Summary

Over a 2-year period 80% of children found to have significant *Proteus* bacteriuria were boys. The organism was isolated from the prepuce in 30% of normal boys and 32% of those with balanitis. *Proteus* urinary tract infection should be carefully confirmed and proved cases thoroughly investigated.

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Exchange transfusion in severe neonatal infection with sclerema

Although improvement in obstetric practices, careful handling of the newborn, rational use of antibiotics, and general supportive treatment have improved the prognosis of neonatal septicaemia, it is still an important cause of death in the neonatal period (Nicolopoulos, Anagnostakis, and Xanthou, 1973). Exchange transfusion has been used successfuly in adults for the treatment of postabortion sepsis (Verkhovskü and Drach, 1965) and other severe infections (McLean and Luke, 1969), but in only a few cases of neonatal septicaemia (Prod'hom *et al.*, 1974). This paper describes the cases of two newborn babies with severe neonatal infection who were treated successfully with repeated exchange transfusions.

Case reports

Case 1. A male weighing 1950 g was born prematurely at 33 weeks. Pregnancy and delivery were normal; no cause was apparent for the premature labour. His weight was normal for gestational age. When 30 hours old he started having spells of apnoea and cyanosis. Serum Ca, Mg, Na, Cl, K, and total CO_2 and blood pH and glucose were all normal. A peripheral blood white cell count showed pronounced neutrophilia with a shift to the left. Throat, nose, ano umbilical swabs and blood and cerebrospinal fluid were cultured. Treatment with ampicillin and gentamicin was started because the baby was thought to have septicaemia. During the next two days his condition deteriorated. He became lethargic and developed mild jaundice (bilirubin 12 mg/100 ml), which was treated with phototherapy. Meanwhile the CSF proved normal but the blood culture grew *Klebsiella* which was sensitive to gentamicin and cephalothin. Therefore ampicillin was substituted for cephalothin. In spite of adequate specific antibiotic therapy the baby's condition progressively deteriorated and sclerema developed in his legs. After five days of therapy with gentamicin and cephalothin the sclerema was steadily progressing up the trunk. The white blood cell count now showed a pronounced neutropenia. At this point it was decided that the baby might benefit from exchange transfusion. Fresh blood with citrate glucose as anticoagulant was used after warming and adding sodium bicarbonate to correct the pH. An exchange of 180 ml of blood/kg over two hours was well tolerated and it was repeated 18 hours later. The baby's condition improved dramatically after the second exchange transfusion. The sclerema disappeared within 48 hours, and subsequent progress was uneventful. Antibiotics were discontinued when the patient was 15 days old and he was discharged one month later in good condition.

Case 2. A male aged 2 days was admitted because of jaundice. He had been delivered normally at term after an apparently uneventful pregnancy but he was small for dates (birthweight 2100 g). On admission he was lethargic and deeply jaundiced. Blood glucose was 18 mg/100 ml, serum unconjugated bilirubin 30 mg/100 ml, Hb 11·2 g/100 ml, and Coombs's test negative. The hypoglycaemia was treated with intravenous glucose while blood was being prepared for exchange transfusion. The latter went smoothly until 340 ml of blood had been exchanged, when the baby had a cardiac arrest. He was resuscitated and placed in an incubator. Shortly afterwards he had a convulsion. The CSF contained 72 polymorphs/mm^3 and a peripheral blood white cell count suggested infection. With a diagnosis

of meningitis most probably associated with septicaemia the baby was started on ampicillin and gentamicin. After 17 hours he was given a second exchange transfusion. At that time his unconjugated serum bilirubin was 20 mg/100 ml. The second exchange transfusion was tolerated well. During the following 48 hours the jaundice subsided but his general condition deteriorated. When 5 days old he developed sclerema of the legs and thighs, abdominal distention, and bile-stained vomiting. *X*-ray examination showed paralytic ileus. A very low neutrophil count suggested severe septicaemia. At this point he was given a third exchange transfusion. Unconjugated serum bilirubin was only 5 mg/100 ml. A blood culture taken immediately before the third exchange transfusion grew *Klebsiella*, as did a throat swab. The exchange transfusion was done very slowly, and thereafter the general condition improved. The sclerema began to subside on the following day and oral feeds were tolerated. Two days later the CSF contained only 2 cells. The baby was discharged 20 days later doing very well and with a normal EEG.

Discussion

In spite of appropriate antibiotic therapy the condition of these two newborn babies progressively deteriorated and generalized sclerema developed. Neonatal septicaemia is almost invariably fatal when associated with sclerema (Hughes and Hammond, 1948; Prod'hom *et al.*, 1974), and in our unit all such cases have died very soon after developing sclerema. The two babies presented here, though critically ill, tolerated the exchange transfusions and improved strikingly after 24 hours, the sclerema disappearing within 3–4 days.

Exchange transfusion improves oxygen transportation by improving the circulation and shifting the oxygen dissociation curve to the right (Delivoria-Papadopoulos, Roncevic, and Oski, 1971). It may correct hypovolaemia and also improve haemostatic mechanisms. Further, it removes bacteria or bacterial toxins, or both, and may also provide substances which enhance the humoral or cellular defence mechanisms.

The absolute numbers of neutrophils and eosinophils in the peripheral blood have been shown to rise considerably during the week after exchange transfusion for neonatal jaundice, while their phagocytic activity also increases (Xanthou *et al.*, 1973, 1974). A rise in serum opsonic activity has been found in neonates after exchange transfusion (Davis, Blum, and Quie, 1971) and recent data suggest that there is also an increase in the activity of lymphocytes (Schechter, Soehnlen, and McFarkand, 1972).

Whatever the mechanisms of action, it seems that exchange transfusion can be an effective therapeutic tool for desperate cases of neonatal infection associated with sclerema.

Summary

Two critically ill newborn babies with severe infection associated with sclerema were successfully treated with appropriate antibiotics and repeated exchange transfusions.

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