Microvascular surgery to preserve a preterm infant's ischaemic arm

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Early microvascular surgery for ischaemia of the arm or leg in newborn babies can restore normal function and development

Acute neonatal gangrene is an uncommon but devastating event. It may follow the adjustments in circulation that occur after birth, which may lead to an embolus arising from a thrombus within the ductus arteriosus or from an extension of an umbilical artery thrombosis.¹ Arterial blood sampling² and compression during delivery can both result in acute neonatal gangrene, and the condition also occurs in babies with sepsis, dehydration, and polycythaemia.

Case report

A normal baby weighing 1300 g, one of identical twins, was born by uncomplicated caesarean section at 30 weeks' gestation. An intravenous infusion was started in his right arm. At 1½ hours old his left arm became white, and, though a brachial pulse was palpable, the radial pulse was absent. Within half an hour his forearm was a dusky purple colour, with no capillary return, and was paralysed (figure). The

Ischaemic forearm in preterm baby

brachial pulse had disappeared, although a faint hum was audible on Doppler ultrasonography. x Ray films of the chest and arm and results of biochemical, haematological, and clotting studies were normal. Infusion with dextran 70 and directly applied transcutaneous oxygen produced no change in his condition. Arteriography was not attempted.

Immediate microsurgical exploration was undertaken. The axillary artery was patent, but a thrombus extended distally down the brachial artery. Thrombectomy was attempted with both a fine suction catheter and direct traction but was unsuccessful. The smallest Fogarty catheter was too large to be inserted into the vessel, which was 1.5 mm in diameter. Further exploration showed that the thrombus extended down the ulnar artery as far as the deep head of the pronator teres, which seemed to be compressing the vessel. The radial artery was collapsed from its origin distally. The pronator teres was divided. At this level a thrombus 5 cm long was readily extracted by ulnar arteriotomy. Though no intimal damage was noted, the ulnar artery was ligated. When the clamp was released immediate revascularisation of the hand occurred through the

radial artery and function was restored. The arm subsequently developed normally.

Discussion

The most likely explanation of ischaemia in this case is that an embolus, formed centrally post partum, became lodged at a site of peripheral narrowing caused by the origin of the pronator teres. Transient ischaemia of the arm or leg in the newborn is well recognised but usually resolves within two hours.¹ Sympathetic blockade may be used in both diagnosis and treatment.² If severe ischaemia persists transumbilical arteriography may help,³ but whether surgical exploration should be delayed by this procedure is questionable. Doppler ultrasonography may be useful in locating the proximal site of occlusion, though, as in this case, it does not show its distal limit.

Though conservative management of ischaemia may preserve the function of the limb, amputation is a more common result; yet pathological examination found patent vessels distal to the occlusion in 13 out of 16 cases, indicating that the limb was potentially viable. Recent reports have advocated early surgery, especially if the ischaemia is severe, proximal, or deteriorating.⁴ Indirect thrombectomy with a Fogarty balloon catheter is the technique recommended⁵ but is not always successful, especially in small vessels distal to the brachial bifurcation and the popliteal trifurcation³; it proved impossible in this case.

All these problems can be overcome by direct exploration of the affected vessel with an operating microscope. Though this baby was the smallest we had subjected to microvascular surgery, the distal arteries of the arm were similar in size and nature to the digital vessels routinely anastomosed during replantation of an adult finger. Extraction of a thrombus under direct vision offers the best chance of removing it completely. If necessary arterial resection and reconstruction with venous grafts are feasible using standard microsurgical techniques. The surgical skill required to carry out such procedures is now widely available throughout the United Kingdom. This case shows that an early request for microsurgical help can lead to an improved prognosis.

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