

Anaesthesia for the laser treatment of neonates with retinopathy of prematurity

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EDITORIAL

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In this edition of *Eye*, Chen and his colleagues raise some interesting and important issues concerning the management of neonates who require laser treatment for retinopathy of prematurity (ROP). Their article, based on a survey of UK ophthalmologists who treat such cases, highlights the problems associated with providing safe and optimal care for premature and ex-premature babies requiring anaesthesia and surgery.

Examinations of the eye for ROP are known to be extremely stressful and probably painful to the neonate. This is in part owing to the speculum required to keep the eyelids open and the intensity of the ophthalmoscopy light. Topical anaesthetic pretreatment can reduce the pain response but is not effective in all neonates.¹ Thus, even for simple examinations of the eye, topical anaesthetic alone may be insufficient.

In a previous study by Haigh *et al.*,² premature babies who received topical local anaesthetic eye drops alone before cryotherapy suffered severe and recurrent cardiorespiratory complications. However, the babies who were managed with controlled ventilation and either sedative or anaesthetic drugs had significantly fewer complications.

It is accepted that the premature baby is capable of feeling pain and that repeated and significant painful stimuli can result in significant morbidity as a result of prolonged bradycardic and apnoeic episodes.^{3–5} Also, neonates exposed to repeated painful procedures respond differently to subsequent painful events as infants and children with an exaggerated affective and behavioural response.⁶

In Chen's article, no infants were treated with topical anaesthesia alone; however, only 50% of

respondents reported the use of intubation and ventilation during laser treatment. The remainder received various types of sedation without airway protection or ventilatory support.

Undoubtedly, these cases are surrounded by immense levels of stress, particularly for the parents who may have had to endure frequent critical episodes in their babies' short but traumatic lives. The thought of their baby having to undergo a general anaesthetic, with all its implications, when they may finally be on the verge of discharge home, is understandably daunting. However, it is at this point that we must be very clear about the safety of our options.

Sedation is a continuum from the awake state to unconsciousness.⁷ Regardless of the intended level of sedation or route of administration of sedative, a paediatric patient and particularly a neonate may move easily from a level of sedation to obtundation with the loss of protective reflexes.

If we accept that laser therapy is at least stressful, if not significantly painful, it can be seen that these babies require more than minimal sedation. They actually require deep sedation and analgesia.

Sedation for various procedures is often based on clinical tradition rather than on scientific evidence.⁸ The practice is often more influenced by available resources (including perceived or actual shortage of paediatric anaesthetic services) than by validated evidence of benefit.

Sedatives such as midazolam do not provide analgesia, and in higher doses can lead to abnormal jittery movements and if given rapidly can cause profound systemic hypotension.⁹ Analgesics such as fentanyl and morphine when given alone are also not the answer, as even in large doses they do not

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completely obtund the autonomic response to noxious stimuli, but may result in prolonged respiratory depression.^{10–12} In the case of fentanyl, rapid large boluses can also result in sudden profound chest wall rigidity, which results in an inability to ventilate. Thus, a balanced anaesthetic using sedation, analgesia, and muscle relaxation in lower doses provides optimal conditions for treatment but with reduced side effects.

Although healthy neonates can tolerate very low doses of sedation and analgesia, the levels required for laser therapy soon result in respiratory depression and airway obstruction. This is further compounded by the fact that observation and airway support is hampered by the ophthalmic surgeon operating around the head, reducing visibility and access.

For these reasons, neonates should be electively intubated and ventilated before laser treatment.

Providing insufficient sedation and analgesia, simply to avoid intubation, merely results in the need for physical restraint to accomplish the laser treatment. This can cause considerable stress to the baby, which is clearly unacceptable and may result in significant morbidity.

We now come to the most significant issue relating to the treatment of these babies, that of organising their treatment. Owing to the meticulous care that these premature babies receive in our neonatal units, the incidence of threshold ROP requiring laser therapy is decreasing. Therefore, these cases present sporadically, often being transferred into regional centres for treatment from peripheral hospitals. This can result in organisational difficulties surrounding where, when, and by whom these babies should be treated.

We must, however, resist pressure to treat these patients under substandard conditions. We must ensure that appropriately trained medical personnel aided by experienced assistants in a suitably controlled environment are involved at all times. This may have resource implications, as funding for these procedures is historically inadequate, but given the often stormy course that these babies have endured, it is only right that the appropriate care be given at this time.

This is not to say that paediatric anaesthetists are the only doctors capable of providing suitable care, or indeed that they are better than neonatologists at intubating and caring for neonates. This is clearly not true. However, anaesthetists are more familiar with treating essentially well patients and rendering them unconscious in order to tolerate painful and uncomfortable procedures. At the end of the procedure, the aim is usually to return them to their normal conscious state. For this reason, anaesthetists would usually choose to use a volatile anaesthetic agent such as sevoflurane as part of the balanced anaesthetic. This has the advantage of rapid control of the depth of anaesthesia, and does not have a

prolonged effect once discontinued. This is in contrast to the use of various forms of oral or intravenous sedation, which as previously mentioned can be unpredictable in effect, but which certainly can result in prolonged sedation post procedure.

So, who should care for these babies while they are having their laser treatment?

The most important issue is to ensure the babies safety, and to that end I feel controlled intubation and ventilation using a mixture of sedative or anaesthetic and analgesic drugs is the gold standard. Erratic swings in heart rate and blood pressure as a result of insufficient anaesthetic can result in significant morbidity. Whoever carries this out should feel confident that they are able to provide the appropriate care. Some neonatologists may feel uncomfortable sedating and intubating older neonates for semiurgent procedures, and some anaesthetists may also feel uncomfortable anaesthetising neonates outside of the operating theatre environment. Hence, discussion and cooperation between all the parties involved should make formulation of a local policy possible, to ensure the best possible care for these babies.

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