Inguinal intranodal lymphangiogram reveals high incidence of suprainguinal lymphatic disease in patients undergoing iliac vein stenting

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Suprainguinal Lymphatic Disease

- No financial disclosures

Suprainguinal Lymphatic Disease

- Lymphatics play an important role in drainage of interstitial fluid and edema prevention[1-3]
- Infrainguinal lymphatics have been studied in some depth
- Suprainguinal patterns of disease in limbs with phlebolymphedema have not been evaluated

[1]Levick JR, Michel CC. Microvascular fluid exchange and the revised Starling principle. Cardiovasc Res. 2010 Jul 15;87(2):198-210.
[2]Levick JR, McHale N. Physiology of lymph production and propulsion. In: Browse N, Burnand K, Mortimer PS, eds. Diseases of the Lymphatics. London: Edward Arnold; 2003. p44–64.
[3]Zawieja D. Lymphatic biology and the microcirculation: past, present and future. Microcirculation 2005;12:141–150.

Suprainguinal Lymphatic Disease

Evaluate the status of lymphatic flow above the inguinal ligament in patients presenting with edema and undergoing stenting for symptomatic chronic iliofemoral venous obstruction (CIVO)

Suprainguinal Lymphatic Disease

- Lower limbs that underwent pedal lymphoscintigraphy (LSG) for leg edema and were candidates for stenting for CIVO
- Each limb underwent intranodal lymphangiogram (INL) of an ipsilateral inferior inguinal group lymph node (10cc of lipiodol) at the time of stenting
- Fluoroscopic visualization of lipiodol transit was done (20min/40 min/60 min/3 hours post-injection)

Suprainguinal Lymphatic Disease

- Criteria:
  - Enumeration of lymph nodes from inguinal ligament to L1
  - Enumeration of lymphatic channels from inguinal ligament to L1
  - Visualization of the thoracic duct
  - Time delay to visualization of the thoracic duct
  - Pathologic changes to thoracic duct

Suprainguinal Lymphatic Disease

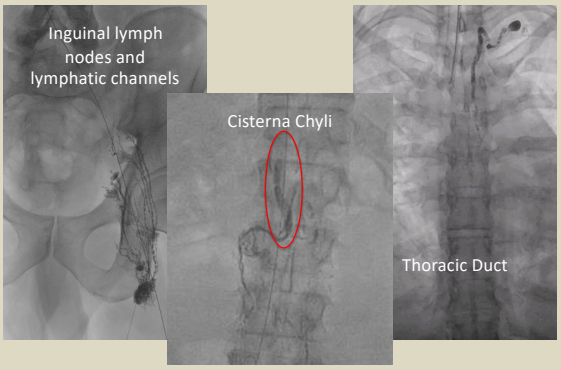
- Criteria – Suprainguinal lymphatic disease:

Variable	Normal	Mild	Moderate	Severe
Lymph Nodes (n)	>4	1 to 4		0
Lymphatic Channels (n)	>4	1 to 4		0
TD Visualization	Yes			No
TD Visualization Delay	<20 min	20-40 min	40-60 min	>60 min
TD Pathologic Changes	Normal			Stenosis

Suprainguinal Lymphatic Disease

- Criteria – Infrainguinal lymphatic disease:

Variable	Normal	Mild	Moderate	Severe
Lymph Nodes (n)	≥5	≤4 - Abnormal		
Collateral Channels	None	Present - Abnormal		
Intensity of uptake	Normal	Reduced - Abnormal		
Popliteal Node(s)	Absent	Present - Abnormal		
Transit time delay	<20 min	20-40 min	40-60 min	>60 min
Dermal Backflow	Absent - Normal			Present



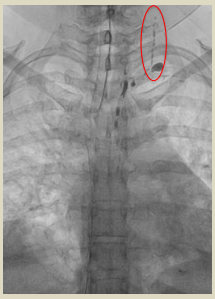
Inguinal intranodal access and ascending lymphangiogram

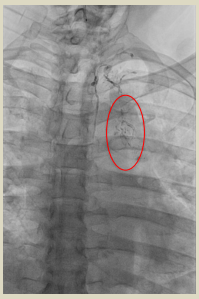
Suprainguinal Lymphatic Disease

Lymphatic channel abnormality

Lymph node abnormality

Suprainguinal Lymphatic Disease





Abnormalities of the thoracic duct

Suprainguinal Lymphatic Disease

- 30 Patients/31 limbs
- Median age: 59 years
- Female/Male: 18/12
- Right/Left: 8/23
- Median BMI: 33.4
- PTS/NIVL: 22/9
- CEAP: C3 (5), C4 (19), C5 (2), C6 (5)
- Median Follow up: 20 Months

Suprainguinal Lymphatic Disease

- Suprainguinal lymphatic disease
  - 24/31 limbs (77%) had suprainguinal lymphatic disease
  - 22/24 (92%) limbs had severe suprainguinal lymphatic disease
  - 2/24 (8%) had mild suprainguinal lymphatic disease
  - There were no limbs with moderate disease

Suprainguinal Lymphatic Disease

Suprainguinal lymphatic disease

- Severe versus absent-mild disease:
  - At baseline both had same degree of leg swelling and VCSS (p=0.1)
  - Improvement post stenting was similar (p=0.4)

Suprainguinal Lymphatic Disease

- Suprainguinal lymphatic disease versus infrainguinal lymphatic disease:
  - 6 limbs (19%) had the same degree of involvement both above and below the groin (1 normal and 5 severe disease)
  - 17 limbs (55%) had more severe suprainguinal lymphatic disease
  - 8 limbs (26%) had more severe infrainguinal lymphatic disease
  - 3 limbs without infrainguinal lymphatic disease had severe suprainguinal lymphatic disease

Suprainguinal Lymphatic Disease

No correlation found between suprainguinal and infrainguinal lymphatic disease

(Spearman coefficient 0.1 p= 0.69)

Improvement post stenting - Overall

- VCSS (Median)

Baseline	6 months	12 months	24 months
8	5 (p<0.0001)	3 (p=0.0002)	4 (p=0.0002)

- Grade of swelling (Median)

Baseline	6 months	12 months	24 months
3	1 (p<0.0001)	1 (p=0.0002)	1 (p<0.001)

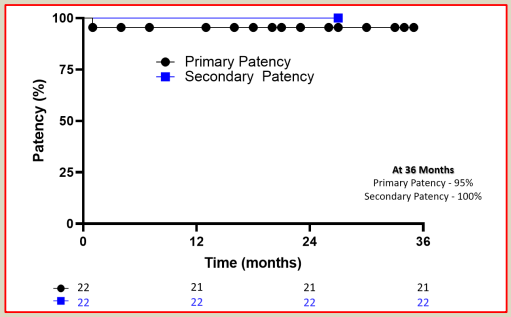
Improvement post stenting – Severe SID

- VCSS (Median)

Baseline	6 months	12 months	24 months
8	5 (p=0.0005)	3 (p=0.012)	5 (p=0.010)

- Grade of swelling (Median)

Baseline	6 months	12 months	24 months
3	1 (p=0.008)	1 (p=0.012)	1 (p=0.012)



Stent Patencies in patients with severe suprainguinal lymphatic disease

Suprainguinal Lymphatic Disease

- 7 limbs underwent complex decongestive therapy (CDT) post stenting
- All had severe suprainguinal lymphatic disease
- One had concomitant severe infrainguinal disease
- All 7 had improvement of edema with CDT

Suprainguinal Lymphatic Disease

- Suprainguinal lymphatic disease appears to be common in patients undergoing stenting for symptomatic CIVO
- Patients with persistent/residual leg edema post stenting benefit from complex decongestive therapy
- In patients whom such benefit does not occur evaluation of suprainguinal lymphatic system and targeted therapy may be considered
- Further study is warranted

Editors' Choice

Inguinal intranodal lymphangiography reveals a high incidence of suprainguinal lymphatic disease in patients with leg edema undergoing stenting for symptomatic chronic iliofemoral venous obstruction

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ABSTRACT

Objective: Recent studies have emphasized the important role lymphatics play in the drainage of interstitial fluid and edema prevention. Although the infrainguinal lymphatics have been studied in some depth, with patterns of pathology identified, such data above the groin are sparse, especially for patients with phlebolymphedema. The present study attempts to evaluate the status of lymphatic flow above the inguinal ligament in patients presenting with edema and undergoing stenting for symptomatic chronic iliofemoral venous obstruction (CIVO).

Methods: A total of 51 lower limbs that underwent pedal lymphoscintigraphy for leg edema and subsequent stenting for symptomatic CIVO formed the study cohort. Each limb underwent intranodal lymphangiography of an ipsilateral inferior inguinal lymph node (10 mL of lipiodol) at the time of stenting. Fluoroscopic visualization of lipiodol transit was performed at 20, 40, and 60 minutes and 3 hours after injection. Enumeration of the lymph nodes and lymphatic collector vessels from above the inguinal ligament to LI, visualization of the thoracic duct, the time delay to visualization of the thoracic duct, and pathologic changes to the thoracic duct when present were all evaluated. These anomalies were independently scored, with the scores combined to generate a total suprainguinal score (range, 0-5). This score was then compared to the limb's lymphoscintigraphically derived infrainguinal score (total infrainguinal score range, 0-5) using the *t* test and Spearman correlation. The clinical outcomes (grade of swelling, venous clinical severity score) after stenting were appraised.

Results: Of the 30 patients (31 limbs), 18 were women, with left laterality noted in 23 limbs. A nonthrombotic iliac vein lesion occurred in 9 limbs and post-thrombotic syndrome in 22 limbs. Of the 31 limbs, 24 (77%) had suprainguinal lymphatic disease (SLD), with 22 of the 24 limbs having severe SLD and 2, mild SLD. When SLD was compared with infrainguinal lymphatic disease, 6 limbs (19%) had the same degree of involvement above and below the groin (5 with normal and 5 with severe disease), 17 limbs (55%) had more severe SLD, and 8 limbs (26%) had more severe infrainguinal lymphatic disease. Three limbs with normal pedal lymphoscintigraphic findings had severe SLD. The Spearman correlation coefficient for the comparison of SLD and infrainguinal disease in the same limb was 0.1 ($P = .69$). At baseline, the limbs with severe SLD had the same degree of leg swelling and venous clinical severity score as the limbs with absent to mild SLD ($P > .1$) with similar improvements after stenting ($P > .4$). Seven limbs underwent complex decongestive therapy (all with severe SLD and concomitant severe infrainguinal disease in one) to treat significant residual leg edema, with improvement.

Conclusions: SLD appears to be common in patients with leg edema undergoing stenting for symptomatic CIVO. Such disease appears to affect the thoracic duct more commonly. Although patients with persistent or residual leg edema after stenting can benefit from complex decongestive therapy, further workup in the form of inguinal intranodal lymphangiography and targeted intervention might need to be considered for those who do not benefit from such therapy. Further study is warranted. (J Vasc Surg Venous Lymphat Disord 2023;11:192.201.)

Keywords: Phlebolymphedema; Chronic iliofemoral venous obstruction; Lymphangiogram; Lymphoscintigram; Post thrombotic syndrome; May Thurner syndrome