PostScript

LETTERS

Free-flow oxygen delivery using a T-piece resuscitator

T-pieces are increasingly used for administering intermittent positive pressure ventilation (IPPV) during neonatal resuscitation.¹ They can also be used to provide free-flowing oxygen to babies who are breathing but remain cyanosed.² The Neonatal Resuscitation Program (NRP) guidelines recommend that when using a T-piece resuscitator the mask should be loosely placed on the infant's face with the positive end expiratory pressure (PEEP) valve occluded to allow delivery of a reliable amount of oxygen.² There are no reports documenting the percentage of oxygen delivered when the PEEP valve is, or is not, occluded. The aim of this study was to determine the oxygen concentration delivered from a T-piece resuscitator and mask when the PEEP valve is occluded and when it is left open.

Method

We simulated delivering free-flowing oxygen with a Neopuff Infant Resuscitator (Fisher and Paykel, New Zealand) fitted with a size 0/1 mask (Laerdal, Stavanger, Norway) held 1 cm above the face of a Laerdal neonatal manikin (Laerdal, Stavanger, Norway), using 100% oxygen flowing into the Neopuff. Oxygen concentrations were measured with an oxygen analyser (Hudson RCI, Durham, North Carolina, USA) fitted inside the manikin's mouth, with the sensor level with the lips. The analyser was calibrated with air and 100% oxygen before each study. Five Neopuffs were tested. The oxygen concentration at 30 s was recorded with oxygen flow rates ranging from 5 l/min to 8 l/min.

Results

Table 1 shows the mean (SD) percentage of oxygen delivered to the face at different flow rates. At 5–8 l/min with the mask 1 cm above the face, on average 97% oxygen was delivered when the PEEP valve was occluded and 95% when the valve was not occluded. The difference between the percentage of oxygen delivered

when the valve was occluded or open was statistically significant (see table 1 for p values) but probably not clinically important.

Discussion

This is the first published report on the amount of oxygen delivered by a T-piece resuscitator with the PEEP valve occluded or open. The device delivers close to 100% oxygen in both situations. We have previously shown that high concentrations of free-flow oxygen can be provided either by a self-inflating bag, or with oxygen tubing in a cupped hand, held close to the infant's face.³ The percentage of oxygen delivered by the Neopuff is similar to that delivered by these two methods. The benefits of using the Neopuff Infant Resuscitator rather than the other free-flow oxygen delivery methods include the ability to provide continuous positive airway pressure to spontaneously breathing infants as well as providing IPPV with PEEP, without having to change equipment during resuscitation.

Conclusion

The Neopuff is able to deliver close to 100% free-flow oxygen with the PEEP valve occluded or open.

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References

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N-terminal pro-B-type natriuretic peptide as a marker of ductal haemodynamic significance in preterm infants: a prospective observational study

The diagnosis of a haemodynamically significant patent ductus arteriosus (sPDA) in preterm infants is often difficult, with echocardiography remaining the gold standard.¹ However, availability and cost pose some difficulties. B-type natriuretic peptide (BNP) may assist diagnosis, but cut-off levels vary widely in the literature. No data exist on the applicability of the byproduct N-terminal pro-B-type natriuretic peptide (NTpBNP), which is more stable and has a longer half life.² We hypothesised that NTpBNP may be useful in the management of preterm infants with sPDA and aimed to investigate its usefulness as a marker of sPDA and treatment success.

Method

The local ethics committee approved the study, and informed written parental consent was obtained from all parents prior to enrolment in the study.

We carried out echocardiographic and NTpBNP determinations at 12 h and 48 h of life, including measurements of PDA absolute and Doppler jet diameters, shortening fraction, descending aorta end-diastolic velocity, and left atrial to aortic ratio, in 48 preterm infants.³ The cohort was divided in to two groups based on the presence or absence of an sPDA. Infants with sPDA were treated with two courses of ibuprofen, which was followed by surgical ligation if the medical treatment was unsuccessful. Both groups of infants underwent another assessment following successful treatment. The results were analysed using Mann-Whitney U test for non-parametric data, and correlations were tested using Spearman's correlation coefficient.

Results

We carried out 131 echocardiographic examinations coupled with NTpBNP determinations (table 1). Table 2 summarises the NTpBNP levels in the two groups on days 1, 3 and after treatment. On day 3, NTpBNP significantly correlated with PDA absolute and jet diameters ($r = 0.48$ and $r = 0.51$, respectively ($p < 0.001$)), left atrial to aortic ratio ($r = 0.46$, $p = 0.001$), and descending aorta end-diastolic velocity ($r = 0.73$, $p < 0.001$). There was no correlation between NTpBNP and shortening fraction. NTpBNP levels were significantly higher in the PDA group compared with controls on day 3 ($p < 0.001$) and fell significantly from 6792 pmol/l to 1199 pmol/l after successful PDA closure ($p = 0.001$). A receiver operating characteristic

Table 1 Mean (SD) oxygen concentration, measured at a manikin's mouth after 30 s, when 100% oxygen was delivered using a Neopuff Infant Resuscitator with 100% oxygen flowing into the inlet at different flow rates, when the positive end expiratory pressure (PEEP) valve was occluded and when it was open

	Flow of 100% oxygen							
	5 l/min		6 l/min		7 l/min		8 l/min	
PEEP valve	Occluded	Open	Occluded	Open	Occluded	Open	Occluded	Open
Mean (SD) percentage of oxygen measured at manikin's mouth	97 (2.1)	95 (2.3)	97 (2.3)	96 (2.7)	97 (2.5)	95 (3)	97 (2.4)	95 (2.5)
Paired t test	p = 0.0035		p = 0.0701		p = 0.0100		p = 0.0026	