SELECTIVE EPIDURAL ANALGESIA AND THE FORCEPS RATE

BY

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SUMMARY

Epidural block for the relief of pain in normal labour still remains a relatively uncommon practice in this country. One of the reasons for its lukewarm acceptance may be the belief that its use commits the mother almost invariably to a forceps delivery. Records of over 800 deliveries attended by the writer from 1957 to 1969 show that, while the use of selective epidural analgesia has increased over the years, the frequency of forceps delivery has decreased. It is suggested that epidural block need be less of a cause of a high forceps rate than hitherto believed provided that: (1) the technique is employed in normal as well as in abnormal labours; (2) the strength of uterine contraction is augmented if necessary by an oxytocin infusion; (3) a selective technique is used involving minimal doses of local anaesthetic directed at the nerve pathways by which the mother is feeling pain at the time of injection; (4) the attending obstetrician is willing to allow the mother time and opportunity to deliver herself without unduly hasty intervention.

"British obstetric opinion is generally in favour of encouraging spontaneous delivery where this can safely be achieved and most spontaneous deliveries are conducted by midwives in hospital and at home. Epidural analgesia, because it produces perineal anaesthesia and so abolishes the reflex expulsive efforts of the second stage of labour, is usually associated with a high forceps delivery rate" (Moir and Willocks, 1967).

The purpose of this paper is to challenge the belief that epidural analgesia is necessarily associated with a high rate of forceps delivery. During the past 12 years the writer has been invited to attend as anaesthetist at over 800 confinements. The majority of the labours were personally managed by obstetricians but the series includes some mothers delivered by midwives. Most of the labours were induced by amniotomy followed by an oxytocic infusion maintained throughout labour until delivery. Those whose labour started spontaneously were given an oxytocic infusion if the intensity of the contractions appeared to diminish during the course of labour. The practice of artificial stimulation of labour under caudal block is endorsed by Stallworthy (1969).

ANATOMICAL CONSIDERATIONS AND ANAESTHETIC TECHNIQUE

The object of selective epidural analgesia is to block only those nerve pathways by which the mother is feeling pain at the time of administration. Pain in labour can be regarded as being of uterine and perineal origin (Bromage, 1961). Uterine pain is transmitted by pathways entering the spinal cord at the 11th and 12th dorsal segments. Perineal pain, which is felt only in the latter part of labour, is transmitted through the pelvic somatic nerves to the 2nd, 3rd and 4th sacral segments, which also provide the motor supply to the muscles of the pelvic floor.

Pain throughout the major part of labour can be relieved solely by blocking the nervous pathways carrying uterine pain. A dose of 7 ml 0.5 per cent bupivacaine with or without adrenaline injected at the 2nd–3rd lumbar interspace with the patient lying horizontally will spread upwards to affect the 11th and 12th dorsal segments. A cannula is introduced into the epidural space through the Tuohy needle so that supplementary doses of bupivacaine may be given when the effect of the previous injection has worn off. The “top-up” dose given is equal to the initial dose unless a reduction is indicated by undue hypotension or a spread of skin analgesia above the level of the umbilicus.

Late in the first stage of labour, or sometimes not until the head has descended in the second stage, there is an awareness of pressure on the rectum or on the pelvic floor. In many cases, provided the uterine pain is abolished, this sensation is well tolerated and the child may be born without distress to the mother. If the sensation of pelvic floor pressure becomes painful perineal analgesia is achieved by injecting 10 ml bupivacaine through the cannula with the patient sitting up. This was needed in only 19 per cent of labours ending in spontaneous delivery. In many labours, particularly after one or two "top-ups" in the horizontal position, there is a fortuitous spread of partial analgesia to the perineum so that a formal perineal block may not be required.

The advantages of avoiding a perineal block are that the tone of the muscles of the pelvic floor is not abolished, the normal mechanism of labour is preserved and the mother retains the sensation of the infant’s head in the vagina thus enabling her to preserve a sense of direction for her expulsive efforts. With non-selective epidural analgesia the nerve supply to the pelvic floor is blocked unnecessarily early in labour, the perineal muscles relax, the head may fail to rotate and the mother finds difficulty in directing her efforts to push in concert with the uterine contractions. Other advantages of limiting the dose of the local anaesthetic agent include the reduction in the severity of toxic side-effects, the reduced frequency of serious hypotension and the retention of motor power in the legs. In the rare event of an inadvertent subarachnoid injection, recovery from the effects of a small dose would be more rapid than from a larger one (Doughty, 1969).

**COMPARISON OF EPIDURAL TECHNIQUE WITH THAT DESCRIBED BY OTHER AUTHORS**

The method used in this series is similar to that described by Bromage (1961) who was also concerned with avoiding the premature blockage of the sacral roots. Bromage, however, divided the induction dose of 7 ml of local anaesthetic solution, giving half through the Tuohy needle with the patient on her side and the other half through the cannula when the mother had been turned on to her back. This was done to avoid unilateral block due to the pooling of the local anaesthetic on the dependent side. In this series the total initial dose was injected with the patient on her left side and the mother turned supine as quickly as possible after the introduction of the cannula. Unilateral block was noted in 22 per cent of cases and paradoxically not always on the left side. If pain relief was not complete after 15 minutes a further 3 ml was injected through the cannula with the patient turned to the side on which pain persisted. It has also been noted that bilateral relief of labour pain may be associated with unilateral loss of sensation to pin-prick.

Duthie, Wyman and Lewis (1968) aimed to achieve a block extending from the 11th dorsal to the 4th sacral segments for the duration of the epidural. The dose used was 10–15 ml 0.5 per cent bupivacaine with adrenaline or 15–20 ml 0.25 per cent bupivacaine with adrenaline. Only two out of thirty patients delivered spontaneously. Both these mothers had expressed the desire to avoid a forceps delivery and the analgesia had been allowed to wane after full dilatation of the cervix in order to comply with their wishes.

Moir and Willocks (1967) in treating the pain associated with inco-ordinate uterine action by continuous epidural analgesia gave 6–9 ml 2 per cent lignocaine with adrenaline with the patient in the sitting position. In the writer’s experience an epidural injection given in the horizontal position will usually relieve even severe sacral back-ache without any specific attempt being made to direct the solution caudally.

Caudal epidural analgesia (Meehan, 1969) is the very antithesis of selective. The sacral roots are inevitably affected by the local anaesthetic in its passage up the epidural space long before their blockade would be justified by the mother’s pain. Nevertheless, “the increase in the incidence of assisted delivery is a small price to pay for the benefits received” (Stallworthy, 1969).

**RESULTS**

Records were kept of the simple fact of whether the patients were delivered by forceps or were delivered spontaneously. Excluded from the series were those labours in which the presentation was other than by the vertex, and those in which the epidural was requested when operative delivery was considered inevitable. Six patients initially...
TABLE I
Increase in use of epidural analgesia over the past 12 years.

<table>
<thead>
<tr>
<th>Years</th>
<th>Cases attended</th>
<th>Epidurals given</th>
</tr>
</thead>
<tbody>
<tr>
<td>1957-62</td>
<td>197</td>
<td>4 (2%)</td>
</tr>
<tr>
<td>1963-65</td>
<td>172</td>
<td>63 (37%)</td>
</tr>
<tr>
<td>1966-69</td>
<td>425</td>
<td>348 (82%)</td>
</tr>
</tbody>
</table>

given an epidural for labour pain were ultimately delivered by Caesarean section.

The writer's experience of giving epidural block by the technique described dates from 1957. Table I shows the increasing frequency with which the method has been used. In 1957-62 an epidural was given in only 4 out of 197 labours. In 1963-65 it was given fairly readily but only when the simpler analgesic methods had failed, while from 1966 up to the present time epidural block has been used as the elective method of analgesia being offered to any mother who would accept it.

Table II shows that the overall forceps rate has diminished from 35 per cent in 1957-62 to 21 per cent in 1966-69 despite a rise in the "epidural rate" from 2 to 82 per cent and the increase in the proportion of primiparae from 31 per cent in 1957-62 to 41 per cent in 1966-69.

The epidural/forceps rate denotes the frequency of instrumental delivery in those patients given an epidural. Of the four such patients in 1957-62 all were delivered by forceps. In 1963-65 when 37 per cent of mothers had an epidural, 75 per cent of these were delivered by forceps, while in 1966-69 when epidurals were given in 82 per cent of labours, the forceps rate for these patients had fallen to 24 per cent.

It therefore seems unlikely that selective epidural analgesia could be indicted as a major cause of a high forceps rate. Indeed, one might expect that by removing maternal distress the forceps rate should be reduced. The higher forceps rate occurred when the method was used comparatively infrequently and a lower forceps rate was achieved when epidurals were given in a high proportion of normal labours.

Parity and the forceps rate.

Tables III and IV show the figures in table II sub-divided according to parity. For comparison with general hospital practice it is worth noting that the forceps rate for primiparae in Kingston Hospital is 26 per cent and for multiparae 9 per cent.

In primiparae (table III) the "epidural rate" rose from 3 per cent in 1957-62 to 87 per cent...
in 1966–69 while the forceps rate fell from 57 to 37 per cent. The epidural/forceps rate decreased with the more frequent use of the method over the years and in 1966–69 was 42 per cent.

The forceps rate in primiparae is high when compared with 26 per cent in a general hospital. To some extent this may be explained by the fact that the average age of primiparae in this series receiving epidural analgesia was 26.2 years with one-fifth of them over the age of 30. The mean age of those delivering spontaneously was 24.8 and of those delivered by forceps 27.5 years ($t = 2.41, P < 0.02$). It is reasonable to suggest that a lower forceps rate might have been expected if the age distribution in this series had been more typical of the general run of primiparae.

In multiparae (table IV) the figures again show the diminution in the forceps rate with the increased use of epidural analgesia. As expected, these figures show a much lower forceps rate when compared with the corresponding figures for primiparae in table III. The forceps rate of 10 per cent in multiparae for 1966–69 approximates very closely to the 9 per cent obtained in general hospital practice.

**DISCUSSION**

It is generally accepted that the indications for epidural analgesia include inco-ordinate uterine action, primary uterine dystocia, persistent occipito-posterior position, severe pre-eclamptic toxaemia and severe maternal distress unrelieved by other means (after Meehan, 1969). If the practice of the technique is restricted solely to these circumstances it is not surprising that epidural analgesia is associated with a low frequency of spontaneous delivery.

The only field in which epidural block appears to be practised extensively in normal labour is where the confinement is personally managed by the obstetrician. Here there may be a strong tendency to deliver electively by forceps. Reporting a spontaneous delivery rate of only 8.9 per cent in a series of 214 epidural labours, de Vere (1969) suggested that low outlet forceps and episiotomy may be less traumatic than the gradual stretching of the pelvic floor over a period of hours. However, this author stated: "Recently the number of spontaneous deliveries has increased as a result of a conscious effort to avoid the temptation to low forceps as a routine procedure". Thus, it is reasonable to believe that epidural analgesia may be commonly associated with a high forceps rate rather than necessarily being a cause of it.

It must be emphasized that the conclusions derived from the series described in this paper are based mainly on obstetrician-managed labours. Nevertheless the obstetricians concerned have been prepared in most cases to allow the mother to deliver spontaneously if at all reasonable. While the patients involved may be thought to belong to a highly selected group it was only this group that afforded the opportunity of applying epidural analgesia in a high proportion of normal labours. In general hospital practice opinion is against the routine use of epidural analgesia in normal labour (Bromage, 1961; Peel and Galley, 1964; Moir and Willocks, 1967).

There is a growing awareness of the inadequacy of the established methods of analgesia in normal labour (Beazley et al., 1967). While the belief persists that epidural analgesia invariably commits the patient to a forceps delivery it is not surprising that hospital obstetricians see in it a source of increased pressure of work and midwives a cause of deprivation of the opportunity to practise their art and train their pupils. The wider acceptance of selective lumbar epidural analgesia could meet some of their objections and encourage more effective pain relief than hitherto available in general hospital practice.

**ACKNOWLEDGEMENTS**

I acknowledge my debt to the many obstetricians with whom I have worked and particularly to Mr. J. V. O'Sullivan for his constant support and encouragement. I am grateful to the sisters and midwives at St. Teresa's Hospital, Wimbledon, for their personal help to me and for their detailed care of the patients under epidural analgesia.

**REFERENCES**


**ALGALGESIE EPIDURALE SELECTIVE ET LA FREQUENCE DE L'ACCOUCHEMENT AU FORCEPS**

**SOMMAIRE**
Le block epidural pour soulager la douleur du travail normal est une coutume relativement peu courante dans ce pays. Une des raisons de ce manque de popularité pourrait être la conviction que son utilisation nécessite quasi invariablement l'accouchement forcipital de la mère. Les observations de l'auteur, au sujet de plus de 800 accouchements dans la période 1957 à 1969 montrent que la fréquence de l'accouchement forcipital a diminué, tandis que l'utilisation de l'analgésie epidurale sélective s'est multipliée au cours des années.
L'auteur présume que le block epidural doit moins fréquemment mener à l'accouchement forcipital que l'on n'a toujours cru, sous condition que (1) la technique est utilisée aussi bien dans le travail normal qu'anormal; (2) la puissance des contractions uterines est au besoin intensifiée à l'aide d'une infusion d'oxytocine; (3) une technique sélective est utilisée avec des doses minimales d'anesthésique local, injectées dans les voies nerveuses qui conduisent, au moment de l'injection, la douleur que ressent la mère; (4) l'obstétricien en charge est prêt à donner à la mère le temps et la possibilité d'accoucher sans intervenir indument et précocememnt.

**SELEKTIVE EPIDURALANALGESIE UND DIE FORCEPSRATE**

ZUSAMMENFASSUNG
Die epidurale Blockade zur Behebung des Schmerzes bei normaler Wehentätigkeit ist in unserem Land immer noch ein relativ ungebräuchliches Verfahren. Einer der Gründe für die wenig begeisterte Aufnahme dieser Methode bei uns ist möglicherweise die Ansicht, daß ihre Anwendung fast unwiderleglich eine Zangenextraktion bei der Mutter erforderlich macht. Wie die zwischen 1957 und 1969 durch den Verfasser zusammengestellten Aufzeichnungen von über 800 Geburten ergeben, hat sich die Zahl der Zangenextraktionen verringert, die Anwendung der Epiduralanalgesie während dieser Zeit jedoch vermehrt. Man vermutet, daß das Risiko einer hohen Forcepsrate aufgrund einer Epiduralblockade geringer ist, als bisher angenommen wurde, vorausgesetzt daß (1) diese Methode sowohl bei normaler als auch abnormer Wehentätigkeit angewendet wird; (2) die Kontraktion des Uterus, wenn erforderlich, durch eine Oxytocininfusion verstärkt wird; (3) eine selektive Methode benutzt wird, bei der mit minimalen Dosen eines Lokalanästhetikums die Nervenbahnen ausgeschaltet werden, die zum Zeitpunkt der Injektion den Schmerz der Mutter verursachen; (4) der anwesende Geburtshelfer der Mutter genügend Zeit und Gelegenheit gibt, ihr Kind ohne unangebrachtes hastiges Eingreifen selbst zur Welt zu bringen.

**CORRESPONDENCE**

**ANAESTHETIC INDUCED MALIGNANT HYPERPYREXIA**
Sir,—In our paper which appeared in your October issue (*Brit. J. Anaesth.*, 41, 844) we mentioned the possibility that cyclopropane might trigger the onset of this syndrome in susceptible pigs. We wish to report that we have now had the opportunity on two occasions to retest this possibility in known susceptible pigs with negative results. Cyclopropane does not trigger malignant hyperpyrexia in susceptible pigs. The triggering of the syndrome we observed following exposure of a susceptible pig to cyclopropane must be accepted as having been due to the previous administration of hexamethonium.

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**REBREATHEING IN A DOUBLE T-PIECE SYSTEM**

Sir,—We read with interest Dr. Anis Baraka's study on "Rebreathing in a double T-piece system" (*Brit. J. Anaesth.*, 41, 47). The use of this as a Magill's system should be quite economical with 1 MV flow in a small child, especially when expensive drugs like halothane are in use. As there is no special expiratory valve in this system, we presume the inflow limb of the proximal Ayre's T-piece acts as an expiratory outlet. In such a case the expiratory resistance could be very high. This system may be even dangerous in older children above 4 years of age. The size of the expiratory outlet in these cases may be much narrower than the diameter of the endotracheal tube and this may be an invitation to disaster.

V. M. Divekar Y. G. Bhojraj
Bombay

Dr. Baraka has replied as follows:
Sir,—I agree with Drs. V. M. Divekar and Bhojraj that our "double T-piece arrangement" has no special expiratory valve. The side limb of T-piece acts as an outlet for such semi-open system and not as an expiratory valve. During spontaneous breathing, this exit is open throughout the respiratory cycle. Using 1 minute volume fresh gas inflow, the reservoir bag is never over-distended and pressure within the system is always low. The child primarily expires into this low pressure system and not directly into the outlet. Expiratory resistance will only occur if the fresh gas inflow used is high enough to over-distend the reservoir bag and increase pressure within the system. We never use such high flows. One minute volume fresh gas inflow is enough to eliminate rebreathing.

Anis Baraka
Los Angeles