Current Practice

Pain control in the neonate

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Introduction

Despite the fact that neonates and infants are not capable of expressing their subjective sensations, it has become clear that they do perceive pain, and pain correlates with hormonal, metabolic and cardio-vascular changes. New findings support the notion that repetitive painful stimuli result in both short-term and long-term psychophysiological effects like de-creased attentiveness, poor regulation of behavioural state and motor processes, increase in irritability, as well as an altered pattern of feeding and sleeping[1]. Especially preterm neonates are frequently exposed to multiple painful procedures. Thus, sufficient anal-gesia during all kinds of painful procedures in the neonate becomes extremely important.

Pharmacological agents in intensive care

Occurrence of early intraventricular haemorrhage within 24-72 hours after birth of a preterm suggests a role for pain and stress in the multifactorial causation of severe intraventricular haemorrhage and periventricular leucomalacia. There is evidence that such neurological outcomes in the preterms who receive ventilatory support can be reduced by morphine analgesia and/or midazolam sedation[2].

Morphine can be used as a bolus of 50-100µg/kg initially over 30 minutes, followed by an IV infusion of 10µg/kg/hr increasing to 20-30µg/kg/hr if required. Slow bolus of 200µg/kg over four hours followed by an infusion of 25µg /kg/hr can also be used[3].

It is important to have naloxone immediately avail-able and of course the ability to continue respiratory support. Caution and immediate access to resusci-tation facilities are required for opiates used in non-ventilated babies and the lower end of the infusion range may be necessary. When opiate analgesia is prescribed for prolonged periods, there is a need for planned withdrawal of the drug. This has even more practical relevance with new ventilatory techniques where spontaneous breathing (PTV or CPAP) is encouraged. During surgery opioids are the drugs of choice aside from local anaesthetics.

However, the use of opioids in neonates and especially preterm infants must be considered in the light of certain pharmacokinetic and pharmacodynamic differences when compared to adults. There is a longer elimination rate resulting in increased duration of action and accumulation of drug. The blood brain barrier is not fully developed in the preterm resulting in more access of opioids to binding sites in the CNS. Differentiation of opioid binding sites has not reached the peak. Thus, higher doses relative to body weight are needed to establish sufficient analgesia. Despite such potential drawbacks, opioids are still the best choice when compared with other drugs, since they show the least cardiovascular changes[1].

Local analgesia

It should be considered when appropriate e.g. lignocaine infiltration before chest drain insertion. Transdermal analgesia like EMLA cream (lidocaine-prilocaine cream) or topical 4% Amethocaine gel (Ametop)[4], both of which are available in Sri Lanka, are useful for procedures like venepuncture, IV cannulation and arterial puncture, provided that the stated dose is not exceeded. There are some concerns related to the use of EMLA cream which has been associated with methaemoglobinaemia when used with another MetHb-inducing agent.

Non-pharmacological interventions to reduce pain and stress

They should be the first choice in painful procedures especially when past the phase of initial intensive care.

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Breast feeding during the procedure

The analgesic effect of breast feeding in term neonates was demonstrated by a randomised controlled trial very recently[5]. As breast feeding is the most potent pleasant stimulation a newborn can experience, this is not surprising. During venepuncture, infants (180 term newborns) were either breast fed, held in their mother's arms without breast feeding, given 1 ml of sterile water as placebo or given 1 ml of 30% glucose followed by a pacifier to suck. There were significant reductions in pain scores used for the breast feeding group and glucose plus pacifier groups when compared with the other two groups. Meta-analysis of studies using oral sucrose administration before painful procedures demonstrates its analgesic effect[6].

Other non-pharmacological methods

It was demonstrated in a controlled trial that reducing inappropriate sensory stimuli during intensive care of neonates was associated with improved clinical and developmental outcome[7]. Gentle massage significantly decreases cortisol levels in preterm infants8. Skin to skin contact significantly reduces cry and circulating beta endorphin levels[9,10].

Overall comprehensive nursing care with awareness of pain and distress is likely to be the key answer for the chronic management of pain.

Conclusions

- Use of opiate infusion in the acute phase, and awareness of pain and kindness to the babies, in the chronic phase are the two main strategies.
- Giving a breast feed or glucose solution followed by a pacifier (for non-nutritive sucking) during a painful procedure is simple but effective.
- Proper analgesia may reduce the incidence of poor neurological outcome in ventilated pre-term neonates.

References

1. Latasch L, Freye E. Pain and opioids in pre-term and newborns, *Anaesthetist* 2002; **51 (4)**: 272-84.
2. Anand K J, Barton B A. Analgesia and sedation in preterm neonates who require ventilator support: results from the NOPAIN trial. Neonatal outcome and prolonged analgesia in neonates. *Arch Pediatr Adolesc Med* 1999; **153 (4)**: 331 -8.
3. Quicin M W. Randomised double blind controlled trial of effect of morphine on catecholamine concentration in ventilated preterm babies. *Lancet* 1993; **342**: 324-7.
4. Jain A, Rutler N. Does topical amethocaine gel reduce the pain of venepuncture in new-born infants? A randomised double blind controlled trial. *Arch Dis Child Fetal Neonatal Ed* 2000; **83 (3)**: 207-10.
5. Carbajal R. Analgesic effect of breast feeding in term neonates: randomised controlled trial. *BMJ* 2003: **326**:13-5.
6. Stevens B. The efficacy of sucrose for relieving procedural pain in neonates - a systematic review and meta-analysis. *Acta Paediatrics* 1997; **86**: 837-42.
7. Als A. Individualised developmental care for the VLBW preterm infant. *JAMA* 1994; **272**:853-8.
8. Acolet D. Changes in plasma cortisol and catecholamine concentrations in response to massage in preterm infants. *Arch Dis Child* 1993; **68**: 28-31.
9. Acolet D. Skin to skin contact for very low birth weight infants and their mothers. *Arch Dis Child* 1988; **63**:1377-81.
10. Acolet D. The effect of mother-infant skin-to-skin contact on plasma cortisol and beta endorphin concentration in preterm newborns. *Infant behaviour & Development* 1997; **20**: 553-7.