# Leg Swelling: Unilateral and Bilateral – Diagnosis Summary

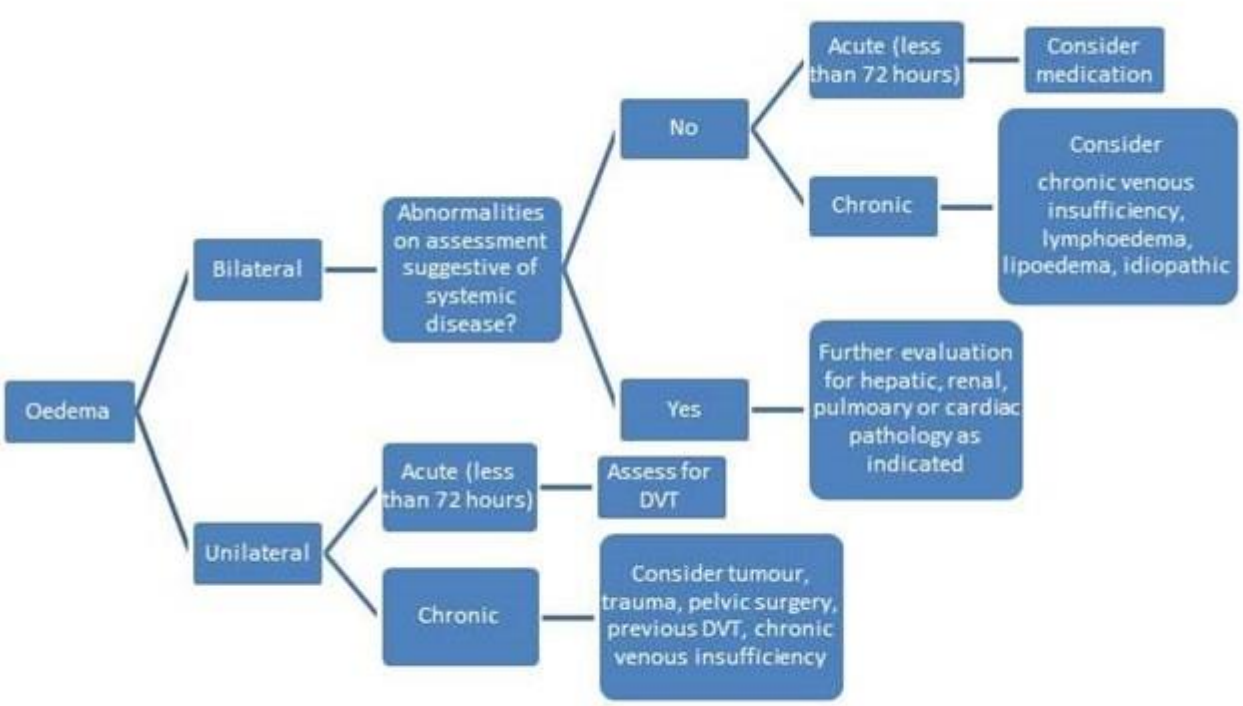
*Last Updated Jan 19, 2022,* Read Disclaimer, By Thomas Merth, Shiny Sachdeva

**Context**

Edema is defined as a palpable swelling produced by expansion of the interstitial fluid volume which occurs when:

- Movement of fluid from intravascular to interstitial space (Starling's law) increased capillary
    - hydrostatic pressure, and/or
    - decreased capillary oncotic pressure, and/or
    - increased capillary permeability.
- Retention of sodium and water by the kidneys.
- Interstitial volume must increase by 2.5 to 3L for
    - edema to become clinically evident.

# Algorithm for peripheral oedema assessment.




**Diagnostic Process**

Table 1: Possible etiologies of leg edema in adult patients

| | Unilateral leg edema | Bilateral leg edema |
|---|---|---|
| **Acute** | DVT<br>MSK injury<br>Lymphangitis<br>Venous insufficiency<br>Popliteal (Baker's) cyst<br>Cellulitis<br>Knee pathology<br>Arterial occlusion<br>Compartment syndrome<br>Superficial thrombophlebitis<br>Necrotizing fasciitis | Bilateral DVT<br>Medications<br>Acute heart failure<br>Acute nephrotic syndrome<br>Acute worsening of chronic causes |
| **Chronic** | Chronic venous disease<br>Lymphedema<br>Complex regional pain syndrome<br>Pelvic neoplasm | Venous insufficiency<br>Heart failure<br>Pulmonary hypertension<br>Renal disease<br>Liver disease<br>Pelvic neoplasm<br>Constrictive pericarditis<br>Idiopathic edema<br>Premenstrual edema<br>Pregnancy<br>Malnutrition<br>Sodium or fluid overload<br>Refeeding edema<br>Inflammation (including sepsis)<br>Medications |

**Acute unilateral leg edema**

Rule out DVT.

DVT work-up is as follows:

Determine pre-test probability for DVT using a scoring system (e.g. Wells score).

- If the pre-test probability is low (Wells score 0-1), then D-dimer can be used to rule out a DVT.
- If pre-test probability is high or D-dimer is positive, then doppler ultrasound of lower extremities is recommended. This is usually done within 24 hrs and the patient is empirically anticoagulated in the meantime.
    - Bedside 3-point compression point-of-care ultrasound (POCUS) performed in ED has been shown to have variable sensitivity of 88.9-100% and specificity of 75.9-100% in diagnosing DVT.[1] This is in part due to a significant operator learning curve. **Decision-making based on POCUS DVT exams should take into account the pre-test probability of DVT, operator experience, and likely include close follow-up.**
- Once DVT is ruled out, consider:[1,2,3]

- 40% – Muscle strain, tear, or twisting injury to the leg – look for history of injury, signs of bleeding/bruising on clinical exam.
- 26% – Unknown.
- 9% – Leg swelling in a paralyzed limb.
- 7% – Lymphangitis or lymph obstruction.
- 7% – Venous insufficiency.
- 5% – Popliteal (Baker's) cyst – look for posterior knee pain, knee stiffness, mass behind the knee (with knee in extension), and bruising around the ankle.
- 3% – Cellulitis – look for clinical signs e.g. fever, leg warmth, redness.
- 2% – Knee abnormality – look for pain, inflammation, and swelling of the knee joint.

**Chronic unilateral leg edema**

- The most common cause of chronic unilateral leg edema is lower extremity chronic venous disease.
- Other causes include:
  - Chronic venous disease[4] – history of thrombophlebitis, hyperpigmentation, and ulceration.
  - Lymphedema – history of an ipsilateral inguinal/pelvic lymph node dissection, or radiation therapy.
  - Complex regional pain syndrome[4,5,6]– pain, edema, alteration in skin color and temperature occurring 4-6 weeks after limb trauma.
  - Chronic DVT.
  - Anatomic obstruction (mass, May-Thurner syndrome).

If presentation is not consistent with above, or significant change, a compression ultrasound with doppler should be obtained.

- Normal study = either lymphedema or complex regional pain syndrome.
- Abnormal venous flow = lower extremity chronic venous disease.
- Suspect neoplasm when ultrasound is suggestive of pelvic outflow obstruction, especially in patients with constitutional symptoms e.g. weight loss. Further pelvic imaging with venous contrast is recommended in these patients.

**Acute bilateral leg edema**

- Acute worsening of heart failure is a common cause.
- Other etiologies are rare:
  - medications (e.g. dihydropyridine CCBs, vasodilators, hormone therapies),
  - acute nephrotic syndrome,
  - bilateral DVT (often associated with malignancy).

- First consider/rule out DVT. For those with high pre-test probability of DVT, proceed to doppler ultrasound of the legs to evaluate for DVTs.
- For the remaining patients:
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    - Meds: Review medication history and discontinue medications known to cause edema.
    - Heart Failure: Hx; Px; CXR, +/- BNP; +/- Echocardiography, ED POCUS can be helpful.
    - Renal disease: Urine dipstick for protein and if positive: urine Protein-Creatinine Ratio (PCR) and serum albumin.
    - DVT: D-dimer.

**Chronic bilateral leg edema**

Chronic venous disease is the most common cause. Skin pigmentary changes, induration, and ulceration are usually evident.

Other causes include:[7]

- Heart failure – history of CHF, dyspnea, orthopnea, PND, abdominal distention, and fatigue.
- Pulmonary hypertension caused by conditions such as sleep apnea – look for signs and symptoms such as excessive daytime sleepiness, loud snoring, interruptions of breathing while sleeping.

Less common causes include:

- Renal disease
- Liver disease
- Pelvic neoplasm
- Constrictive pericarditis
- Idiopathic edema
- Premenstrual edema
- Malnutrition

Lymphedema and myxedema (e.g. severe hypothyroidism) are not true edematous states.

If initial history and clinical exam are not indicative of the etiologies listed above, consider:

- urine dipstick protein,
- serum creatinine,
- albumin, PT/INR, liver function tests,
- TSH.

If these tests are unremarkable, consider:

- Echocardiogram to evaluate the possibility of heart failure or pulmonary hypertension should be obtained.

- CT pelvis with contrast is recommended to exclude a pelvic neoplasm if all other investigations are negative.

**Quality Of Evidence?**

**JUSTIFICATION**

Evidence comes from a wide range of studies addressing the etiology and diagnosis of leg edema that are in relative agreement with each other.

MODERATE

**Related Information**

**REFERENCE LIST**


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