998 to 2011 for whom lymphoscintigraphy was performed were reviewed.

Main outcome measures: Lymphoscintigraphy findings and clinical outcomes.

Results: In all, 24 patients (13 males and 11 females; age range, 14–83 years) had undergone lymphoscintigraphy for suspected lower limb lymphedema. Eight cases were confirmed positive,

including one with lymphangiectasia, five with lymphatic obstruction, and two with lymphatic leakage. No complication was encountered.

Conclusion: Lymphoscintigraphy is safe and effective for the evaluation of lymphedema in lower extremities.

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New knowledge added by this study

- Our local experience confirmed the diagnostic value of lymphoscintigraphy in the evaluation of lymphedema of lower extremities.

Implications for clinical practice or policy

- Prompt diagnosis of lymphedema is crucial as effective treatment may be available. Lymphoscintigraphy aids the diagnosis of lymphedema, identification of causes and the approximate site of lymphatic obstruction, and should therefore be considered under appropriate clinical settings.

Introduction

Lymphedema is the accumulation of tissue fluid in the interstitial spaces, resulting from anatomical or functional lymphatic obstruction or defective lymphatic drainage.¹ Local data about the prevalence of this condition are not available, but it is estimated to affect 2 to 3 million inhabitants in the US.² Lymphoscintigraphy has emerged and become the standard investigation in the evaluation of lymphedematous extremities. We reviewed our experience in the use of lymphoscintigraphy for this purpose in a single regional hospital.

Methods

We retrospectively identified all the cases with suspected lower limb lymphedema referred for lymphoscintigraphy from 1998 to 2011. Case records and imaging studies were reviewed.

Imaging techniques

Studies conducted from 1998 to 2007 were performed with a single detector system (Picker Prism 1000;

Picker International, Cleveland [OH], US). Studies performed after 2007 were performed with a single photon emission computed tomography–computed tomography imaging system (Siemens Symbia T6; TruePoint SPECT CT, Siemens Medical Solutions, Illinois, US). The interdigital web space between the first and second digits on the patient's lower limbs was anaesthetised with local anaesthetic cream, and subsequently 0.5 mCi of Technetium-99m filtered sulphur colloid (through 0.22 micron filter) was injected into the preanaesthetised interdigital web spaces, creating a wheal. About 1 to 2 minutes after the injection, patients were encouraged to exercise their toes. Two-phase dynamic images were obtained at 5 minutes (from toes to knee) and 10 minutes (from knee to groin). Anterior whole-body scans were obtained at 15, 30, 45, and 60 minutes. Delayed 4-hour and 24-hour whole-body scans were obtained whenever deemed necessary.

Results

There were 24 patients with suspected lymphedema of lower extremities who had undergone

淋巴造影診斷下肢淋巴水腫：本地經驗

林茂珠、陸永恆、謝家熙

目的：回顧我們使用淋巴造影診斷下肢淋巴水腫的經驗。

設計：病例系列回顧研究。

安排：香港一所分區醫院。

患者：1998年至2011年間所有疑似下肢淋巴水腫並已接受淋巴造影的病人。

主要結果測量：淋巴造影結果及臨床治療結果。

結果：共24名年齡介乎14至83歲的病人（13男11女）被納入研究範圍。其中8人確診淋巴肢體水腫，包括1例淋巴管擴張症，5例淋巴管阻塞和2例淋巴管滲漏。診斷過程中並無任何併發症發生。

結論：淋巴造影能安全有效診斷下肢淋巴水腫。

per calf and 1-2 per thigh). Iliioinguinal nodes should be visualised within 1 hour. Typically, 1 to 3 popliteal nodes and 2 to 10 ilioinguinal nodes are seen. Figure 1 shows a normal lymphoscintigraphic examination of the lower limbs.

Abnormal lymphoscintigraphy scans manifest a wide range of findings, including interruption of lymphatic flow, collateral lymph vessels, dermal backflow, reduced number of lymph nodes, dilated lymphatics, delayed or non-visualisation of lymph nodes and even the lymphatic systems.

There were eight patients confirmed to be positive for lymphedema. These included one with lymphangiectasia (Fig 2), five with lymphatic obstruction (Fig 3), and two with lymphatic leakage (Fig 4). The Table summarises the lymphoscintigraphic findings and follow-up data on these eight cases.

lymphoscintigraphy. The patients were aged 14 to 83 (mean, 58) years; 13 were males and 11 were females. Apart from mild pain during injection, all patients tolerated the examination well without any serious complication.

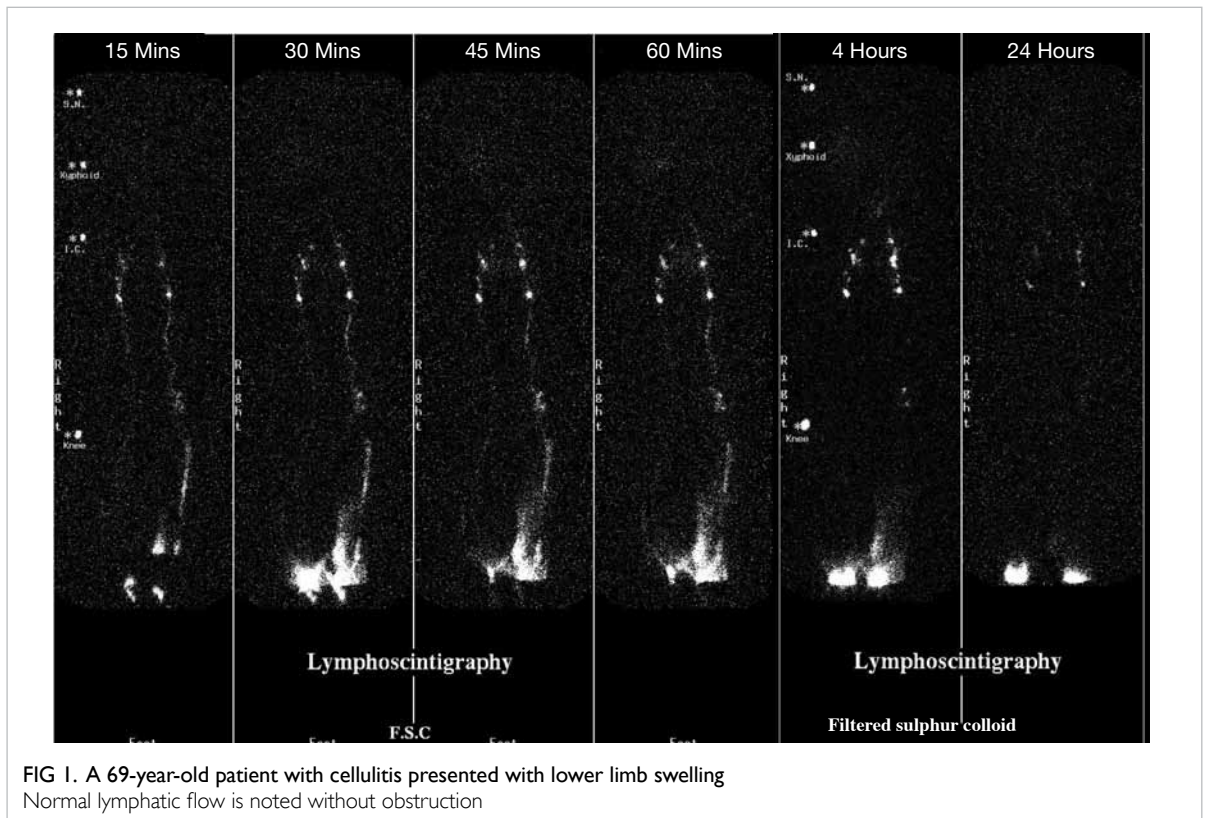
Lymphoscintigraphy findings

A predictable sequence should be seen in patients with normal lymphatic anatomy and function. In the lower limb, there should be symmetrical migration of radionuclide through discrete lymph vessels (3-5

Discussion

Lymphedema of the extremities is typically a chronic disease, which is often misdiagnosed and results in significant functional impairment, and may give rise to reduced coordination and mobility.³ Therefore, prompt and accurate diagnosis of the condition is important.

Decades ago, lymphangiography had been used to investigate lymphatic disorders, but it was a time-consuming investigation involving direct cannulation of lymph vessels. Moreover,



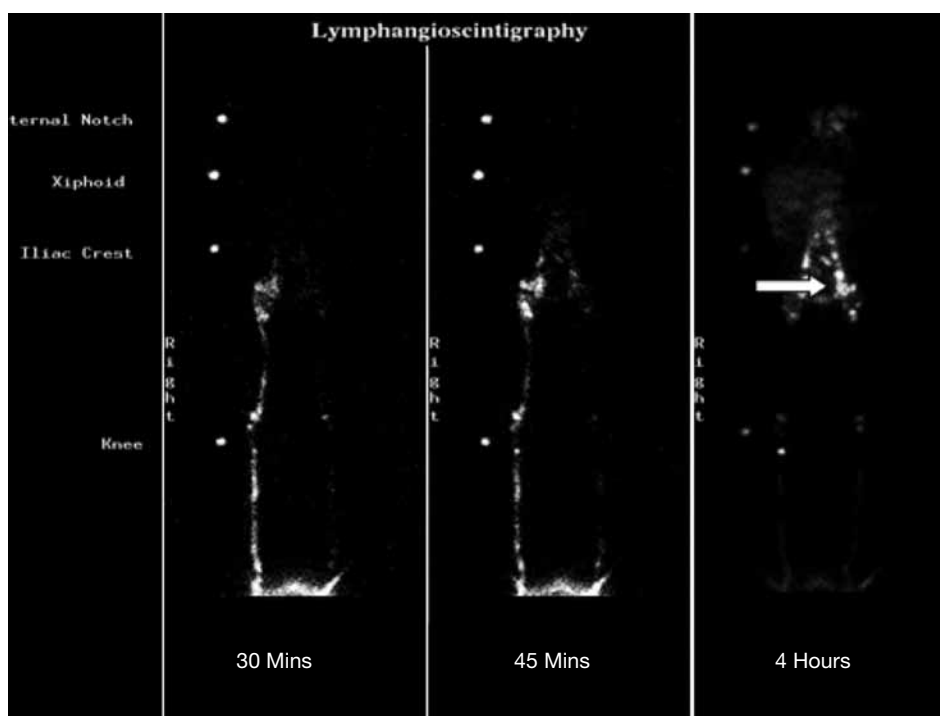


FIG 2. Patient No. 1: a 14-year-old patient with Noonan syndrome
Dilated lymphatics are seen within the abdomen (arrow) in the 4-hour post-injection film. Faint activity is observed in the liver. There was subsequent machine failure with inability to obtain images after 4 hours

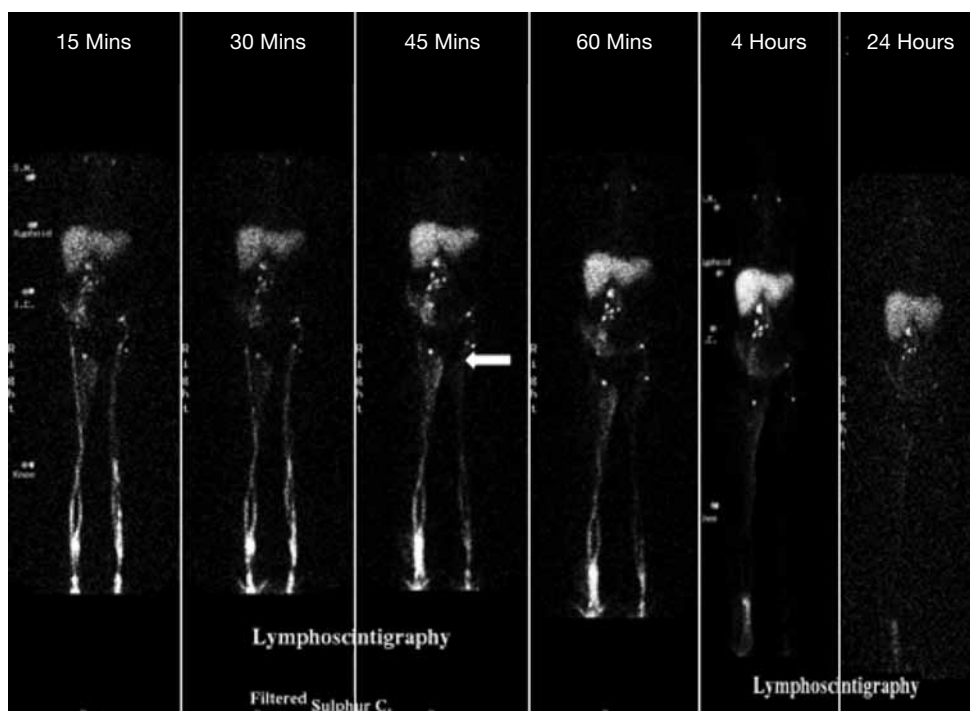


FIG 3. Patient No. 6: a 71-year-old patient with previous radiotherapy for cervical cancer; she suffered from partial lymphatic obstruction of the right lower limb
Dermal backflow is seen at the right thigh (arrow)

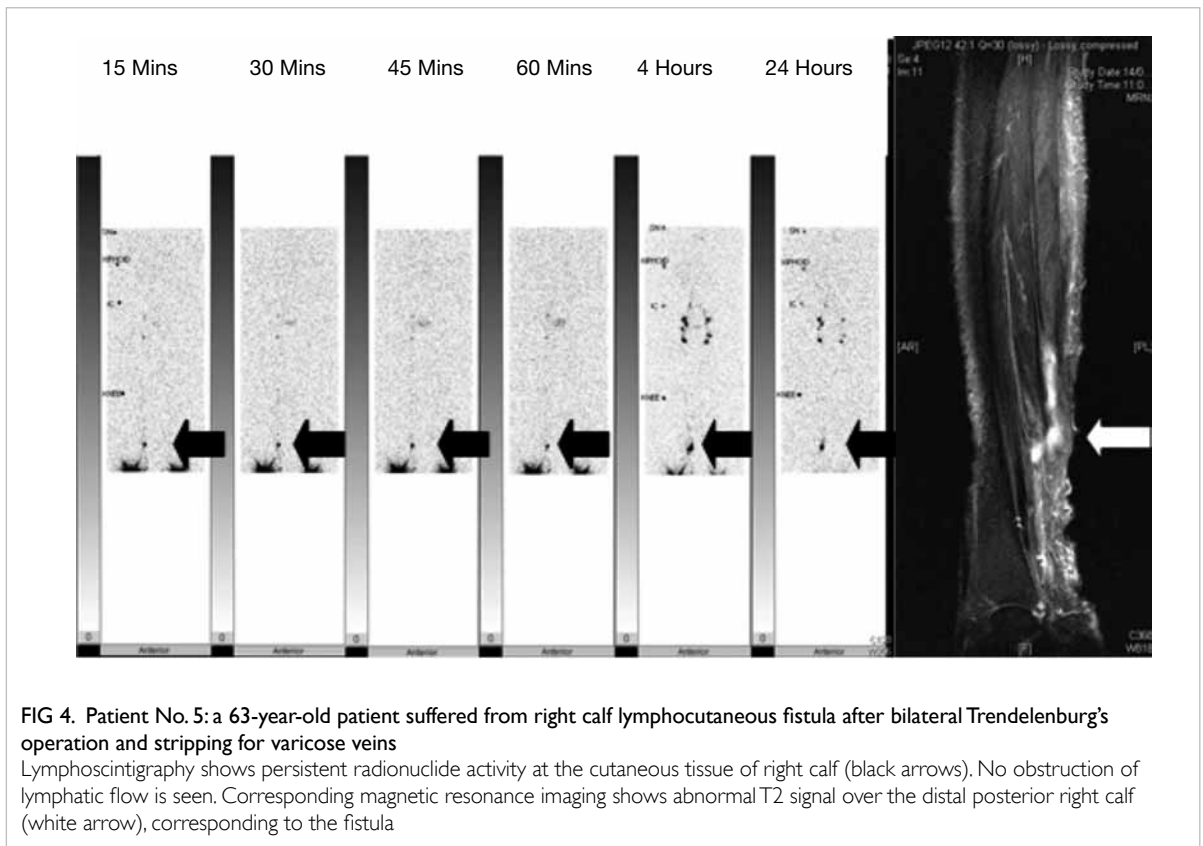


TABLE. Lymphoscintigraphic findings and follow-up in eight positive cases

Patient No.	Findings	Follow-up
1 (Fig 2)	Dilated lymphatic within abdomen was noted, compatible with lymphangiectasia.	The patient was known to have Noonan syndrome and was under continuous medical care for pulmonary valve stenosis and atrial septal defect.
2	Slower drainage above right knee was noted, probably due to previous radiotherapy resulting in partial obstruction.	The patient was treated conservatively with a pressure stocking. The oedema gradually subsided.
3 (Fig 3)	Lymphatic obstruction was noted above the groin/pelvic region.	CT showed no obstructing lesion. The patient was treated for filariasis as she has been in an endemic area (Indonesia) for more than 20 years. Symptoms were under control after two courses of ivermectin.
4	Lymphatic obstruction was noted in the distal right calf.	The patient was previously taking sirolimus (post-renal transplant) and diagnosed to have sirolimus-related lymphedema. Symptoms improved after ceasing drug treatment.
5 (Fig 4)	Accumulation of radiotracer was noted at the right calf, compatible with a lymphocutaneous fistula.	MRI showed collection at the corresponding region. Treatment entailed antibiotics and dressing. The fistula and oedema gradually resolved.
6	Lymphatic obstruction was noted at the lower abdomen or pelvic region.	The patient was treated with a pressure stocking.
7	Accumulation of radiotracer was noted at the left groin, compatible with lymphatic leakage.	Plication of the lymphatics was performed. Daily dressings were applied and the wound gradually healed.
8	Lymphatic obstruction was detected at the left groin.	The patient was treated with pressure stockings and thereafter the oedema decreased.

Abbreviations: CT = computed tomography; MRI = magnetic resonance imaging

complications such as infections, hypersensitivity, oil embolism, and lymphatic obstruction were reported.⁴ Lymphoscintigraphy has replaced lymphangiography and become the investigation of choice. Its advantages include being non-invasive,

free from adverse effects, and low radiation exposure to patients. Furthermore, it can be repeated and can even be used to follow-up after treatment response.⁵ The reported sensitivity and specificity of lymphoscintigraphy is approximately 66 to 100% and

83.5 to 99%, respectively.⁶

Lymphedema can usually be diagnosed clinically. The differential diagnosis of suspected lower- extremity lymphedema includes obesity, chronic venous insufficiency, Milroy's disease,⁷ and systemic diseases (eg hypoalbuminaemia). Lymphoscintigraphy enables confirmation of the diagnosis in unclear cases, assessing the risk of developing lymphedema,⁸ predicting the outcome of therapy,⁹ and assessing the results of lymphedema treatment.¹⁰⁻¹³

Lymphoscintigraphy can usually identify the approximate anatomical site of lymphatic obstruction adequately. However, when greater anatomical details are warranted, cross-sectional imaging techniques like computed tomography and magnetic resonance imaging can be used to supplement the findings.¹⁴ This point was well illustrated in this study.

Lymphoscintigraphy aids the diagnosis of underlying lymphatic disorders and hence, guides subsequent treatment, which have proven to be effective in the management of lymphedema.¹⁵⁻¹⁹ Conservative treatment includes physical therapy, drug therapy, and psychosocial rehabilitation.¹⁴ Operative treatment includes microsurgery, liposuction, and surgical resection.¹⁴ The treatment choice depends on the cause of lymphedema, disease severity, functional impairment, and availability of local expertise.

Conclusion

Lymphoscintigraphy is a safe and effective investigation for suspected lymphatic disorders. Our local experience supports its use in the investigation of lower-extremity lymphedema in our locality.

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