Indication for tracheal intubation in meningococcal disease and septic shock

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PostScript

LETTERS

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We read with interest the recently published update to an algorithm for the early recognition and treatment of meningococcal disease in children.[1] Of note there is a change to the recommended trigger point for tracheal intubation. The previously recommended trigger point has moved from after 40 ml/kg of fluid resuscitation in the face of persistent shock to after 60 ml/kg of fluid resuscitation. This is following consideration of the work of Carcillo *et al* who recommend that up to 200 ml/kg (average 40–60 ml/kg) of fluid resuscitation may be required in the first hour of resuscitation in septic shock.[2] This is based on level II evidence. Although early intubation in fluid refractory septic shock is desirable, the trigger for tracheal intubation should not be based solely on the volume of resuscitation fluid administered; the trigger should be based on clinical need. Indeed, Carcillo *et al* recommend that the decision to intubate and ventilate in septic shock should be based on the presence of the clinical findings of increased work of breathing, hypoventilation, impaired mental status or the presence of a moribund state. The current algorithm as published may result in patients being intubated unnecessarily; as this is not without considerable risk in this cohort of patients, this presents a significant patient safety issue.

The time course over which fluid is administered is also very important: 60 ml/kg given over minutes will precipitate a very different physiological response to 60 ml/kg given over several hours. The optimal time course of rapid volume expansion is within the first hour of resuscitation; however, this time course is often delayed. The resultant redistribution of fluid over time may negate the need for tracheal intubation in some cases and this should be reflected in the algorithm.

If we examine the adult data of Rivers *et al* looking at early goal-directed therapy in septic shock, we find that early and generous fluid resuscitation reduced the number of shocked patients who required tracheal intubation and ventilation.[3] If these data are extrapolated to the paediatric population they suggest that early, aggressive fluid resuscitation may reverse the progression of septic shock and circumvent the need for tracheal intubation.

This algorithm has contributed to more effective resuscitation of patients with meningococcal septicaemia and septic shock in general. However, without more robust evidence we believe that the indication for tracheal intubation in septic shock should be based on clinical criteria and not the volume of fluid infused during initial resuscitation.

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Avidity of *Haemophilus influenzae* type b antibody in UK infants

Preterm infants have been shown to respond with lower antibody levels of protective anti-polyribisolribitolphosphate (PRP) to immunisation against *Haemophilus influenzae* type b (Hib) than term infants. This may be particularly relevant in the UK where fourth doses of Hib vaccine were not given until September 2006, and preterm infants were at increased risk of Hib disease. Other measures such as antibody avidity may give valuable information.

Having previously reported the anti-PRP responses to primary immunisation in a large group of UK preterm infants,[1] we went on to measure the geometric mean avidity index (GMAI) where the antibody level was sufficiently high to allow this (0.7 μg/ml) by modification of the assay as previously described.[2 3] Results of a comparison with contemporaneously immunised term infants are shown in table 1; no significant differences were found.

Infants with post primary anti-PRP level of <1.0 μg/ml were offered a fourth dose of vaccine at median 6.9 (9.2) months (term (preterm)) (interquartile range 6.7–8.1 (8.2–12.8)) of age, and we again measured the avidity. These infants' serum antibody had a similar level of avidity to those who had responded to their primary immunisations (table 1).

These data suggest that if an anti-PRP level of >0.7 μg/ml to priming with three doses of Hib vaccine is achieved in a preterm infant, then the avidity of antibody is not likely to be significantly reduced compared to term infants similarly immunised. If an anti-PRP level of <1.0 μg/ml is seen after primary immunisation, a fourth vaccine dose produces high antibody levels with similar avidity indices in both pre-term and term infants. These data suggest that the introduction of the new UK schedule, including a fourth dose of Hib vaccine in the second year of life, should boost the protection that the standard schedule offers to those infants born prematurely who respond poorly to priming doses and render it comparable to that seen in term infants, at least from 1 year of age.

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Table 1 Geometric mean avidity index in preterm and term infants

	Preterm	Term
Pre immunisation		
GMT all (95% CI) (n)	0.16 (0.12 to 0.2) (161)	0.73 (0.5 to 1.06) (34)
Avidity measured on	6	3
GMT	5.18 (3.5 to 7.5)	2.99 (2.4 to 3.7)
GMAI (95% CI)	61 (33 to 109)	302 (148 to 614)
Post primary immunisation		
GMT all (95% CI) (n)	1.82 (1.37 to 2.4) (161)	2.82 (1.87 to 4.30) (33)
Avidity measured on	68	22
GMT (95% CI)	5.77 (4.3 to 7.72)	4.48 (2.87 to 6.97)
GMAI (95% CI)	143 (118 to 172)	202 (148 to 275)
Post booster		
GMT all (95%CI) (n)	12.4 (8.54 to 17.9) (55)	14 (5.19 to 38.2) (6)
Avidity measured on	47	6
GMT (95% CI)	15.5 (11.2 to 21.5)	14 (5.19 to 38.2)
GMAI (95% CI)	129 (102 to 160)	135 (87.3 to 210)

GMAI, geometric mean avidity index; GMT, geometric mean titre (μg/ml).