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Intralipid microemboli

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SUMMARY A baby girl died after receiving intravenous Intralipid. At necropsy a pulmonary Intralipid microembolus, unrelated to the cause of death, was found. Serum taken immediately before infusion agglutinated Intralipid. C reactive protein concentration was raised. This supports the theory that C reactive protein may agglutinate Intralipid *in vivo*, causing embolisation.

There have been a number of published reports describing lipid emboli in the tissues of neonates receiving intravenous fat emulsions.¹⁻³ Intralipid tends to be agglutinated *in vitro* (creaming) by sera containing significantly raised concentrations of C reactive protein⁴ and is also agglutinated by purified

C reactive protein in the presence of calcium ions. It has been postulated that this phenomenon may occur *in vivo*, resulting in embolisation of Intralipid agglutinates.^{3,4} We describe a case that supports this hypothesis.

Case report

A baby girl was born by elective caesarean section at 34 weeks for breech presentation. She was found to have a tracheo-oesophageal fistula, which was surgically closed the following day. She remained critically ill and four days postoperatively was started on parenteral nutrition, including 10% Intralipid at an infusion rate of 0.08 g/hour. Immediately before infusion serum was obtained for estimation of C reactive protein concentration and a creaming test⁴

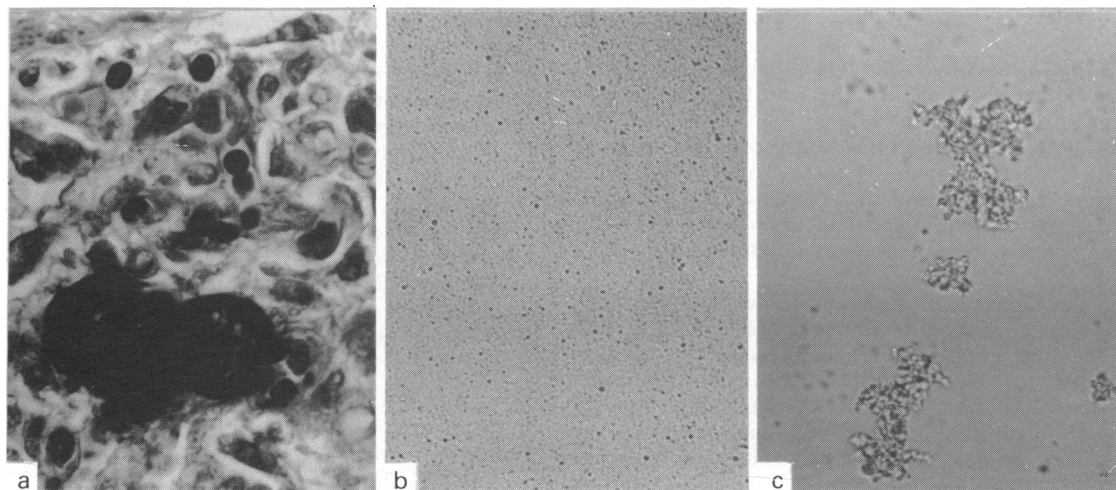


Figure (a) Intralipid microembolus (stained with Sudan black); (b) Normal appearance of Intralipid in serum; (c) Intralipid agglutinated (creamed) by serum.

performed. The C reactive protein concentration was high (119 mg/l), and the creaming test yielded positive results. These results were not available until some days later.

Eight hours after the beginning of infusion of Intralipid the baby suffered a cardiac arrest and died. At necropsy the anastomoses were found to be intact, and the cause of death was cardiac failure due to a large ventriculoseptal defect. Two blocks of each lung were taken and tissue from the kidney also examined. Paraffin sections were stained with Sudan black and examined microscopically for Intralipid microemboli. One microembolus was found in the lung and measured $100 \times 40 \mu\text{m}$ (Fig. (a)). The embolus had the characteristic bubbly appearance described by Barson.¹ Careful examination of the other lung and kidney sections showed no evidence of fat microemboli.

Discussion

The baby developed an Intralipid microembolus after only eight hours of infusion of Intralipid at well below the recommended rate. Only one small embolus was seen, but this is perhaps not surprising considering the infant only received 0.64 g of fat in all. The serum agglutinated Intralipid and contained a high concentration of C reactive protein at the time of infusion. This supports the hypothesis that microemboli are formed by agglutination of Intralipid in the blood stream by C reactive protein.

Intralipid normally consists of discrete particles 0.1–0.5 μm across (Fig. (b)), which when 'creamed' agglutinate into spherical particles 5 μm across, which further aggregate into clumps up to 200 μm across (Fig. (c)). We suggest that these aggregates may be formed in vivo and are then filtered by the lung and embolise. This would explain the characteristic bubbly appearance on histological examination.

Mughal *et al* have described fat embolism in a preterm infant receiving Intralipid.⁵ Serum at the time of clinical deterioration agglutinated Intralipid,

and the C reactive protein concentration was raised. Clinical improvement was associated with the absence of agglutination and a decrease in the C reactive protein concentration. The current case report provides histopathological support to those clinical observations.

Creaming is not a phenomenon peculiar to Intralipid. A recent study has shown that it occurs with many other intravenous fat emulsions.⁶ It is probable, therefore, that patients who embolise Intralipid would embolise other fat emulsions.

In most cases embolisation of fat emulsions may be clinically unimportant, but in some it may exacerbate ventilation perfusion inequalities. The precise pathogenesis of Intralipid embolism is unclear, nor is it known whether the condition is entirely preventable. None the less it may be prudent either to ensure that the C reactive protein concentration is normal (less than 10 mg/l) or perform a creaming test to determine which babies may embolise the infused fat emulsion.

References

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