Cerebral venous sinus thrombosis in a patient with type 1 diabetes in the absence of ketoacidosis

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Case history
A 17-year-old British man of Indian origin presented with a two-day history of severe generalised headache followed by blurred vision and vomiting on the day of admission. He was known to have type 1 diabetes mellitus since the age of 11 years. He had been treated with a basal bolus insulin regimen using glargine and NovoRapid. Despite regular input from medical and nursing teams, his glycaemic control had been deteriorating (HbA1c 12.7%, 11.8%, 9.8%, and 9.6% at 0, -3, -6 and -12 months from admission respectively). He had no known diabetic micro- or macrovascular complications and was normotensive. He was a full-time student living with his parents, with no history of thrombophilia in the family. He denied any history of smoking, using any recreational drugs or alcohol consumption.

On admission, general physical and systemic examinations were within normal limits and there were no meningism, papilloedema, pyramidal or cerebellar signs. His blood glucose was 11 mmol/L. An initial urinary dipstick showed 2+ ketones although subsequent repeats were all negative and arterial blood gas analysis excluded acidosis – serum pH 7.38 (7.35–7.45), calculated osmolality 305 mmol/kg, base excess -1.4 mEq/L (±2 mEq/L) and serum bicarbonate 23 mEq/L (21–28 mEq/L). The rest of his routine haematological and biochemical profiles were within normal limits. An urgent CT scan of his brain (Figure 1a) raised the suspicion of a dural venous sinus thrombosis. A subsequent magnetic resonant venogram confirmed the diagnosis of sagittal sinus and left transverse sinus thrombosis (Figure 1b). Anticoagulation was initiated with low molecular weight heparin, and maintained with warfarin. While in hospital he developed diplopia secondary to right 6th nerve palsy that was considered to be a false localising sign. The symptoms responded well to treatment and his neurological signs improved prior to discharge from hospital. Investigations for underlying thrombophilic state, myeloproliferative disorders, auto-immune conditions and haemoglobinopathy were all negative.

Discussion
Cerebral venous sinus thrombosis (CVST) is an uncommon disorder with an estimated annual incidence of three to four cases per million. Most patients are young adults or children and clinical presentation is variable but often dramatic. Headache is the presenting symptom in 70–90% of cases, while seizures, focal deficits, cranial nerve syndromes involving IX, X, and XI (jugal foramen syndrome) or III, IV and VI cranial nerve palsies, impairment of consciousness, visual disturbances and papilloedema occur in 25–75% of cases.2,3 Predisposing factors to CVST can only be identified in 65–80% of patients, with more than one factor often found in individual patients.4 These include local and systemic conditions predisposing to venous thrombosis including pregnancy, puerperium, oral contraceptive pills, intracranial pathologies, malignancies, connective tissue and inflammatory diseases, haematological conditions and drugs.2 As a general rule, Virchow’s triad, as first formulated (venous stasis, vessel wall injury, acquired or genetic changes in composition of blood), is still the primary mechanism for the development of venous thrombosis.4

ABSTRACT
While the increased risk of thrombosis in the arterial tree among individuals with diabetes has been well studied, little is known about such risk in the venous system outside the settings of hyperosmolality or ketoacidosis. Cerebral venous sinus thrombosis (CVST) is a recognised but extremely rare complication of diabetic ketoacidosis (DKA). We report a case of CVST in a patient with type 1 diabetes but without DKA, in whom we speculate that chronic poor glycaemic control was a contributory factor. Copyright © 2010 John Wiley & Sons.

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cerebral venous sinus thrombosis; diabetes; diabetic ketoacidosis

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Cerebral venous thrombosis in type 1 diabetes without ketoacidosis

Diabetes remains a controversial risk factor for venous thromboembolism. While diabetes itself is associated with several defects of platelet function, coagulation and fibrinolytic systems resulting in a hypercoagulable state, the increased rate of thrombotic complications observed is often in the presence of additional risk factors. It is evident that the rate of thrombotic complications in diabetic patients with frequent episodes of hyperketonaemia and hyperosmolarity is increased. Published literature on CVST and diabetes is limited to case reports predominantly among patients with type 1 diabetes and is in the context of diabetic ketoacidosis (DKA), dehydration or hyperosmolarity. In association with type 2 diabetes, two cases of CVST are reported: one presenting with DKA while the other patient had transverse sinus aplasia. To our knowledge, this is the first report of a CVST in association with type 1 diabetes but in the absence of concomitant ketoacidosis or any known prothrombotic conditions.

The optimum treatment for CVST and its duration have remained uncertain, especially where there is no identifiable aetiology. Based upon limited available evidence, anticoagulation appears to be safe and probably reduces the risk of death or dependency. Treatment with systemic or local thrombolysis has been reported in cases with a deteriorating clinical course despite anticoagulation therapy. There are, however, no randomised controlled trial data to support efficacy or safety of thrombolysis in CVST. In the presence of a transient risk factor, anticoagulation is generally recommended for three to six months. Patients with idiopathic CVST or those with hereditary thrombophilia are anticoagulated for longer periods given their higher risk of recurrence. In an international study that was performed in 624 patients with CVST, the cumulative risk for recurrent CVST or other thrombotic events was 6.5%, with over half not undergoing anticoagulation at the time of their recurrence.

While our case might be considered among the 20–35% of CVST cases with no identifiable cause, we speculate whether long-standing hyperglycaemia may have played a role in increasing our patient’s thrombotic risk, and highlight a potential direct association between CVST and hyperglycaemic state even in the absence of dehydration or ketoacidosis. If such a relationship between diabetes and CVST were to be found, new prognostic measures might become necessary and this may also have an implication on the risk of recurrence and duration of anticoagulation in this group of patients.

Our case highlights the need for clinicians to consider CVST among patients with diabetes even in the absence of ketoacidosis or hyperosmolarity.

Key points
- The risk of thrombosis in the venous tree in diabetes is less well studied
- Cerebral venous sinus thrombosis (CVST) is a recognised but rare complication of diabetic ketoacidosis
- Our case illustrates the need to consider CVST in patients with poorly controlled diabetes even in the absence of ketoacidosis or hyperosmolarity

Conflict of interest statement
There are no conflicts of interest.

References
References are available at www.practicaldiabetesinternational.com.
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