POSTURE AND THE SPREAD OF EXTRADURAL ANALGESIA IN LABOUR

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SUMMARY

Thirty-five patients kept in a sitting position for 5 min after a standard extradural injection in labour were compared with 54 patients maintained in the left lateral position throughout. The mean upper limit of analgesia was unchanged. A significant shift of the mean lower limit occurred in the sitting patients (P = 0.05, two-tailed), but contrary to classical teaching this was in a cephalad direction. Successful sacral blockade (analgesia at S234) and asymmetry of blockade occurred in a similar proportion of each group. It was concluded that the sitting position conferred no clinical advantage to patients receiving extradural analgesia in labour.

The sitting position may be used as part of an extradural technique designed to ensure adequate anaesthesia for Caesarean section (Thorburn and Moir, 1980). In addition, its use during "top-ups" of lumbar extradural analgesia to obtain perineal anaesthesia in the second stage of labour is common. However, we have found that the manoeuvre may cause discomfort and distress to some patients when in strong labour. Studies of its value are few, and somewhat conflicting in their conclusions (Bromage, 1962; Burn, Guyer and Langdon, 1973; Datta et al., 1979; Hodgkinson and Husain, 1981). The present prospective study compares the outcome of maintaining the left lateral position throughout with patients sitting up during, and for 5 min after, a standard extradural injection in labour.

PATIENTS AND METHODS

Patients in labour undergoing routine extradural blockade were allocated by hospital number to one of two groups. Fluid administration, safety precautions and asepsis followed each anaesthetist's routine but certain aspects of technique were standardized. A 16-gauge Tuohy needle was inserted through the midline between the spines of L3 and L4 and the extradural space identified by loss of resistance to the injection of 2 ml of saline. With the bevel of the needle cephalad a Teflon catheter was inserted 20 mm into the extradural space, where it was secured (after withdrawal of the needle).

In group 1 (even numbers) patients sat with their legs over the bed and their feet on a stool during, and for 5 min after, injection, and then assumed the left lateral horizontal position. In group 2 (odd numbers) the left lateral position was maintained throughout the procedure. In all patients a standard dose of 0.5% bupivacaine (plain) 8 ml was injected slowly through the catheter. Ethyl chloride spray was used to test for anaesthesia to cold after 15 min, bilaterally, at every dermatome from S5 to T4 inclusive, following charts adapted by Bromage from Hansen and Schliack (Bromage, 1978).

RESULTS

There were 35 patients in group 1 (sitting) and 54 patients in group 2 (left lateral horizontal). Spinal segments were numbered upward from S5 (S5 = 1, S4 = 2 ...).

Histograms showing the distribution of patients in each treatment group with given numbers of symmetrically blocked spinal segments are shown in figure 1. This represents the extent of clinically successful blockade. An overall two-sample test for a difference in the number of segments blocked between patients in the two groups provided a significance level of 8.6% (two-tailed). In group 1 7.1 ± 4.5 (mean ± SD: range 0–15) spinal segments (35 patients) were blocked, while in group 2 8.8 ± 4.5 (range 0–17) spinal segments (54 patients) were blocked. Thus, the mean extent of clinically useful blockade was 1.7 spinal segments narrower in sitting patients and this difference was weakly significant (P = 0.086, two-tailed).

Histograms showing the distribution of patients

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with given upper and lower levels of symmetrical blockade are shown for the two treatment groups in figures 2 and 3. Patients with no block or completely one-sided blocks have been omitted. Among those patients with at least some extent of symmetrical blockade, there was no difference between the two groups in the upper level of blockade; this level was 13 ± 1.0 (SD) (equivalent to T10) spinal segments in group 1 (30 patients) and 13 ± 1.5 spinal segments in group 2 (48 patients). However, an obvious trend towards a more cephalad lower limit of block was shown for the group of sitting patients. The lower level in this group was (mean ± SD) 5.6 ± 3.5 spinal segments (30 patients) while in group 2 it was 4.1 ± 3.1 spinal segments (48 patients). Students’ t test and Wilcoxon’s rank sum test showed the difference to be significant at the 5% level (P = 0.05; two-tailed). Thus, the trend towards a narrower extent of blockade in the sitting patients was not explained by a change in the upper limit of block, which remained at T10, but rather by an upward shift in the lower limit of block, from S2 to almost L5 (the observed difference between the means being 1.5 segments).

Although this difference was further reflected in an increase in the proportion of patients in group 2 having some segments blocked in the important S2-3 region, there was no difference in the proportion having all 3 of these segments blocked (29% group 1, 30% group 2). The proportion of subjects with blocks asymmetrical by 2 or more segments at either end was 40% for group 1 and 34% for group 2. Of the 16 asymmetrical blocks in group 2 the dependent side (left) was favoured in 12 patients (75%), while of the 14 asymmetrical blocks in group 1 the side which became dependent after 5 min (left) was favoured in 11 patients (79%). This difference between groups was not significant.

Two patients in group 1 and three in group 2 had totally unilateral blocks. Three patients in each
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Fig. 3. Lower limits of extradural block 15 min after 8 ml of 0.5% bupivacaine.

group had no detectable block at all after 15 min. Missed segments, unblocked with blockade present above and below, were present in one patient in group 1 and five patients in group 2, an overall rate of 6.7%. In each instance the missed segment included the S1 dermatome.

An attempt was made to relate the number of segments blocked to the variables such as age, race, weight, height and number of previous births using multiple linear regressions on the pooled results, but no significant predictors emerged.

DISCUSSION

It is widely held that the effect of gravity may be utilized to influence the spread of extradural blockade, both for Caesarean section (Crawford, 1980; Thorburn and Moir, 1980) and during labour (Bromage, 1978). Our results, however, suggest that the sitting position conferred no advantage to patients either in regard to blockade of sacral nerves or in regard to the frequency with which asymmetrical blockade occurred. On the contrary, this position actually appeared to limit caudal spread.

It has now been well established that the lateral position favours the spread of analgesia to the dependent side both in non-pregnant (Grundy, Rao and Winnie, 1978; Apostolou, Zarmakoupis and Mastrokostopoulos, 1981) and pregnant (Husemeyer and White, 1980a) patients. Our results confirm this trend but we would agree with the suggestion that the influence is of insufficient magnitude to be important clinically (Datta et al., 1979; Apostolou, Zarmakoupis and Mastrokostopoulos, 1981). The majority (66%) of our left lateral patients had blockade within a dermatome of complete symmetry. Marked asymmetry of blockade may be caused by factors other than gravity, such as catheter placement (Usubiaga, Reis and Usubiaga, 1970) or topographical abnormalities of the extradural space (Husemeyer and White, 1980b). This is borne out by the observation that in four of 16 blocks in which asymmetry exceeded 2 spinal segments at either end (and one of three that were totally unilateral) spread actually favoured the non-dependent side.

It is generally considered that the sitting position tends to limit cephalo-caudal spread of extradural blockade (Bromage, 1962), and our results are in agreement with this. The lack of influence on the cephalad limit of spread has been previously shown (in non-obese patients undergoing Caesarean section) by Hodgkinson and Husain (1981). However the dose used in this study (20 ml of 0.75% bupivacaine) would have produced blockade reaching S5 in almost all patients. We are not aware of a previous study considering the influence of the vertical position on the caudal limit of extradural block using a standard dose of a magnitude appropriate for analgesia in labour. Although our results show a statistically significant alteration in the mean limit of this caudal spread, the magnitude (1.5 spinal segments) is not great and we would emphasize that no difference occurred between the two groups in the frequency with which all three of the important S234 segments were blocked.

The mechanism of extradural analgesia is complex (Bromage, 1978) and factors influencing its spread are likely to be multiple. The gradient of
extradural injection pressures from a positive lumbar to a negative thoracic pressure is greater when vertical than horizontal (Bromage, 1978). A correlation between extradural pressure and spread (Usubiaga, Wikinski and Usubiaga, 1967) might explain our findings, but such a correlation has been disputed (Husemeyer and White, 1980a). Furthermore, the study of Burn, Guyer and Langdon (1973) suggests that the physical spread of solution in the extradural space may bear little relationship to the extent of clinically observed analgesia and that this clinically observed spread must be ascribed to factors other than gravity. Capillary spread may be such a factor.

A number of methodological considerations require comment. Wugmeister and Hehre (1967) showed a close correlation between anaesthesia to cold and pinprick for extradural (in contrast to spinal) blockade and we have found this a most useful and reliable method of assessment. To conform more closely to clinical practice in labour we have injected through catheters rather than needles, but we have tried to minimize the influence of placement by restricting the intra-extradural length to 2 cm (Zaaijman and Slabber, 1979). We have studied the outcome of an initial dose only, but agree with Bromage (1962) that subsequent doses are likely to be even less influenced by gravity. The assessment of analgesia at 15 min was a compromise between providing time for the block to stabilize and the need to supplement within an acceptable period those blocks which were obviously unsatisfactory. It may take 30 min or more to assess the full spread of 0.5% bupivacaine (Galindo et al., 1978), but the onset time to first painless contraction is much shorter, and has been reported as 9 min (Littlewood et al., 1977). In lieu of a test dose we have injected solutions slowly, but as the rate of injection does not appear to influence spread of analgesia in pregnancy (Husemeyer and White, 1980a) we have not standardized this variable. Finally, our failure to correlate age or height with spread in our pooled results agrees with previous findings in pregnancy (Hodgkinson and Husain, 1980).

In conclusion, our results suggest that posture is likely to have little influence on the spread of extradural analgesia in labour. In view of its simplicity and safety we now use the left lateral position for all doses including those “top-ups” intended to produce sacral blockade for the second stage of labour.

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REFERENCES


POSTURE ET EXTENSION DU BLOC PÉRIDURAL AU COURS DU TRAVAIL

RESUME
Trente cinq patientes maintenues en position assise pendant 5 min après une injection péridurale standard, au cours du travail, ont été comparées à 54 patientes maintenues en décubitus latéral gauche tout le temps. La limite supérieure moyenne de l’analgésie est restée la même. Un déplacement significatif de la limite inférieure moyenne est survenu chez les patientes en position assise (P<0,05) mais à l’inverse des notions classiques, ce déplacement se faisait vers le haut. Le succès du bloc sacré (analgésie en S2, S3, S4) et l’asymétrie du bloc étaient aussi fréquents dans un groupe que dans l’autre. Nous en concluons que la mise en position assise n’apporte pas d’avantages cliniques aux patientes recevant une analgésie péridurale au cours du travail.

KÖRPERSTELLUNG UND AUSBREITUNG DER PERIDURALANALGESIE IN DER GEBURTSHILFE

ZUSAMMENFASSUNG
Drei und dreissig Patientinnen, die nach einer periduralen Injektion während der Wehen für 5 Minuten in sitzender Position belassen wurden, wurden mit 54 Patientinnen verglichen, die dauernd in linker Seitenlage waren. Die durchschnittliche Obergrenze der Analgesie war gleich. Eine signifikante Verschiebung der mittleren Untergrenze trat bei den sitzenden Patientinnen ein (P=0,05, zweiseitig), im Gegensatz zur klassischen Meinung jedoch kopfwärts. Erfolgreiche Sakralblockade (Analgesie bei S2,3,4) und Asymmetrie der Blockade wurden bei beiden Gruppen im gleichen Verhältnis beobachtet. Es wurde gefolgt, daß die sitzenden Patientinnen, die während der Wehen eine Periduralanästhesie erhalten, keine klinischen Vorteile bieten.

POSTURA Y DIFUSION DE LA ANALGESIA EXTRADURAL EN EL PARTO

SUMARIO
Se llevó a cabo una comparación entre 35 pacientes mantenidas en postura sentada durante 5 min después de una inyección normal extradural durante el parto con 54 pacientes mantenidas en postura lateral izquierda todo el tiempo. El límite superior promedio de analgesía se mantuvo sin cambio. Ocurre un cambio significativo del límite inferior promedio en las pacientes sentadas (P=0,05, ambos lados), pero contrario a la enseñanza clásica, esto era en un sentido cefálico. Ocurred en una proporción similar en ambos grupos el bloqueo sacro exitoso (analgesia al S234) y la asimetría del bloqueo. Se concluyó que la postura sentada no confirió ninguna ventaja clínica a las pacientes que recibían una analgesia extradural durante el parto.