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Cerebral venous thrombosis associated with inhalational drug abuse*

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SUMMARY

Cerebral venous thrombosis is a life-threatening disorder for which the management has been controversial. A 23-year-old critically-ill man with superior sagittal sinus thrombosis (SSST) and cavernous sinus thrombosis secondary to sinusitis following inhalational drug abuse was managed with full heparinization from the fourth day of presentation. He went on to make a full recovery. The association between this form of drug abuse, sinusitis and SSST is an important one, and warrants antibiotics and early aggressive anticoagulation therapy.

Key words: superior sagittal sinus thrombosis, sinusitis, drug abuse anticoagulation, heparin

INTRODUCTION

Superior sagittal sinus thrombosis (SSST) is an unusual and rare syndrome with a variety of signs and symptoms that can make diagnosis difficult. The diagnosis and treatment of SSST remains a challenge, as it is associated with significant mortality (nearly 80%) and morbidity (Southwick et al., 1986). The different aetiologies of SSST include infective causes (for example following trauma, otitis media, sinusitis) and non-infective causes such as pregnancy and puerperium, oral contraceptives, malignancies, Behçet's disease, connective tissue diseases, severe dehydration, polycythemia, thrombocytopenia, hereditary anti-thrombin-III deficiency, protein-C deficiency and protein-S deficiency (Ameri and Bousser, 1992). We report a case of a young man with SSST caused by chronic glue sniffing, who made a complete recovery.

CASE REPORT

A 23-year-old male, obviously malnourished and known chronic drug abuser (glue sniffer), presented to our Accident-and-Emergency Department with abdominal pain, vomiting and feeling generally unwell for the past few days, and with a history of severe frontal headaches for the past few weeks. He was lethargic, uncommunicative and refused to give any further history.

On examination, he appeared unwell, distressed, malnourished, dehydrated and anaemic. He was conscious (GCS 15), pyrexic (38.5°C), tachycardic (120 beats/min), tachypneic (40 breaths/-min) with chemosis and ptosis of the left eye. He showed normal movements of all limbs. There was evidence of left basal pneumonia. Abdominal examination was normal, apart from constipation.

In view of deteriorating respiratory pattern he was admitted to the Intensive Care Unit, where he was sedated, paralysed, intubated and ventilated. Contrast-enhanced CT scan of the brain showed bilateral cerebral oedema, non-enhancing fluid along the falx and an empty-delta sign suggesting the diagnosis of SSST. There were no haemorrhages or infarctions. It also demonstrated frontal and maxillary sinus opacification. MRI scan, on the following day, confirmed the presence of SSST and bilateral cavernous sinus thrombosis. Sedation and paralysis were continued and he was hyperventilated ($PaCO_2$: 4-4.6 kPa) and enterally fed. Investigations revealed a haemoglobin of 9.6 g/dl, a platelet count of $64x10^9$/l, and a WBC of $13.3x10^9$/l with neutrophilia (with immature granulocytes and band forms). Liver function tests, urea and electrolytes and clotting screen were normal. Extensive haematological investigations revealed no underlying thrombophilia. The maxillary and frontal sinuses were washed out resulting in frank pus with Streptococci seen on Gram stain, which was treated with appropriate antibiotics.

By day 4, his face was swollen; proptosis, chemosis and ptosis of both eyes due to upper lid abscess had developed. A continuous heparin infusion and prophylactic anticonvulsant, phenytoin were started. The rate of heparin infusion was carefully monitored to maintain an APTT of 2-3 times the normal. This was continued for 22 days and an oral anticoagulant (warfarin sodium) was started later. A repeat CT scan of the brain on day 5, showed cerebral oedema, delta sign and no haemorrhages or

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infarctions. It again showed opacified ethmoidal, maxillary and frontal sinuses. Bilateral maxillary antrostomy through the inferior meatus, external ethmoidectomy in view of lid abscesses, and an elective tracheostomy were performed on the same day. By day 6, he developed bilateral basal pneumonia, which was treated with appropriate antibiotics and chest physiotherapy. On day 10, weaning from mechanical ventilation was begun and left hemiparesis was noted without any neck stiffness. But he was successfully weaned off the ventilator by day 14.

The patient was discharged from the Intensive Care Unit on the 16th day and transferred to a medical ward, where he made full recovery from the left hemiparesis by the 30th day and went home with advice to continue phenytoin and warfarin for 6 months. Six months after discharge from the hospital, the patient was in good health without neurological sequelae and attending a drug rehabilitation clinic.

DISCUSSION

Septic thrombosis of the cerebral venous sinuses is a rare but often catastrophic complication of paranasal sinusitis. Chronic inflammation of the paranasal sinuses with infected material (e.g., glue sniffing in drug abusers), chemical exposure or allergy may contribute to the development of intracranial complications of paranasal sinusitis such as meningitis, subdural empyema, intracerebral abscess, epidural abscess, and rarely cavernous sinus thrombosis and/or SSST (Clayman et al., 1991). Both cigarette smoking and topical drug abuse are known to cause ciliary abnormalities including a decrease in number, flaccidity and structural abnormalities (Batsakis, 1987). This patient was a malnourished, chronic drug abuser in the form of regular glue sniffing, who developed pansinusitis and an associated cavernous sinus thrombosis and SSST.

The high morbidity and mortality with SSST may be associated with initial diagnostic difficulties followed by therapeutic controversies. The high degree of suspicion aided by radiological imaging (contrast-enhanced CT scan, cerebral angiography, or MRI scan), leading to diagnosis and aggressive treatment, may be required to improve the outcome. Unfortunately, the treatment of cerebral venous sinus thrombosis is still controversial.

This patient was managed with: (1) immediate surgical drainage of sinuses and appropriate intravenous antibiotic therapy; (2) continuous heparin infusion titrated to maintain 2-3 times the normal APTT; (3) Hyperventilation to lower intracranial pressure; and (4) prophylactic phenytoin therapy.

In the literature, glucocorticoids, diuretics, osmotherapy, platelet inhibitors, local or systemic thrombolysis, barbiturate coma and surgery have been suggested for the treatment of cerebral sinus venous thrombosis (Einhaupl et al., 1991).

Anticoagulation was first used in 1941 for cavernous sinus thrombosis. Since then there have been case reports and retrospective studies with contradictory conclusions (Gettelfinger and Kokmen, 1977; Bousser et al., 1985; Levine et al., 1988). The theoretical role for anticoagulant therapy in cerebral venous sinus thrombosis is to prevent thrombus extension and enhance recanalization of the thrombus (Levine et al., 1988; Helpern et al., 1984). The disadvantages as quoted by the opponents are increased risk of intracranial and systemic haemorrhage and promote dissemination of septic emboli (Gettelfinger and Kokmen, 1977; Levine et al., 1988). In a prospective, randomised, double-blind study Einhaupl et al. (1991) strongly suggest that dose-adjusted intravenous heparin treatment lowers the mortality associated with sinus venous thrombosis and does not promote intracranial haemorrhages. We have found only one case report possibly due to heparin-associated cerebral haemorrhage (Pirkey, 1949). Levine et al. (1988), in their retrospective case-control study, conclude that antibiotics in conjunction with an early carefully-monitored anticoagulant therapy for cavernous sinus thrombosis reduce morbidity among survivors. Their use, however, might be justified early in the course of the disease before haemorrhage or infarction have occurred. Bousser et al. (1985), in their review, have reported that intravenous heparin significantly reduced the mortality from cerebral venous thrombosis. As SSST is associated with early venous infarctions, early anticoagulant therapy should be considered in the absence of contra-indications (Eskridge and Wessbecher, 1991).

The use of fibrinolytics is even more controversial. Although there have been reported successes with local or systemic fibrinolytic therapy (DiRocco et al., 1981; Eskridge and Wessbecher, 1991), this has not been a universal finding (Helpern et al., 1984).

The incidence of seizures after SSST is as high as 80%, so prophylactic anticonvulsant therapy has been recommended (Wald et al., 1981). The use of corticosteroids may interfere with antibiotic penetration and patients' immunological resistance (Konrtopoulos et al., 1983; Newelt et al., 1984), hence they were not used in our patient. However, corticosteroids have been advocated to decrease cerebral oedema and reduce inflammation (Gettelfinger and Kokmen, 1977; Clayman et al., 1991).

SSST is often associated with significant cerebral oedema and elevated intracranial pressure, which has been controlled by barbiturate infusion and/or CSF drainage (Hanley et al., 1988). But we used only hyperventilation ($PaCO_2$: 4 kPa) in our patient.

It is likely that the use of a dose-adjusted heparin infusion, in conjunction with antibiotic therapy and surgical drainage, contributed to this patient's recovery and resolution of hemiparesis rapidly before discharge. Anticoagulant (warfarin) and phenytoin were continued for 6 months. The patient is now fully recovered, but unfortunately abusing drugs again.

In conclusion, SSST is a rare disease, which may be associated with inhalational drug abuse. With early diagnosis and aggressive intensive-care-unit management, morbidity and mortality can be reduced.

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