Clinical Interventions in Chronic Lung Disease

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Higher survival rates of very immature infants has meant increasing numbers of babies survive with chronic lung disease (CLD), that is they remain oxygen dependent at least until 28 days of age and some even after 36 weeks postconceptional age. These babies now present an enormous workload to neonatal intensive case units and their appropriate treatment is an important problem.

Results of clinical series and randomized trials have demonstrated the efficacy of certain methods of respiratory support in the prevention of CLD [1]. Surprisingly then, although barotrauma is a recognized aetiological factor for CLD, few studies have addressed the equally important area, optimization of respiratory support in infants with established CLD with the aim of reducing ongoing damage and improving long-term outcome. Data are, however, available from acute physiological studies and suggest that infants with type-I CLD (that is without cystic abnormalities on their chest radiograph) are best ventilated with relatively high levels of positive end-expiratory pressure (6 cm H_2O), as this will improve oxygenation without impairing carbon dioxide elimination [2]. In those patients who require full support, a ventilation rate of 60 bpm and inspiratory to expiratory ratio of 1:1 provides most effective gas exchange [3]. On recovery, extubation directly into a 'hatched box' provides as effective support as nasal continuous positive airway pressure and avoids the complications of that method of support seen in this population, which include hyperoxia and agitation [4]. There is little information on alternative forms of ventilation [4]. The role of patient-triggered ventilation is limited, but when required, triggering from the airway is the preferred site [5]. Continuous negative pressure must be used with caution, as it can cause overdistension and carbon dioxide retention particularly in infants with bronchopulmonary dysplasia.

Unfortunately, infants with CLD frequently suffer acute respiratory deteriorations, increasing their requirement for respiratory support and prolonging their admission [6]. The commonest cause for such episodes is infection and a viral aetiology should be considered. In infants in whom a viral infection is proven or strongly suspected, a randomized

trial demonstrated that antiviral therapy can speed recovery from the acute deterioration and is associated with improved lung function at follow-up [7].

Diuretics have a role in infants with CLD, particularly those who are fluid overloaded or have incipient right heart failure. It is controversial, however, whether such therapy improves the long-term outcome and diuretics do have side effects. These include hypercalciuria, renal

calcification and nephrolithiasis [8], as a consequence infants on chronic diuretic therapy should receive regular monitoring, particularly renal ultrasounds. Wheezy infants with CLD benefit from bronchodilator therapy but, although regular bronchodilators improve symptom status at follow-up, their effect may be short-lived in the ventilated infant. Administration by an inhaler and spacer device is preferred above nebulization, as the former method of delivery is equally effective yet avoids the early paradoxical deterioration in lung function [9]. Steroid therapy is perhaps the most successful treatment for infants with CLD. Although early trials suggested early weaning from the ventilator was the only benefit, randomized studies have now shown a reduction in the length of stay and improved outcome at follow-up [10]. The data from those trials suggest that the greatest effects are seen when steroids are started early and perhaps given in high dose and as a prolonged course. Unfortunately, systemic administration is associated with numerous side effects, the most common being hypertension [11]. These can be avoided by giving the steroids by inhalation [12], but initial experience suggests that this method of administration is less efficacious and associated with a slower onset of action; higher doses may be required.

Infants with CLD have many other problems which require careful evaluation and intervention, particular emphasis must be placed for example on adequate nutrition, developmental stimulation and family support.

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