Imaging of neonatal arterial thrombosis

François Gudinchet, Jean-Luc Dreyer, Maurice Payot, Bertrand Duvoisin, Ricardo Laurini

Abstract

The case of a neonate who presented with symptoms of upper limb ischaemia related to spontaneous multiple arterial and venous thromboses that were demonstrated by colour Doppler sonography and digital subtracted angiography is reported. The presentation of limb ischaemia at birth may be the warning sign of simultaneous cerebral infarction.

Multiple thromboses of large arterial and venous vessels in the neonatal period, not related to umbilical catheterisation, are rare and there are variable clinical presentations. We describe an additional case in which the correct diagnosis was made in the perinatal period by colour Doppler sonography (CDS) and digital subtracted angiography (DSA).

Case report

A full term boy was referred to our institution at the age of 2 days because of the absence of spontaneous movement and cyanosis of the right arm. The pregnancy had been uneventful. A prolonged delivery was due to shoulder dystocia. Absence of spontaneous movement, cyanosis, and absence of a palpable pulse of the right arm suggested that the diagnosis was a

right brachial plexus injury but in view of cyanosis and the absence of both brachial and radial pulses echocardiography, CDS, and DSA of the aorta were carried out. A catheter was passed through the umbilical artery into the ascending aorta and DSA showed a failure of opacification of the brachiocephalic trunk with reversed flow through the right carotid and vertebral arteries (fig 1A and 1B). This was consistent with an obstructing thrombus in the brachiocephalic trunk. CDS demonstrated further thrombi at the emergence of the left common carotid artery (fig 2) and in the retrohepatic inferior vena cava. Contrast enhanced computed tomography (fig 3) showed a hypodense lesion in the area of the right middle cerebral artery with calcification, which was highly suggestive of a prenatal thromboembolic event. After intravenous anticoagulant treatment with heparin (10 U/kg hour) and aspirin (100 mg/kg/day) for 10 days, nicoumalone (0.2 mg/kg/day) was given for three months. Ten days after the first CDS, a second CDS showed the resolution of the left carotid artery thrombus and the persistence of a thrombosed brachiocephalic trunk. Normal movements of the right arm returned four days after the first CDS. Subsequently a left hemiparesis became apparent at 3 months of age; the child is now 23 months old and has a complete

University Hospital,
Lausanne, Switzerland,
Department of Radiology
François Gudinchet
Jean-Luc Dreyer
Bertrand Duvoisin
Department of
Paediatrics
Maurice Payot
Department of Pathology
Ricardo Laurini

Correspondence to:
Dr François Gudinchet,
Radiodiagnostic,
CHUV-BH07,
CH-1011, Lausanne,
Switzerland.

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Figure 1 (A) Aortic DSA. The tip of the catheter has been placed in the ascendant aorta (large solid arrow). Opacification of the left subclavian (small arrows) and left carotid (curved arrow) arteries. Absent opacification of the brachiocephalic trunk (open arrow). (B) Late image showing opacification of the right subclavian artery (small arrows) via retrograde flow through the right carotid artery (curved arrow).

Figure 2 Sagittal CDS image of the left common carotid (solid straight arrows) with proximal partially obstructing mural thrombus (curved arrow). The arterial flow is blue and the venous jugular flow is red (open arrows).

Figure 3 Contrast enhanced cerebral computed tomogram demonstrating a superficial infarct in the territory of the middle carotid artery (open arrows). The atrophic aspect and the deep focal calcification suggest a prenatal ischaemic event. Cephalhaematoma (curved arrow).

left hemiplegia. There was no detectable coagulation abnormality, homocystinuria, or a deficit of protein C or antithrombin III in the infant or his family.

Discussion

Thrombosis of the aorta, great vessels, and veins in the neonatal period has been reported in association with the use of indwelling arterial

catheters.¹ Primary arterial and venous thromboses associated with antenatal stroke are rare and only two similar cases have been reported.²⁻³ Thrombosis of the ascending aorta has been encountered with early development of severe heart failure.³ Upper limb ischaemia at birth followed by hemiparesis has been reported.²

Aortic arch and great vessels thrombosis in the neonate is related to additional rare conditions like sepsis, dehydration, maternal diabetes, birth trauma, asphyxia, and aneurysmal ductus arteriosus. Some associations with homocystinuria, protein C and antithrombin III deficiency have been described¹⁻³ but were absent in the present case. Viral aortitis,³ thromboarthritis due to infantile periarteritis nodosa, and Kawasaki and Takayasu's disease must be considered in the differential diagnosis. In this case, the hypodense lesion in the area of the right middle cerebral artery was highly suggestive of a prenatal infarction, but was probably unrelated to birth trauma.

Many investigators consider ultrasound as the method of choice to visualise aortic arch obstruction and inferior vena cava thrombi.⁴⁻⁶ In the present case, CDS displayed the different arterial and venous thrombi and the reversed flow through the right carotid and subclavian arteries. Some authors recommend angiography as the definitive test for the diagnosis of arterial thrombosis.⁴⁻⁵ In the present case, DSA allowed us to confirm the findings of CDS without femoral puncture. The various attempted treatments have included surgical vascular repair, thrombolysis, prostaglandin E₁ infusion, or (as in our case) anticoagulant treatment. Renovascular hypertension, impaired renal function, and spastic hemiparesis are the most frequently described sequelae.²⁻⁴

In cases of perinatal upper limb ischaemia, CDS and DSA may provide important information about the site of obstruction. Obstructive lesions in relation to the great vessels derived from the aortic arch may be associated with cerebral infarction and so brain imaging should also be carried out.

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