Computed tomography features of venous sinus thrombosis and venous infarction in children

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Dural sinus and cortical venous thrombosis occurs regularly in paediatric practice, more often as the result of dehydration than of infective meningitis. On non-contrast computed tomography (CT) scanning in the acute phase, clot is seen as a high-density within a venous sinus and is especially well seen in the superior sagittal, transverse and straight sinuses as well as the vein of Galen. During the first few months of life, however, high signal within the venous sinuses is a normal finding. These patients therefore need follow-up CT to allow differentiation between this normal finding and a thrombus, which will show progressive decrease in density over time. Beyond the acute phase, the administration of intravenous contrast may

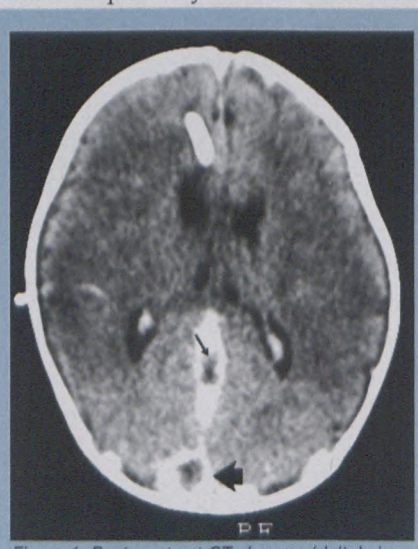

Figure 1: Post-contrast CT shows a 'delta' sign (large arrow) as well as a filling defect within the straight sinus (small arrow). The subcortical white matter is of low density bilaterally, in keeping with venous infarction.

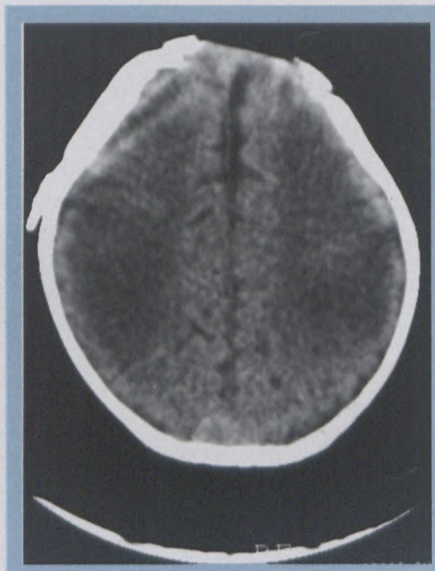

Figure 2: Non-haemorrhagic venous infarct is seen as bilateral symmetrical subcortical white matter low-density involving the centrum semiovale

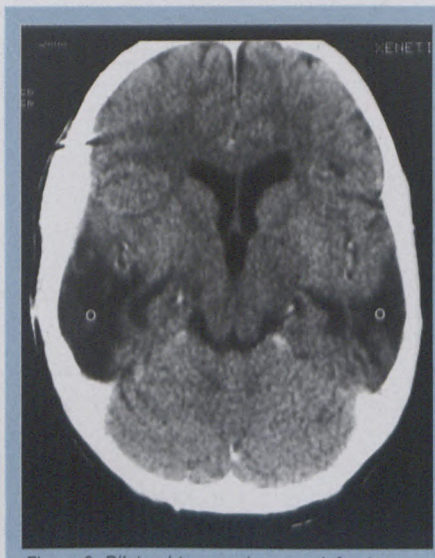

Figure 3: Bilateral temporal venous infarcts resulting from thrombosis in both transverse sinuses (circles)

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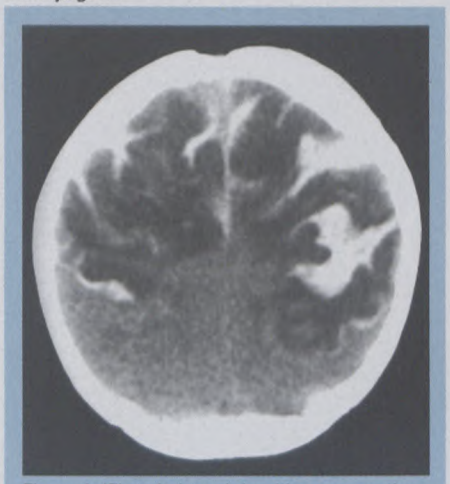

Figure 4: 'Flame'-shaped densities representing haemorrhage along thrombosed cortical veins on the low-density background of oedema

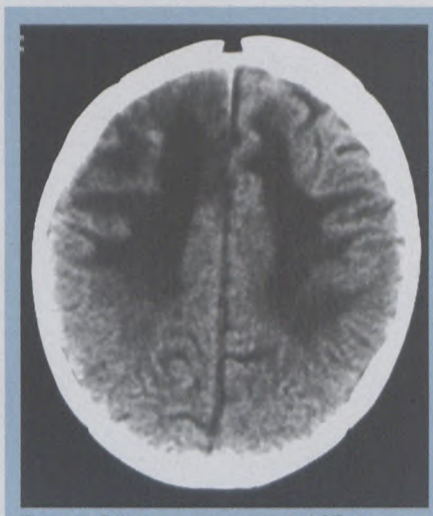

Figure 5: Follow-up non-contrasted CT shows bilateral low-density infarction after resolution of the haemorrhage

demonstrate the 'delta' sign. This is contrast-enhanced blood around the hypodense clot and has the appearance of a hollowed-out triangle.

Venous infarcts are diagnosed by their characteristic appearance and location. Sagittal sinus thrombosis results in parasagittal infarcts. Straight sinus and Vein of Galen thrombosis involve the thalami. Thrombosis of the vein of Labbe, the transverse and the sigmoid sinuses involve the temporal lobe. On CT scanning, venous infarcts are poorly demarcated, often multi-focal areas of low or mixed density that involve the subcortical white matter. These may produce mild mass effect on the ventricles. Low density probably represents oedema, while high density represents haemorrhage. Twenty-five per cent of venous infarcts are haemorrhagic. Haemorrhagic areas may vary in size and occasionally may be linear, indicating haematoma within and around a vein. After administration of intravenous contrast, gyral enhancement is seen overlying the areas of infarction.

Reference

Barkovich AJ. *Paediatric Neuroimaging.* 2nd ed. Philadelphia: Lippincott-Raven. 1996; **138,** 577-583.