Dural venous sinus thrombosis diagnosis

Bloodwork

Routine blood studies (CBC, chemistry, PT & aPTT) should be performed (Level I).

To detect prothrombotic conditions, useful tests include protein C and S levels*, antithrombin deficiency*, antiphospholipid antibodies=anticardiolipin antibodies, and lupus anticoagulant) as well as tests for specific predisposing conditions (Factor II level, serum homocysteine level, paroxysmal nocturnal hemoglobinuria (PNH) panel, leukocyte alkaline phosphatase (Level I).

* Tests for protein C & protein S, and antithrombin deficiency should be deferred until 2–4 weeks after completing anticoagulation (testing is of limited value on warfarin or in the acute setting since the acute process will cause numerous abnormalities in the clotting system (Level II)).

D-dimer: a fibrin degradation product, showed a sensitivity of 97.1%, specificity of 91.2%, a negative predictive value of 99.6%, and a positive predictive value of 55.7%.84 A normal D-dimer level by a sensitive radioimmunoassay or ELISA may help identify patients with a low probability of CVT (Level II). However, if suspicion is high, further evaluation is indicated.

Radiographic features

Any of the dural sinuses can be affected, in isolation or combined/continuous with one another:

Superior sagittal sinus thrombosis

Straight sinus thrombosis

Transverse sinus thrombosis

Sigmoid sinus thrombosis (including dural sinus occlusive disease -DSOD)

Cavernous sinus thrombosis

CT

Unenhanced CT is usually the first imaging investigation performed given the nonspecific clinical presentation in this cases. When not associated with venous haemorrhage or infarction, it can be a subtle finding on CT images, relying on hyperdensity of the sinus being identified. Potential findings include:

cord sign

dense vein sign

a potential pitfall is interpreting the distal superior sagittal sinus as being hyperdense near the torcula

herophili; it is important to appreciate that normal blood within the dural sinuses is usually of slightly increased density relative to brain parenchyma and that true hyperdensity is the key to recognising thrombosis

The walls at this location can be thick, measuring up to 2-3 mm cerebral/cortical oedema: secondary to venous hypertension unilateral or bilateral cortical or peripheral venous haemorrhage

With contrast administration, especially with a CT venogram, then a filling defect in a sinus is sought. Multiplanar reformatted CT venography has been reported with a sensitivity of 95% for this diagnosis 4. Signs on contrast CT include:

empty delta sign (specific to a superior sagittal sinus thrombosis) gyral enhancement prominent intramedullary veins

In the blunt head trauma setting, there are findings that correlate with increase risk of dural venous sinus thrombosis and thereby promote CTV confirmation:

skull fractures that extend to a dural venous sinus

skull base fractures that involve the groove for the sigmoid sinus

dural sinus hyperdensity

intrasinus gas

MRI

MRI is able to both visualise the clot as well as the sequelae.

Conventional spin-echo sequences may demonstrate an absence of normal flow void on the dural sinuses. The clot acutely is isodense on T1 and hypointense on T2 (this can mimic a flow void), with subacute clot becoming hyperintense on T1. All the findings listed in the CT section are also seen on MRI. The most sensitive conventional MRI sequence for detection of the clot is susceptibility sequences such as SWI or GRE. Overall, the conventional MRI sequences in combination are very sensitive but relatively non-specific in the detection of dural venous sinus thromboses. 3D T1WI GRE is the most sensitive and specific MRI sequence in detection of DVST; MRV will demonstrate a lack of flow. Staging severity

Dural venous thromboses can result in parenchymal oedema and ischemia in its watershed area; the severity of which can be graded as follows:

type 1: no imaging abnormality

type 2: high T2

type 3: high T2 with enhancement

type 4: haemorrhage or infarction.

LP

LP is generally not indicated unless there is suspicion of meningitis. There are no specific CSF abnormalities, so LP is often not helpful. Opening pressure (OP) is increased in > 80%. CSF may be bloody or xanthochromic.