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Artificial Grunting in Respiratory Distress Syndrome

Sir,

Infants suffering from idiopathic respiratory distress syndrome (RDS) show the grunting type of respiration illustrated in the Fig. It has been shown that grunting is an effective means of raising arterial oxygen tension (PaO₂) in RDS (Harrison, Heese, and Klein, 1968), and the ability to simulate this pattern of respiration during mechanical ventilation might therefore be useful in the treatment of RDS.

We have modified a simple ventilator to produce this pattern, which Gregory et al. (1971) would describe as continuous positive pressure breathing (CPPB), in the treatment of infants with RDS.

The East–Radcliffe ventilator* has been adapted for use in the neonate to produce intermittent positive pressure ventilation (IPPV) (Tunstall et al., 1968). It was further modified to produce CPPB by the addition of a gate-clamp to the expiratory tubing distal to the ‘dummy lung’. With this arrangement the pressure changes may be monitored continuously on the manometer of the ventilator itself. The infant can then be supplied via a nasotracheal tube with oxygen-enriched heated, humidified air at any preselected pressure.

In the Fig., pressure-volume tracings obtained during artificial grunting are compared with tracings obtained during IPPV. During IPPV, airway pressure falls to zero midway through the ventilator cycle because of negligible resistance during the expiratory phase, possibly allowing further alveolar collapse to take place. With CPPB on the other hand there is continuing positive pressure during the expiratory phase, producing volume changes similar to grunting in RDS but with positive airway pressure remaining at the end of each cycle. This presumably increases the infant’s functional residual capacity and helps to prevent alveolar collapse.

When CPPB is applied as described, the ventilator minute volume is considerably reduced and may even

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Table:<br>(a) **Oesophageal Intrathoracic Pressure**<br>\[ +1 \text{ cm H}_2\text{O} \]

(b) **Ventilator Airway Pressure**<br>\[ +30 \text{ cm H}_2\text{O} \] Rate 37/min

(c) **Intrathoracic Oesophageal Pressure**<br>\[ -10 \text{ cm H}_2\text{O} \]

(d) **Ventilator Airway Pressure**<br>\[ +30 \text{ cm H}_2\text{O} \] Rate 37

Figure.—Simultaneous volume-pressure tracings from (a) normal infant, (b) intermittent positive pressure ventilation (IPPV), (c) spontaneous gruntings in RDS, and (d) ‘grunting’ produced during continuous positive pressure breathing (CPPB).

become less than the minute volume of a normal infant, with consequent risk of carbon dioxide retention. However, the flow rates during CPPB are not sufficiently low to result in reduced gas temperature to the infant even with the same humidifier temperatures as those used in IPPV.

It is therefore easy to perform CPPB with the East-Radcliffe ventilator, producing a grunting pattern similar to that observed in the natural course of RDS. It has been our impression that this type of ventilatory assistance leads to a rapid improvement in hypoxaemia with a less dramatic effect on respiratory acidosis, but this impression is based on the study of only four cases and further investigations are being undertaken to define the role of CPPB in the management of RDS.

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**REFERENCES**