HOT TOPIC

'DO YOU ROUTINELY DO A BROMAGE SCORE ON ALL PATIENTS BEFORE EPIDURAL INSERTION?'

SUMMARY OF KEY POINTS:

- Epidural analgesia is a safe and effective option for analgesia in children.
- However epidural analgesia can cause serious, potentially life-threatening complications[1].
- Children with pre-existing neurology are particularly vulnerable to injury and clear documentation is essential to patient safety and the timely investigation of any new neurology.

REVIEW OF EVIDENCE

Central neuraxial blockade is a central tool in the anaesthetist's armoury of perioperative anaesthetic and analgesic techniques. Regional techniques are widely encouraged in many enhanced recovery pathways as well as for opioid sparing postoperative analgesia. Indeed, paediatric epidurals are recommended as part of many Enhanced Recovery Programmes[2]. The NAP-3 project looked at all complications of neuraxial anaesthesia in the UK and reported that 21,500 central neuraxial blocks (CNB) are performed in children each year, of those were 18050 caudal epidurals and 3125 continuous lumbar or thoracic epidurals [3]. During the one-year study period, there were no cases of permanent harm and therefore the incidence of major complications, particularly permanent harm, following CNB in children appears to be very low. Similarly, the national paediatric audit carried out in 2007 showed comparably low rates of serious complications[4] further strengthening that epidurals in children are safe.

Despite the positive safety record which is comparable to that of the adult population, the number of epidurals performed in paediatric patients have declined significantly recently[5]. The reasons for this include the preferential use of minimally invasive surgical techniques and the use of peripheral nerve block techniques that avoid the requirement for a CNB. This means that staff may deskill and lose confidence in performing the technique, and ward staff may not be confident in managing these patients postoperatively[6].

Paediatric patients with pre-existing neurology who present for surgery pose a challenge to anaesthetists. These children often have complex comorbidities and would derive significant benefit from a CNB technique but concerns about the safety and post-operative management of a neuraxial block in this group may deter anaesthetists from inserting blocks that they would otherwise have performed[7].

There are concerns that children who have a pre-existing neuropathy are much more vulnerable to further nerve injury when exposed to an additional insult, and that the effects of the secondary injury may be of a far greater magnitude than would be expected if that same lesion was inflicted on a healthy nerve[8]. It is well documented from in vitro studies that all local anaesthetic agents have a degree of dose-dependent neurotoxicity[9]. It is therefore understandable that many anaesthetists choose to avoid CNB in children with a pre-existing neuropathy for fear of further exacerbating their condition, even with a perfectly performed and managed block.

Patients may present with neurological disorders with a variety of aetiologies, and it is important that anaesthetists are able to use a standardised framework to make informed risk-benefit decisions about the safety of a central neuraxial block for each individual child. Methods of monitoring an epidural block must be adapted for the developmental age of the child, and all staff should receive adequate training[1].

In our institution, we have experienced several cases where postoperative management of children with epidurals and pre-existing neurology has been challenging and has caused significant concern. When called to assess an epidural postoperatively, it is essential that the anaesthetist can quickly and accurately compare the current neurology to that of the pre-operative state. Among children with pre-existing neurology, it is challenging to assess how much of the neurology is related to the block, or whether there is a new nerve injury which may require urgent intervention. Without precise, detailed pre-operative documentation by anaesthetists, it is challenging to differentiate between pre-existing neurology and a new nerve injury, which may delay time-sensitive escalation and treatment.

It is essential that we are able to monitor the density, level and quality of an epidural block to maximise patient safety. Whilst the paediatric population poses unique challenges in terms of assessment of regional blockade, we call for a unified stance on the management of regional blocks in children with pre-existing neurology. An essential part of this framework should be to routinely assess and record the Bromage score for each limb before block insertion. The Bromage scale is a long established and very widely used tool for assessing motor block in the lower limbs [10]. However, since this scale was originally described in 1965, there have been many variations in its use and description. Studies of postoperative neuraxial block monitoring have shown concerning discrepancies between institutions in how blocks are monitored, and it is vital that we work to promote unified practice and implementation to aid clear communication about a block.

In conclusion: the use of epidurals in children is declining in frequency, which may mean that staff are less confident in managing epidurals and identifying complications. Early identification of any nerve injury or other complication caused by an epidural is essential and time critical. Children with pre-existing neurology are particularly vulnerable and it is vital that baseline function is meticulously documented to aid postoperative assessment and management. All paediatric anaesthetists should therefore meticulously document pre-operative neurology including baseline Bromage scores.

REFERENCES:

1. Royal College of Anaesthetists, Faculty of Pain Medicine, Royal College of Nursing, Association of Anaesthetists Great Britain and Ireland, Society of British Neurological Surgeons, Royal Pharmaceutical Society. Best Practice in the Management of Epidural Analgesia in the Hospital Setting [Internet]. 2020 Aug pp. 1–19. Available from: https://fpm.ac.uk/sites/fpm/files/documents/2020-09/Epidural-AUG-2020-FINAL.pdf.

2. Mangat S, Hance L, Ricketts KJ, Phillips MR, Mclean SE. The impact of an enhanced recovery perioperative pathway for pediatric pectus deformity repair. Pediatric surgery international. 2020;36(9):1035-1045. doi:10.1007/s00383-020-04695-z

3. Cook TM, Mihai R, Wildsmith JAW, Royal College of Anaesthetists Third National Audit Project Working Group. A national census of central neuraxial block in the UK: results of the snapshot phase of the Third National Audit Project of the Royal College of Anaesthetists. Anaesthesia. 2008;63(2):143-146. doi:10.1111/j.1365-2044.2007.05320.

4. Llewellyn N, Moriarty A. The national pediatric epidural audit. Paediatric anaesthesia. 2007;17(6):520-533. doi:10.1111/j.1460-9592.2007.02230.

5. Gupta A, Jay MA, Williams G. Evolving pediatric epidural practice: An institution's clinical experience over 20 years-A retrospective observational cohort study. Paediatric anaesthesia. 2020;30(1):25-33. doi:10.1111/pan.13767.

6. Moriarty A. Pediatric epidural analgesia (PEA). Paediatric anaesthesia. 2012;22(1):51-55. doi:10.1111/j.1460-9592.2011.03731.

7. Stephanie Cung, Matthew L. Ritz, Melissa M. Masaracchia. Regional anesthesia in pediatric patients with preexisting neurological disease. Paediatric Anaesthesia.2021;31(5) 522-530. https://doi.org/10.1111/pan.14152

8. Zahir KS, Zahir FS, Thomas JG, Dudrick SJ. The double-crush phenomenon--an unusual presentation and literature review. Connecticut medicine. 1999;63(9):535-538.

9. Werdehausen R, Fazeli S, Braun S, et al. Apoptosis induction by different local anaesthetics in a neuroblastoma cell line. British journal of anaesthesia. 2009;103(5):711-718. doi:10.1093/bja/aep236.

10. Bromage PR. A comparison of the hydrochloride and carbon dioxide salts of lidocaine and prilocaine in epidural analgesia. Acta anaesthesiologica Scandinavica Supplementum. 1965; 16:55-69. doi:10.1111/j.1399-6576. 1965.tb00523.

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