EPIDURAL ANALGESIA FOR PARTIAL GASTRECTOMY

BY

M. Buck

West Middlesex Hospital, Isleworth, Middlesex, England

SUMMARY

A technique of epidural analgesia for partial gastrectomy is described, using 1.5 per cent lignocaine with adrenaline. Satisfactory operating conditions were provided in 234 of the 250 patients reviewed. No serious complications occurred that with certainty could be attributed to the anaesthetic technique. One patient died 10 days after operation. The results confirm that the method is practical and safe and has advantages in patients with some pulmonary disorders. Lack of bleeding and contraction of the gut during operation are advantageous to the surgeon.

One role of the anaesthetist in the theatre at any given operation is to provide for the individual surgeon on that occasion the conditions which he requires. One of the surgeons of this hospital prefers epidural analgesia, either with or without general anaesthetic cover, for his abdominal cases. The reasons for his preference are the perfect relaxation obtained, the reduction in volume of the gut and the diminution of bleeding.

This is a review of 250 consecutive cases of partial gastrectomy performed by the same surgeon under epidural analgesia during the years 1959 to 1963. The patient is allowed to remain conscious during the operation in order that the important postoperative psychotherapeutic aspect of the management of the peptic ulcer patient can be started as soon as possible; before the patient leaves the operating theatre he is encouraged to believe that his gastro-intestinal tract is now perfectly normal and will function normally.

The cases selected are those in which the operation is expected to be straightforward. The surgeon works rapidly and the operation takes about 1½ hours to perform. In patients expected to require a complicated or lengthy procedure, such as those who have had a previous laparotomy or who are extremely obese, and in cases of known carcinoma of the stomach, in whom there is a possibility of inoperability, extreme difficulty or the need for total gastrectomy, general anaesthetic cover is provided. Emergency partial gastrectomy for haematemesis is usually performed under general anaesthesia alone. Some patients are psychologically unsuitable for operation under local analgesia and this is also taken into consideration.

Ninety per cent of the patients reviewed were suffering from peptic ulceration, and the remainder from carcinoma of the stomach. The sex and age of the patient are shown in table I.

<table>
<thead>
<tr>
<th>Age in years</th>
<th>20–29</th>
<th>30–39</th>
<th>40–49</th>
<th>50–59</th>
<th>60–69</th>
<th>70–79</th>
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<tbody>
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<td>Sex Male</td>
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<td>25</td>
<td>40</td>
<td>69</td>
<td>41</td>
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<td>Female</td>
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<td>8</td>
<td>15</td>
<td>16</td>
<td>10</td>
<td>2</td>
</tr>
</tbody>
</table>

ANATOMICAL AND PHYSIOLOGICAL CONSIDERATIONS

(Johnston and Whillis, 1947; Ranson, 1943)

The surgeon makes an upper midline skin incision; the nerve supply of this part of the abdominal wall, including the parietal peritoneum, is derived from the seventh to the tenth thoracic segments. Muscle tone in the abdominal wall is largely a reflex phenomenon and the relaxation obtained by epidural analgesia using 1.5 per cent lignocaine is achieved by interruption mainly of the sensory side of the reflex arc. The nerve supply of the stomach and small intestine is derived from the sympathetic system by way of the coeliac plexus, and from the parasympathetic system by way of the right and left vagus nerves. The coeliac plexus receives preganglionic sympathetic efferent fibres from the greater and lesser splanchnic nerves of both sides; the sympathetic afferent fibres are contained in the same nerves. These sympathetic fibres run in the ventral and dorsal spine roots from the fifth to the eleventh thoracic segments.

The plexus also receives parasympathetic efferent and some visceral afferent fibres from the right vagus
nerve. It is necessary, therefore, that the epidural analgesia extend as high as the fifth thoracic segment; this interrupts the sympathetic supply to the stomach and small intestine, but not the parasympathetic including those sensory fibres running with the vagus nerve. Though the latter carry few impulses to the conscious level, visceral reflexes are not entirely abolished. The effect of the sympathetic block is to constrict the gut and increase its motility, and to cause vasodilatation in the splanchnic bed with consequent hypotension.

THE TECHNIQUE OF THE EPIDURAL BLOCK

It is important that the patient should be visited by the anaesthetist prior to the operation, so that he may be assessed and reassured. The premedication consists of phenobarbitone sodium 180 mg 3 hours pre-operatively and papaveretum 40 mg 1½ hours pre-operatively, both injected intramuscularly. These doses may be modified according to age, weight and fitness. A Ryle's tube is passed and gastric lavage performed. The patient is brought to the anaesthetic room on a tilting trolley half an hour before operation. The sphygmomanometer cuff is applied to the right arm and the blood pressure taken. The patient is then turned into the left lateral position. Full aseptic precautions are taken.

The skin of the back is prepared and the space between the third and fourth lumbar vertebrae is identified in the usual way, and from this the space between the twelfth thoracic and first lumbar vertebrae is located. The spine is then flexed as far as possible. A solution containing lignocaine 1.5 per cent and adrenaline 1/300,000 is used. Using a 2-ml syringe and a No. 12 disposable needle, 2 ml of the mixture are injected into the skin, subcutaneous tissues and ligaments (namely supraspinous, interspinous and ligamentum flavum) of the space. A Harris lumbar puncture needle is then inserted exactly in the midline and at right angles to the back into the ligamentum flavum. It may be necessary to angle the needle in the sagittal plane in order to avoid bony structures. This ligament is usually tough and after some practice its presence can be appreciated. The stylet is then removed (it is important that the ligamentum flavum be entered before the stylet is removed, otherwise a false impression of the epidural space may be gained either in the ligaments or between them), and a 10-ml syringe containing 2 ml of normal saline is attached to the needle. This syringe must be well-fitting and very smooth running and must fit the needle perfectly. The needle is then firmly supported by resting the back of the hand holding it against the back of the patient; the syringe is held in the other hand, with the thumb resting on the plunger. The needle is then gently, slowly and firmly advanced. As it enters the epidural space, there is a loss of resistance and the plunger is found to advance with the ease of an intravenous injection; mechanical aids such as Macintosh's balloon indicator are not used. The needle is rotated through 90 degrees and a little more saline injected, to ensure that the injection is still easy. This is to confirm that the whole bevel of the needle is within the space. The syringe is then detached to ensure that no cerebrospinal fluid leaks back; a drop of the saline may drip back and feels cold if allowed to drop on the back of the bare hand (gloves are worn; one can be pulled back). Using the same 10-ml syringe, 30–50 ml (usually about 45 ml) of the lignocaine-adrenaline mixture is then injected, supporting the needle and using great care as previously described; this is very important, as it is easy to advance the needle 1 or 2 mm into the theca. The administration of a test dose is unnecessary provided that these precautions are taken, and may be misleading; with careless technique it is possible to advance the needle into the theca after a satisfactory test dose.

Should the subarachnoid space or a vein be entered, the needle is removed and another space used, preferably between the eleventh and twelfth thoracic vertebrae but failing this, between the first lumbar and twelfth thoracic; it is technically easier to locate the epidural space in the lumbar region than the thoracic, but less certain that the local anaesthetic agent will spread high enough. During the injection, while refilling the syringe, some fluid may leak back; this may occur because the epidural space is small and the injection has been too rapid to allow immediate spreading, or it may be that the needle has been moved into a ligament; if the subarachnoid space has been entered, the fluid is felt to be warm on the back of the bare hand. After the injection of the first 10 ml the trolley is tipped 10 to 15 degrees into the head-down position. At the end of the injection, the needle is removed and the patient turned

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on his back; the head-down position is maintained.

A Mitchell needle is inserted into a vein on the back of the left hand. The Ryle’s tube is sucked and removed. The signs of a successful block may appear almost immediately or after as long as 20 minutes; these are a scaphoid appearance of the abdomen, visible abdominal aortic pulsation, a fall in systolic blood pressure and insensitivity to a pinprick in the area of the incision; this area is infiltrated in all layers with 50 ml of 1/300,000 adrenaline in normal saline. The patient is then positioned on the operating table; the table is adjusted so that the head is raised 10 to 15 degrees and the feet about 5 degrees; this position is comfortable for the patient and gives the surgeon good access to the field of operation. The left arm is flexed on the chest so that the Mitchell needle is readily accessible to the anaesthetist. The right arm remains by the side. The eyes are covered by a swab and the patient is encouraged to doze.

Repeated blood pressure readings are taken throughout the procedure and arterial hypotension is controlled by vasopressor drugs; intravenous or intramuscular ephedrine hydrochloride (15 mg or 30 mg) is given and repeated once or twice if necessary, after which time, if more vasopressor is necessary, methoxamine hydrochloride may be preferred. It is desirable that the systolic pressure should not remain below 80 mm Hg. If traction on the stomach causes retching, this may be relieved by deep breathing and by encouragement from the anaesthetist. Should the operation be prolonged and the full effect of the analgesia be wearing off before the end of the operation, closure of the abdomen is helped by injecting a small dose of intravenous thiopentone (150 mg) with or without suxamethonium chloride (50 mg); this is very short acting and does not affect the level of consciousness at the end of operation. Endotracheal intubation is not necessary; inflation with nitrous oxide and oxygen using a face mask is quite adequate.

After the patient has returned to the ward, the foot of the bed is raised on blocks and the blood pressure is taken every quarter of an hour. After 2 hours, the blocks can usually be removed and the patient is gradually raised on pillows, and is sitting up 16 hours postoperatively; the blood pressure is taken intermittently for 24 hours. If

the subarachnoid space has been entered at any time during the epidural procedure, the patient is kept flat for 16 hours postoperatively.

RESULTS

In 234 of the 250 patients, satisfactory analgesia was obtained. In thirteen patients the block was incomplete due to a fault in the technique; in some the analgesia did not extend high enough. In others, it is likely that not all the anaesthetic mixture was introduced into the epidural space; in these cases a general anaesthetic had to be administered at some stage of the operation. In three cases, an epidural block was not achieved; in one of these, with an abnormality of the bony spine the injection was made into what appeared to be the epidural space, but no block resulted; in another the subarachnoid space was repeatedly entered and the epidural space could not be found; in the third case the injection was made into a false space. These difficulties tended to occur early in the experience of the individual anaesthetist.

Complications.

Drug reactions. Mild toxic effects of lignocaine were sometimes seen. These consisted mainly of drowsiness and muscular twitching but no treatment was required.

Neurological. Headache occurred occasionally, generally following spinal tap. External rectus palsy occurred in one patient in the series, and was associated with a spinal tap; this cleared up in a few days. Retention of urine did not occur any more frequently in these patients than in other postoperative cases. In no case was a total spinal anaesthetic given.

Cardiovascular. Two patients had myocardial infarcts; one became profoundly shocked as he was removed from the table, but responded to treatment and recovered. The other infarct occurred several days after the operation in a patient who died with paralytic ileus and uraemia.

Hypertension. The blood pressure during the first 2 hours after operation may fluctuate and in sixteen patients rose well above the pre-operative level; one of these developed pulmonary oedema but recovered. Mild cardiac failure appeared in one patient, but responded to treatment.

Hypotension. In no case did hypotension occur of sufficient severity to require treatment.
Respiratory. All the patients received physiotherapy from the ward staff postoperatively. In three cases there was partial lung collapse from which the patients recovered. Bronchoscopy was never required. In five cases pneumonic consolidation occurred, with recovery.

Psychological. Three patients became psychologically unbalanced; one became uncontrollable during the operation; the others were severely agitated postoperatively. In retrospect all were temperamentally unsuitable for the technique.

DISCUSSION

The technique of epidural block is not difficult, although practice is needed to become proficient; it is a useful technique and proficiency is well worth acquiring. Our experience confirms that epidural analgesia for upper abdominal surgery is both feasible and safe. The surgeon operating on these cases is both dextrous and speedy, and the "single shot" technique is therefore adequate; if the operating time were longer the technique would have to be modified.

Epidural analgesia is useful in the patient with bronchopulmonary disease, for whom general anaesthesia may hold additional hazards; the block affects mainly sensory somatic fibres and the respiratory muscles are relatively unimpaired. Bromage (1954) showed that patients with emphysema and bronchoconstriction may improve after epidural block; confirmation of this was not obtained by Moir (1963) in his series, but he remarks that epidural block is a suitable anaesthetic technique for this type of patient, since ventilation is not impaired to any important degree and may in fact be clinically improved.

Epidural analgesia has many advantages over intercostal regional block for upper abdominal surgery; the latter is time-consuming and involves considerable discomfort to the conscious patient. The lower seven intercostal nerves are individually blocked on both sides with amethocaine; this results in total sensory and motor block (James, 1943) and consequent respiratory impairment. Bilateral splanchnic blocks are also done.

It is interesting to compare this series with the large series described by Bromage (1952) in which lumbar epidural analgesia combined with light general anaesthesia was used for operations below the diaphragm; the dosage and technique are very similar and the patients were talking and pain-free when they left the theatre. Hill, Wharton and Delaney (1962) made the same points in their paper on epidural analgesia for operations on the hip.

ACKNOWLEDGMENTS

I am particularly indebted to Mr. W. J. Ferguson, for his encouragement and permission to publish this series of cases.

I also wish to thank him and Dr. C. H. Dunn, for their valuable advice in the preparation of this article.

The success of this method owes much to the enthusiasm and devotion of the ward sisters.

REFERENCES


L'ANALGESIE EPIDURALE DANS LA GASTREC­TOMIE PARTIELLE

SUMMARY

L'auteur décrit une technique d'analgésie epidurale pour les gastrectomies partielles. On emploie 1.5% de lignocaine avec de l'adrénaline. Chez 250 patients vus cette méthode a donné chez 234 des conditions satisfaisantes pour l'intervention chirurgicale. Il n'y eut pas de complications sérieuses susceptibles d'être attribuées avec certitude à la technique d'anesthésie. Un patient est mort dix jours après l'opération. Les résultats confirment que la méthode est pratique et sûre et qu'elle présente des avantages lorsqu'il s'agit de patients atteints d'affections pulmonaires. L'absence d'hémorragies et le resserrement intestinal constituent autant d'avantages pour le chirurgen.

EPIDURALE ANAESTHESIE BEI TEILWEISER MAGENRESEKTION

ZUSAMMENFASSUNG