

Acknowledgments

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Epidural catheter migration during labour

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Summary

A study was undertaken to determine the incidence, magnitude and direction of catheter migration in 100 patients who had epidural analgesia for pain relief in labour. Over 50% of catheters migrated from the original position at sitting. The relevance of this migration and the usefulness of its measurement are discussed.

Key words

Analgesia; obstetric.

Equipment; catheter, epidural.

Epidural analgesia for pain relief in labour has been available in this maternity unit for 10 years and we now have experience of over 10 000 cases. Approximately 60% of top-ups are given by specially trained midwifery sisters. Our midwife top-ups have been relatively problem-free but there always remains anxiety about the development of either a sub-arachnoid block or systemic toxicity from inadvertent intravascular injection of the local anaesthetic,^{1,2} due to migration of the epidural catheter. Migration of the

catheter out of the epidural space into the superficial tissues of the back or through an intervertebral foramen may also occur³ and lead to inadequate analgesia or complete failure. This frequently necessitates resiting the catheter.

We had not previously examined in detail catheter migration; the purpose of this study was to determine its incidence, magnitude and direction during labour and to see whether our management of epidural analgesia required modification.

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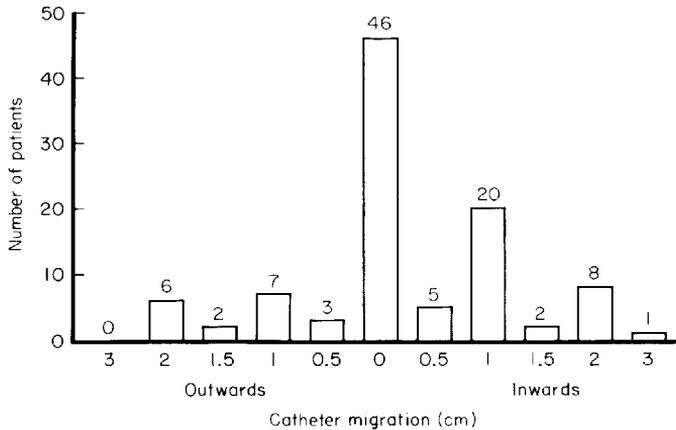


Fig. 1. Histogram showing range of catheter migration (cm).

Methods

The study was performed on 100 fit patients who requested epidural analgesia for labour. All epidural catheters were sited with the patient in the left lateral position. A record was made of the depth of the epidural space and of the length of catheter left in the space using the method outlined by Doughty.⁴ The number of centimetre markings on the catheter visible from where it emerged from the skin, was also recorded; allowance was made for any skin dimpling during insertion. This was designated the skin level.

Catheters were fixed to the patient's back according to the personal preference of the individual anaesthetist but, as in most units, this usually involved looping the catheter on the skin, applying gauze, plastic spray dressing and some form of adhesive dressing such as Sleek or Elastoplast. Top-ups were given to suit each patient and a record was kept of the effectiveness of the analgesia throughout labour. The midwives were asked to record the skin level again after delivery, prior to the removal of the catheter. Any migration of the catheter could therefore be quantified and assigned a positive value if it had moved in and a negative value if it had moved out.

Results

Of the 100 epidurals, 72 were inserted at the $L_{2/3}$ and 28 at the $L_{3/4}$ interspaces. The depth from the skin to the epidural space ranged from 3–8 cm, and 2–4 cm of catheter were left in the space. The range of catheter migration is shown in Fig. 1. In 46 patients the catheter had not moved from its position at siting; in 18 it had moved outwards and in 36, inwards.

There was no significant difference in the proportion of catheters that migrated in or out when sited at either $L_{2/3}$ or $L_{3/4}$. No correlation could be found between

the number of top-ups or duration of labour, and catheter migration. In none of the patients studied did the epidural cease to function because the catheter had migrated completely out of the epidural space. No correlation could be found between effectiveness of analgesia, unilateral blockade and catheter migration.

Discussion

Our experience of over 10 000 epidurals for pain relief in labour had mistakenly led us to expect that catheter migration would be in an outward direction. This was not found to be so. *Twice as many catheters migrated inwards.* This may be due to the gripping action of the ligamentum flavum which propels the catheter inwards as the patients deflex their back from the position adopted for the insertion or for other procedures. No correlation between catheter migration and analgesic effectiveness was found in this study, but significant catheter migration may occur which has a bearing on the course of epidural analgesia and its complications.

Two patients from the study are of interest. In one, where the catheter had migrated 2 cm inwards, a diagnosis of concealed dural tap was made after the occurrence of a spinal headache on the day following delivery.⁵ Fortunately, this patient delivered spontaneously about one hour after the first top-up (as always, performed by the anaesthetist) and, as she had an intact perineum, no top-up was required for suturing. In the second patient, blood had appeared in the catheter at the original siting but the catheter flushed clear when it was withdrawn to leave 2 cm in the epidural space. Subsequent top-ups were uneventful until a midwifery sister gave one prior to suture of the episiotomy. The patient immediately had signs and symptoms of an intravenous injection of local anaesthetic. When the catheter was removed, not only were the terminal 3–4 cm full of blood but it had migrated 2

cm inwards, presumably into an epidural vein. These cases, and experiences such as those of Boys and Norman⁶ and Park,⁷ illustrate that serious complications may arise following a previously normal course of epidural analgesia.

The results of this study provide a quantitative incidence of catheter migration. Closer attention to fixation is required and we would advise adoption of the technique described by Webster⁸ in obese patients and that the fixative dressing is not applied until the patient is in the position adopted for top-ups. We also plan to discontinue the use of a gauze swab at the lower end of the catheter and, instead, use a transparent adhesive dressing so that the skin level is always visible and can be inspected frequently. Should any inward migration take place, the anaesthetist should be called. We intend to modify our epidural charts to include the catheter skin level on removal, because this information may be useful in subsequent patient management.

Since 1976 we have used epidural catheters with three helical side holes. Our experiences with both the patients described here⁵ lead us to believe that end orifice catheters may be safer, since one will then be sure that all the local anaesthetic emerges from the tip of the catheter wherever it is situated; thus, assessment of the test dose and first top-up is made prognostically more valuable.

There is no room for complacency in the organisation of an epidural service. Attention to detail and house audits such as this study, are necessary for the continual safety of epidural analgesia.

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