

BUDESONIDE

Use

Inhaled steroids (like budesonide) are central to the management of asthma and useful in the management of croup. Prophylactic use has done little to reduce the incidence of ventilator-induced chronic lung disease, but one small study suggests that direct liquid intra-tracheal co-instillation with surfactant may be more effective.

Pharmacology

Budesonide (patented in 1975) and beclometasone dipropionate (called beclomethasone dipropionate in the USA) are steroids of almost equivalent potency with strong glucocorticoid and negligible mineralocorticoid activity. Fluticasone propionate is a related compound which is about twice as potent on a weight for weight basis. They are widely used topically on the skin or by inhalation into the lung (as in asthma) and have little systemic effect unless high dose treatment is employed. There is no contraindication to their use during pregnancy and lactation: indeed it is particularly important to keep asthma under stable control during pregnancy. Administration is generally from an aerosol or dry powder inhaler. Suspensions of budesonide and fluticasone can also be nebulised, but there seems to be no comparable preparation of beclometasone.

Intra-tracheal steroid use in the preterm baby

Early prophylactic use: The OSECT trial compared inhaled budesonide versus systemic dexamethasone, and early versus delayed, treatment in 570 ventilated babies of less than 30 weeks gestation using a factorial design. Inhalation seemed almost as effective as systemic treatment when started early, and less likely to cause hyperglycaemia or a rise in blood pressure. Fewer babies treated early (systemically or by inhalation) were dead, or still oxygen dependent at 36 weeks (55% v. 59%), but the difference was not statistically significant. Outcome at seven years was similar in the four trial groups. Because of concern for the long term consequences of early postnatal steroid use (as outlined in the monograph on dexamethasone), there is now a consensus that systemic steroid treatment should only be given to babies displaying clear signs of serious lung damage (bronchopulmonary dysplasia) more than a week after birth. There is, however, one small study suggesting that, in the very oxygen-dependent baby, early treatment may reduce this risk if budesonide is co-administered with surfactant to help optimise distribution within the lung as a *liquid*. There were few early side effects, but the long term outcome is not yet known, so wider use must wait until more trials are done.

Treatment of established disease: A recent overview of trial information suggests that, while aerosolised or nebulised budesonide or beclometasone can be of some help in weaning babies from ventilator support, they are not as effective as systemic steroids. Use may, however, help to reduce or abolish the need for systemic treatment with dexamethasone in a few babies with chronic lung disease.

Inhaled steroid use in croup

Croup (the sudden onset of hoarseness, a barking cough, and distressing inspiratory stridor) is common in young children. It is mainly viral in origin, though atopy plays a part in some children. Symptoms often settle almost as fast as they arise. Brief steroid use can reduce admission, and only 1% of those admitted require intubation (once cases of bacterial epiglottitis are recognised for what they are).

Treatment

Early prophylactic use: One small study has suggested that instilling 250 micrograms/kg of budesonide premixed with 100 mg/kg of the surfactant beractant directly into the trachea (see below) may reduce the risk of chronic lung disease in the very preterm baby. This should **only** attempted as part of a clinical trial.

Managing ventilator-induced chronic lung disease: 200 (or 500) micrograms of budesonide inhaled twice a day may occasionally aid extubation but is of no other demonstrable long term benefit. The drug has usually been given from a metered-dose aerosol inhaler into a rigid 'aerochamber' during hand ventilation. Mask administration using a jet nebuliser after extubation can reduce the child's 'symptom score' but trials have failed to show any more general clinical benefit. It may be wise to protect the eyes during mask administration. Only a tenth of the administered dose reaches the baby.

Use in croup: Two 1 mg doses of nebulised budesonide 30 minutes apart can reduce the need for hospital admission as effectively as a single 0.6 mg/kg oral (or IM) dose of dexamethasone (q.v.).

Supply and administration

500 microgram (2ml) respules[®] of budesonide, designed for face mask nebulisation, cost £1.60 each. For direct intra-tracheal instillation mix 8 ml (200 mg) of beractant with 2ml (500 micrograms) of budesonide in a syringe and give 5 ml/kg of this in 3–4 aliquots into the trachea at 2–5 minute intervals. The effect of using any *other* surfactant is, as yet, unknown, and could involve putting twice as much fluid into the lung. Fluticasone propionate is available in 2 ml 500 microgram Nebules[®] (costing 90p) for jet nebuliser use.

References

See also relevant Cochrane reviews ©

Wilson TT, Waters L, Patterson CC, *et al.* Neurodevelopmental and respiratory follow-up results at 7 years for children from the United Kingdom and Ireland enrolled into a randomized trial of early and late postnatal corticosteroid treatment, systemic and inhaled (the Open Study of Early Corticosteroid Treatment). *Pediatrics* 2006;**117**:2196–205. [RCT]

Berger WE, Qaquadah PY, Blake K, *et al.* Safety of budesonide inhalation suspension in infants aged six to twelve months with mild to moderate persistent asthma or recurrent wheeze. *J Pediatr* 2005;**146**:91–5. [RCT]

Yeh TF, Lin HC, Chang CH, *et al.* Early intratracheal installation of budesonide using surfactant as a vehicle to prevent chronic lung disease in preterm infants: a pilot study. *Pediatrics* 2008;**121**:e1310–8. [RCT]