Skin-Epidural Distance in Paediatric Patients: An Audit.

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Introduction: At our hospital, an epidural catheter is inserted in paediatric patients undergoing lower limb surgery to provide intra-operative and post-operative analgesia. Recognised complications of epidural catheter insertion include the occurrence of a 'dural tap' and subarachnoid placement of the epidural catheter. Some studies have estimated the incidence of dural tap as up to 10%, depending on the experience of the anaesthetist, age of the patient, presence of spinal deformity, type of epidural needle and the loss of resistance technique used [1].
Dural puncture can lead to post dural puncture headache (PDPH). Fortunately this is a rare complication in children [2]; although there may be a failure to recognize the symptoms of PDPH in some paediatric patients.
After a spinal anaesthetic, the incidence of PDPH may be as high as 4-5%, with a 25-guage or a 27-guage needle [3]. Unrecognised dural tap with the epidural needle may also lead to subarachnoid placement of the epidural catheter, thereby leading to a 'total spinal' with disastrous consequences [4]. The best strategy in the management of PDPH or total spinal blockade is its prevention. This can be achieved by a skilled and experienced anaesthetist who is aware of the 'predictability' of the depth of the epidural space in children. Identification of the epidural space may be difficult in children because of softer ligaments, smaller epidural space and the procedure being carried out under general anaesthesia [4]. Several formulae have been described to estimate the distance from the skin to the epidural space. A well documented formula used for estimating the depth of the epidural space in a paediatric patient between the ages of approximately 6mths and 10 years old is follows: depth of space (mm) = wt. of patient (in kg) [5]. The aim of this audit was to estimate the correlation between weight of the patient (kg) and the skin-epidural space distance (mm) in our paediatric population.

Method: After approval from our Hospital Audit Department, we have conducted a retrospective audit of paediatric patients undergoing insertion of epidural catheter for lower limb procedures from February 2003 to March 2004 for a period of 13 months. The data collected included age, sex, weight, type of epidural needle, lumbar inter-space, depth of epidural space (skin-epidural distance) and the occurrence of any complications, as recorded by the anaesthetist. The results were analysed using Microsoft excel. Linear regression analysis was used to determine the correlation between the skin-epidural distance and the weight as well as the skin-epidural distance and the age.

Results: 33 patients were audited retrospectively for a period 13 months. There were 21 male and 12 female patients with a mean age of 120 months (SD 45.5; range 16 – 209 months). The mean weight was 30.9 kg (SD 12.8; range 10 – 61 kg). All the patients had epidural catheter insertion under general anaesthesia in the left lateral position. The epidural needle used was 18/19 G Tuohy needle. The 'loss of resistance' to saline technique was used, with continuous pressure whilst advancing the needle in all cases. The procedure was performed by the anaesthetic consultant or by a trainee under consultant supervision. The lumbar interspaces used were L2/3 and L3/4. None of the patients had any complications related to the procedure. The mean depth of the epidural space from the skin in the lumbar region was 30.9 mm (SD 10.45; range 15 – 50). A good correlation was seen between skin-epidural distance and both age and weight. The relationship between skin-epidural distance and body weight was given by the regression equation: skin-epidural distance = 0.59 weight (kg) +12.6, $R^2 = 0.53$, (fig 1). The relationship between skin-epidural distance and age was given by the regression equation: skin-epidural distance = 0.18 age (months) + 8.7, $R^2 = 0.64$ (fig 2)

Discussion: We conclude that there is a good correlation between patient weight(kg) and skin-epidural distance(mm) in children. Further research within various age groups is required to confirm this relationship. This predictability of the depth based on weight may help minimize the risk of dural tap in children.

References:

1. Dalens et al. Lumbar epidural anesthesia for operative and postoperative pain relief in infants and young children. Anesthesia and Analgesia 1986; 65: 87-90
2. Alexander Oliver. Dural punctures in children: What should we do? Paediatric Anaesthesia 2002; 12(6): 473
3. Kokki et al. Comparison of 25G and 29G Quincke spinal needles in paediatric day cases. Paed Anaesth 1996; 6:115-119
4. Rowney et al. Epidural and subarachnoid blockade in children. Anaesthesia1998; 53: 980-1001
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Figure 1, Depth(mm) vs weight (kg)

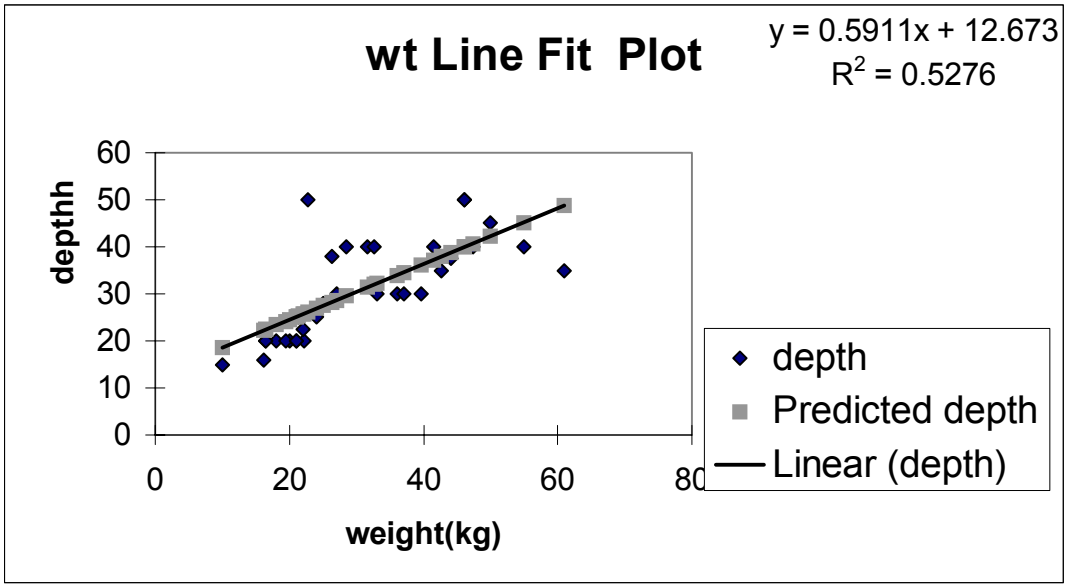

Figure 2, Depth (mm) vs Age (months)