

Repeat epidural analgesia and unilateral block

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The use of epidural analgesia has become so widespread in recent years that many women are now requesting repeat epidural analgesia for their second or subsequent labour. This study examines the incidence of problems at insertion and of inadequate block in 71 multiparae having second epidurals compared with 150 primiparae having their first epidural. Unilateral block occurred in 6.66% of primiparae and 18.3% of multiparae ($P < 0.02$). There was no association between difficulty of insertion of catheter, blood in needle/catheter or paraesthesia and unilateral blockade. Epidurals were inserted at a greater dilatation ($P < 0.05$) and there was a shorter time to delivery ($P < 0.01$) in the multiparous group. We conclude that unilateral block is thus more common in women receiving repeat epidurals.

Depuis quelques années, l'analgésie épidurale obstétricale connaît tellement de succès que plusieurs parturientes en refont la demande pour leur deuxième accouchement et les accouchements subséquents. Cette étude examine l'incidence des problèmes au moment de l'insertion du cathéter et l'insuffisance du bloc chez 71 multipares à la deuxième épidurale comparativement à 150 primipares à la première épidurale. Un bloc unilatéral survient chez 6,66% des primipares et chez 18,3% des multipares ($P < 0,02$). On ne trouve aucune relation entre la difficulté d'insertion du cathéter, la présence de sang dans l'aiguille ou la cathéter, une paresthésie et l'unilatéralité du bloc. Les épidurales sont insérées lorsque la dilatation est plus grande ($P < 0,05$) et le délai précédant l'accouchement est plus court ($P < 0,01$) dans le groupe des multipares. Nous concluons que le bloc unilatéral survient plus souvent chez les femmes qui reçoivent une deuxième épidurale.

Key words

ANAESTHESIA: obstetrical;
ANAESTHETIC TECHNIQUES: epidural, lumbar;
ANALGESIA: epidural;
COMPLICATIONS: unilateral block.

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Epidural analgesia is now the commonest method of providing pain relief during labour in many institutions. In our hospital 77% of primiparae and 55% of multiparae receive epidurals. With the increasing use of epidural analgesia many women are presenting in their second or third pregnancy requesting repeat epidural analgesia. The effect of previous epidural injection on performance and outcome of subsequent epidurals has not received much attention.¹

It was our impression that there was a higher incidence of unilateral blockade among women receiving their second epidural. We therefore initiated a prospective study to examine performance and outcome in women receiving their first versus second epidural.

Methods

Ethics Committee approval was not sought since there was no change from routine practice. Informed consent was obtained for performance of the epidural. The study was carried out in the obstetric suite. Patients were excluded if there was a language problem or if there was an obvious physical reason for difficult epidural performance e.g., scoliosis. There were no other selection criteria. The patient's demographic data, details of labour (gestation, cervical dilatation) and details of epidural insertion were recorded by the anaesthetist performing the epidural. The patient was asked to mark a visual analogue scale (VAS) before the epidural and 30 min after injection of local anaesthetic. The anaesthetist or nurse asked the patient to note the severity of her contraction pain on a 10 cm line.

A standard procedure was followed for epidural insertion and establishment of block. With the patient in the sitting position the midline approach was used with a 16-g Tuohy needle and the epidural space was identified by loss of resistance to air, as is our routine practice. Bupivacaine 0.25% plain, was given in three 4 ml increments at five-minute intervals, the first administered through the needle and then through the catheter with the patient positioned on the right and then the left side. Multiorifice catheters were inserted to a standard 8 cm depth. At the time of insertion of the catheter the patient was asked to report any pain or tingling experienced. The operator recorded the ease of insertion of the catheter

TABLE I Demographic data

		Age (yr)	Weight (kg)	Height (cm)	Gestational age (wk)	Cervical* dilatation (cm)	Labour† duration (min)	VAS‡	
								0	30 min
Primiparae n = 150	mean SD	26.6 ± 7.1	74.4 ± 11.0	63.8 ± 5.8	38.9 ± 5.8	3.2 ± 1.8	374 ± 250	6.8 ± 2.2	1.6 ± 2.2
Multiparae n = 71	mean SD	30.4 ± 7.4	71.8 ± 18.8	64.5 ± 2.3	37.3 ± 9.3	3.4 ± 1.8	218 ± 151	6.2 ± 2.4	2.4 ± 2.6

*At time of epidural insertion.

†From epidural insertion to delivery.

‡Visual analogue scales.

TABLE II Results

	Total	Unilateral block (%)	Persistent unilateral block (%)
Primiparae	150	10 (6.7)	6 (4.0)
Multiparae	71	13 (18.3)*	4 (5.6)

* $P < 0.02$.

(difficult or easy) and the occurrence of blood in needle or catheter. Epidurals were performed by staff anaesthetists or fellows.

At 30 min after injection of bupivacaine, the second VAS was completed and the level of blockade checked by cold sensation. If an inadequate level was noted (less than T_{10}), the pain score remained high or increased, or the patient complained of poor pain relief she was asked to describe the site and type of pain experienced. A unilateral block was defined as the description by the patient of worse pain on one side than the other, or pain on one side only, combined with either a 30-min pain score minimally changed or increased from time zero or a low level of blockade on the painful side, or both. If unilateral or inadequate block occurred the catheter was withdrawn 0.5–2 cm and a further 4 ml bupivacaine 0.25% were administered with the patient lying on the unblocked side. If the block was still inadequate epidural fentanyl 50 µg was given or the catheter was removed and a second epidural catheter inserted in another interspace.

The number of repeat injections of bupivacaine and length of time between epidural insertion and delivery were noted, as were details of previous epidurals in the multiparous women. Statistical analysis was by paired Student's *t* test for demographic data and chi-squared analysis.

Results

Two hundred and twenty-one women were studied, 150 were primiparae having their first epidural and 71 had received epidural analgesia or anaesthesia during a previous pregnancy. The two groups were comparable with

respect to weight and height (Table I). The multiparae were, predictably, older than the primiparae and had greater cervical dilatation at epidural insertion. Time between epidural insertion and delivery was also shorter in the multiparae. There were 22 Caesarean sections in the primiparae compared with two in the multiparae.

Ten primiparae fulfilled the criteria for unilateral block (6.7%) as did 13 multiparae (18.3%) ($P < 0.02$) (Table II). There was no difference between the groups when comparing those women who had persistent unilateral block, that is, pain not relieved by further bupivacaine, fentanyl or adjusting the epidural catheter. Of those multiparae who experienced unilateral block five (38.5% reported having had a previous unilateral block.

There were no differences between the groups with respect to paraesthesia, difficulty of catheter insertion or blood appearing in the catheter. There were no dural taps during the study.

Discussion

Unilateral epidural blockade is a well recognized phenomenon, occurring in between 5%² and 21%³ of epidural blocks. Persistent unilateral blockade is reported in 0.5%⁴–2%². Bray and Carrie compared the efficacy of first with second epidurals,⁵ finding no difference between women receiving their first or subsequent epidurals for labour. More recently Narchi *et al.*⁶ reported a unilateral block rate of 16% in repeat epidural analgesia against 7% in women receiving first epidurals. However, in the earlier series⁵ the assessment of block was only performed after further local anaesthesia was administered in the case of inadequate block at 30 min. In the later series the assessment was retrospective by means of a questionnaire administered in the post-partum period and the incidence of persistent unilateral block was not recorded. We examined the patients at 30 min and then noted the effect of further local anaesthesia or catheter repositioning. This may explain the much higher incidence of unilateral block in our series. Our incidence of persistent unilateral block in the two groups was 4.0% and 5.6% respectively, compared with 1.34% and 1% in the earlier study.⁵ These authors also described a 13%

incidence of persistent unilateral block in women who had had previous lumbar *and* caudal epidurals.

Repeat epidural analgesia has been associated with a higher failure rate when used for lithotripsy. Korbon *et al.*¹ reported an increased proportion of failed blocks as the number of previous epidurals for lithotripsy increased. The greater failure rate, as defined by the need to use general or spinal anaesthesia, was associated with more reports of pain on injection and with aspiration of bloody local anaesthetic solution from needle or catheter, a finding which we did not corroborate. No comment was made as to the precise level of block or incidence of unilateral block. The authors postulated that epidural tissue damage may have been caused by the impact of the lithotripter shock wave on the air-fluid interface created by the loss-of-resistance to air technique utilised for epidural space localisation.

A median connective tissue band, which may act as a barrier to bilateral spread of local anaesthetic, has been demonstrated by several methods. In autopsy specimens resin injection studies have disagreed as to the consistent presence of a dorso-median fold.^{7,8} Epiduroscopy has provided another method of examination in cadavers, demonstrating a dorso-median fold in all 48 cases studied.⁹ Epidurography with computed tomography has allowed the investigation of a dorso-median fold in living subjects¹⁰ and has also confirmed its presence in 100% of subjects with 76% having sufficient midline tissue to be a potential impediment to catheter passage. This figure is obviously grossly out of proportion to the clinical problem, suggesting that local anaesthetic must diffuse through the connective tissue bands.

Barriers to spread of local anaesthetics may be acquired as well as congenital. It has been postulated that fibrous adhesions may form in the epidural space following the passage of an epidural catheter, due to local irritation. There has been one case report of blood and granulation tissue in the epidural space at autopsy following prolonged morphine infusion via an epidural catheter.¹¹

Epidural blood patching presumably works by causing a localised fibrosis in the epidural space and might be expected to affect subsequent local anaesthetic spread. Selwyn Crawford reported an incidence of two cases of inadequate block (one unilateral block, one missed segment) in 17 women who received epidural analgesia after a blood patch.¹² In a further woman the sensory level could not be extended above T₁₀ for Caesarean section. A similar case has been reported with failure of block to spread above L₂ following a blood patch performed at L_{1/2} three years previously.¹³ A retrospective analysis of the effects of dural puncture with and without blood patch on subsequent epidural blockade found success

rates of 90% for women having epidural analgesia following a previous uncomplicated epidural, 65% in those who had experienced a previous dural puncture and 59% in those who received a blood patch following a dural puncture.¹⁴

A retrospective study of 3011 epidurals found a strong positive correlation between incidence of unilateral blockade and distance between the skin and the epidural space.¹⁵ The incidence of unsatisfactory block was over 40% when the distance between skin and epidural space was greater than 6 cm. It was proposed that unilateral block is a function of lateral catheter placement following deviation of the Tuohy needle tip from the midline. The distance between the skin and the epidural space was not noted in our study; however, since there was no difference between the two groups with respect to weight (which has been shown to correlate directly with skin to epidural space distance¹⁶), this factor is unlikely to have been responsible for the difference in unilateral blockade.

The conclusion of our study is that there is a higher incidence of unilateral block amongst women receiving second epidurals for labour. However, the unilateral block is amenable to treatment in the form of additional local anaesthetic, fentanyl or a combination of these with adjustment of the catheter, in all but 4–6% of cases. Further investigation of this problem could be achieved by the study of a group of multiparae receiving their first epidural analgesia, a group difficult to find in our practice where the epidural rate is very high in primiparae. The role of the epidural catheter could be evaluated by injecting the initial 12 ml dose through the needle prior to catheter insertion.

References

- 1 Korbon GA, Lynch C, Arnold WP, Ross WT, Hudson SB. Repeated epidural anesthesia for extracorporeal shock-wave lithotripsy is unreliable. *Anaesth Analg* 1987; 66: 669–72.
- 2 Moir DD, Slater PJ, Thorburn J, McLaren R, Moore J. Extradural analgesia in obstetrics: a controlled trial of carbonated lignocaine and bupivacaine hydrochloride with or without adrenaline. *Br J Anaesth* 1976; 48: 129–35.
- 3 Caseby NG. Epidural analgesia for surgical induction of labour. *Br J Anaesth* 1974; 46: 747–50.
- 4 Ducrow M. The occurrence of unblocked segments during continuous lumbar epidural analgesia for pain relief in labour. *Br J Anaesth* 1971; 43: 1172–4.
- 5 Bray MN, Carrie LES. Unblocked segments in obstetric epidural blocks. *Anaesthesia* 1978; 33: 232–4.
- 6 Narchi P, Hamza J, Jullien P, Lecoq G. Is repeated epidural anesthesia reliable in obstetric patients? *Anesthesiology* 1990; 73: A954.

- 7 *Husemeyer RP, White DC.* Topography of the lumbar epidural space. *Anaesthesia* 1980; 35: 7–11.
- 8 *Harrison GR, Parkin IG, Shah JL.* Resin injection studies of the lumbar extradural space. *Br J Anaesth* 1985; 57: 333–6.
- 9 *Blomberg R.* The dorso-median connective tissue band in the lumbar epidural space of humans: an anatomical study using epiduroscopy in autopsy cases. *Anesth Analg* 1986; 65: 747–52.
- 10 *Savolaine ER, Pandya JB, Greenblatt SH, Conover SR.* Anatomy of the human lumbar epidural space: new insights using CT-epidurography. *Anesthesiology* 1988; 68: 217–20.
- 11 *Carl P, Crawford M, Raulo O.* Postmortem findings after long-term treatment of pain via an epidural catheter. *Ugeskr Laeger* 1983; 145: 4001.
- 12 *Selwyn Crawford J.* Epidural blood patch (Letter). *Anaesthesia* 1985; 40: 381.
- 13 *Rainbird A, Pfitzner J.* Restricted spread of analgesia following epidural blood patch. *Anaesthesia* 1983; 38: 481–4.
- 14 *Ong BY, Graham CR, Ringaert KRA, Cohen MM, Palahniuk RJ.* Impaired epidural analgesia after dural puncture with and without subsequent blood patch. *Anesth Analg* 1990; 70: 76–9.
- 15 *Narang VPS, Linter SPK.* Failure of extradural blockade in obstetrics. A new hypothesis. *Br J Anaesth* 1988; 60: 402–4.
- 16 *Palmer SK, Abram SE, Maitra AM, Von Coldite JH.* Distance from skin to the lumbar epidural space in an obstetric population. *Anesth Analg* 1983; 62: 944–6.