DEEP VEIN THROMBOSIS: DIAGNOSIS

Thrombosis Canada
Thrombose Canada

TARGET AUDIENCE: All Canadian health care professionals.

OBJECTIVE:

To provide an evidenced-based approach to diagnosis of patients presenting with signs and symptoms of deep vein thrombosis.

ABBREVIATIONS:

DVT	deep vein thrombosis
UEDVT	upper extremity deep vein thrombosis
US	ultrasound

BACKGROUND:

An estimated 45,000 patients in Canada are affected by deep vein thrombosis (DVT) each year, with an incidence of approximately 1-2 cases per 1,000 persons annually. This translates to 2-4 DVTs per year in a typical, individual, Canadian family practice, where these cases commonly present. One third will suffer from post-thrombotic syndrome manifest with chronic lower leg edema, pain, pigment changes and skin breakdown, and one third will have a recurrent event within 10 years. Approximately one third of untreated DVT result in potentially fatal pulmonary embolism. Rapid diagnosis and treatment of DVT is essential to prevent these complications.

DIAGNOSIS:

A rapid accurate diagnosis, based on objective measures, is essential.

The diagnosis of DVT is based on:

1) Pre-test Probability

The clinical likelihood of a DVT is best evaluated using the Wells score (see **Table** below).

Table: Wells Score for DVT

Clinical Findings	Points
Paralysis, paresis or recent orthopedic casting of lower extremity	1
Recently bedridden (> 3 days) or major surgery within past 4 weeks	1
Localized tenderness in the deep veins	1
Swelling of entire leg	1
Calf swelling 3 cm greater than other leg (measured 10 cm below the tibial tuberosity)	1
Pitting edema greater in the symptomatic leg	1
Collateral non-varicose superficial veins	1
Active cancer or cancer treated within 6 months	1
Alternative diagnosis more likely than DVT (Baker's cyst, cellulitis, muscle damage, superficial venous thrombosis, post-phlebitic syndrome, inguinal lymphadenopathy, external venous compression)	**-2**

Wells Score	Probability of DVT	Strata
-2 – 0	5%	Low
1 – 2	17%	Moderate
3 – 8	53%	High

2) Venous Ultrasound

Proximal ultrasound (US) examines the compressibility of the femoral and popliteal veins. Failure to demonstrate full compressibility is diagnostic of proximal DVT requiring treatment. Although thrombosis may be confined to the distal veins, the probability of significant clinical consequences is unlikely, so detection of distal DVT may result in over-treatment. However, distal thrombosis has the potential to extend proximally, and, if suspicion remains high, proximal US should be repeated after 5-7 days. Alternatively, whole leg US, including examination of the deep veins of the calf, may be performed initially to eliminate the need for serial studies. Whole leg US may not provide overall benefit over serial proximal US.

In the case of recurrent ipsilateral proximal DVT, compression US can be problematic because residual compression abnormalities are often present. In such cases, diagnosis needs to be confirmed by other evidence of new thrombosis, including non-compressibility in previously normal venous segments or increases of 2-4 mm in compression diameters from prior studies.

3) D-Dimer

D-Dimer is a non-specific measure of thrombosis. Although elevated in association with DVT, it is also elevated in a variety of other conditions including, but not limited to, inflammatory diseases, malignancy, pregnancy, surgery and advanced age. This renders the test useful to help

rule out DVT when negative, but of no diagnostic value when positive. Although there are several D-dimer assays available, those that are typically used in Canada are all highly sensitive assays that can be used interchangeably in combination with the Wells score to exclude DVT.

DIAGNOSTIC STRATEGY:

Patients with suspected DVT should first undergo a history and physical exam focused on the components of the Wells score. Those with a low Wells probability of DVT may have a D-Dimer test and, if negative, no further testing is required. Where a D-Dimer test is not performed, all patients suspected of having a DVT should undergo proximal or whole leg US examination. In patients with a moderate Wells score, a *highly sensitive* D-Dimer test may be used to rule out DVT, but most clinicians would prefer US. All patients with a high Wells pre-test probability of DVT should undergo proximal or whole leg US. Patients with a negative proximal US should be considered for follow-up proximal US after 5-7 days in order to rule out extension of a distal DVT.

MANAGEMENT:

See DVT: Treatment guide.

General measures:

a) Unless US is rapidly available, patients with moderate to high suspicion of DVT, unless they have a high risk of bleeding, should start therapy before the diagnosis is confirmed.

b) Outpatient management is generally preferred over hospital-based treatment.

c) Initial treatment chosen should have an immediate anticoagulant effect. Warfarin monotherapy is not appropriate initially.

d) Compression stockings should be worn in patients with symptoms of post-thrombotic syndrome.

SPECIAL CONSIDERATIONS:

Upper extremity DVT

See Central Venous Catheter-Related DVT guide.

a) Upper extremity DVT (UEDVT) is very rare with an annual incidence of approximately 3/100,000 persons.

b) Clinical manifestations include acute and chronic arm pain, swelling discoloration, and dilated collateral veins over the arm, neck or chest.

c) Pre-test probability scores have not been validated for UEDVT risk factors, including central venous catheters, pacemaker wires and malignancies, although spontaneous events may

occur less frequently, often related to effort and narrowing of the thoracic outlet (Paget-Schroetter syndrome).

d) Combined compression US and colored Doppler flow studies should be used for diagnosis.

e) If UEDVT occurs in association with a central venous catheter, the catheter should be left in place, if still needed.

f) Treatment should generally follow the principles of lower extremity DVT.

Distal lower extremity DVT

a) Distal DVT does not need to be sought or treated unless it is felt that progression to proximal DVT is likely.

b) If isolated distal DVT is found, anticoagulation may be offered if severe symptoms are present or if the risk of proximal extension is high. Patients may also be followed with serial US for 2 weeks, after which time extension is unlikely.

c) Risk factors for proximal extension include: positive D-Dimer, extensive thrombosis, unprovoked, distal DVT, cancer, history of venous thromboembolism and in-patient status.

Pregnancy

See Thromboprophylaxis: Pregnancy guide.

PEDIATRICS:

Diagnosis of DVT is initiated with an ultrasound. US testing is non-invasive; however, it is insensitive for the upper venous system and has not been studied in the lower venous system. If the clinical suspicion is high for DVT with a negative US, the use of magnetic resonance imaging or computed tomography may be considered. Studies using pre-test likelihood as part of a diagnostic plan have not been completed. See Pediatrics guide.

REFERENCES:

Bates SM, Jaeschke R, Stevens SM, et al. Diagnosis of DVT: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest 2012;141 (2 Suppl):e351S-418S.

Monagle P, Chan AK, Goldenberg NA, et al. Antithrombotic therapy in neonates and children: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest 2012;141(2 Suppl):e737S-801S.

Please note that the information contained herein is not to be interpreted as an alternative to medical advice from your doctor or other professional healthcare provider. If you have any specific questions about any medical matter, you should consult your doctor or other professional healthcare providers, and as such you should never delay seeking medical advice, disregard medical advice or discontinue medical treatment because of the information contained herein.