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Case Series Review

Spinal anaesthesia in lower abdominal and limb surgery: A review of 200 cases

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Abstract

Background: Modern technology has produced better equipment than was available hitherto with the result that spinal anaesthesia is undoubtedly simpler, cheaper and above all, safer than it used to be. These notwithstanding, it is used infrequently. The aim of the study was to evaluate the safety, benefits and applicability of subarachnoid spinal anaesthesia in a tertiary referral centre in a developing country.
Methods: This was a prospective analysis involving 200 patients requiring anaesthesia for lower abdominal and limb surgery at the Jos University Teaching Hospital, Jos. Subarachnoid spinal anaesthesia was performed through the L2/L3 or L3/L4 interspace employing either 0.5% bupivacaine hydrochloride in 8% glucose monohydrate (Marcain heavy Astra) 2-4mls or 5% lignocaine (heavy xylocaine Astra) 1-2mls. Patients with uncorrected or undercorrected hypovolaemia, uncorrected anaemia or heart disease, local sepsis and those on anticoagulant therapy or who had bleeding disorders were excluded. Also excluded were children.
Results: A total of 200 patients with age range of 15-90 years and a mean age of 34.48 years were studied. The male to female ratio was 1:1.74. Eighty of them underwent caesarean section (*38* emergency and 42 electives), 26 prostatectomy, 24 appendicectomy, 19 herniorraphy, 11 haemorrhoidectomy, 9 fissurectomy, 7 total abdominal hysterectomy, 5 Manchester operation, 4 myomectomy, while the remaining 15 were for other procedures involving the lower abdomen or limb. Complications noted were: nausea (17.50%) and vomiting (3.5%), pain at injection site (15.5%), chills/shivering (15.0%), post-spinal headache (0.5%) and hypotension (3.0%). Subarachnoid anaesthesia was non-fatal. One hundred and ninety patients (95%) were satisfied with spinal anaesthesia.
Conclusion: Spinal anaesthesia though safe is not without hazards. Spinal anaesthesia may be used for most operations in the lower abdomen (including caesarean section), perineum or leg.

Introduction

Spinal anaesthesia is a form of regional anaesthesia where conduction block of nerve roots is achieved by injecting a small volume of hyperbaric (*heavy*) local anaesthetic solution into the subarachnoid fluid through a lumbar puncture. It produces complete analgesia with profound muscle relaxation, quiet respiration and small contracted bowel.[1] Injection is made at a level below that of second lumbar vertebra *(*the level at which the spinal cord terminates), frequently at the interspace between the third and fourth lumbar vertebra. A solution denser than cerebrospinal fluid is normally used which allows the nature of the block to be controlled by positioning the patient so that the drug flows "downhill" under gravity to the segment that needs to be blocked. For example, injection with the patient in the sitting position will result in a block of the sacral nerve roots (low spinal or saddle block) and suitable for perineal surgery. Injection with thepatient in the lateral position, if the position is maintained, will produce unilateral, anaesthesia on the lower side. A 'medium' spinal block covers the segment from T10 to L4 and is suitable for herniorraphy, lower abdominal operations and operations on the leg. A block extending above this level is a high spinal and is not recommended for the occasional anaesthetist.Drugs in use include lidocaine, bupivacaine, cinchocaine and tetracaine. The choice depends on the duration of operation and the quality of the aftercare available for those patients whose operations end before their blocks wear off. Complications include: nausea from hypotension or bowel traction, urinary retention, pain at injection site, headache mainly attributed to cerebrospinal fluid leakage

from the site of dural puncture, meningism due to contamination of cerebrospinal fluid with red cells, septic meningitis due to non-sterile techniques, 'total spinal' block with anaesthesia followed.[1] Modern technology has produced better equipment than was available hitherto with the result that spinal anaesthesia is undoubtedly simple, portable, cheaper and above all safer than it used to be, but notwithstanding it is still used infrequently. [2,3,4] In developing countries, money for equipment may be short or facilities limited. Thus anaesthetic techniques that depend on as little as possible external supplies and technology (equipment, expertise for maintenance work) become necessary. In this study, the authors' recent experience of subarachnoid anaesthesia in lower abdominal, anal and lower limbs surgery is reviewed and an attempt is made to draw the required attention to this form of regional anaesthesia

Patients and methods

Two hundred patients who received subarachnoid block for various surgical procedures at the Jos University Teaching Hospital (JUTH) during the period (March 1999 - March 2000) were prospectively studied. Exclusion criteria were: patients with uncorrected or undercorrected hypovolaemia, uncorrected anaemia or heart disease, local sepsis and those with bleeding disorders. Also excluded from the study were children. The procedure was explained to the patients and their informed consent obtained. The opinions of patients regarding the choice of anaesthesia were sought. The reasons for choosing the preferred methods of anaesthesia were also obtained from the patients. Subarachnoid puncture was aseptically performed either in the L2/3 or L3/4 interspace after an intravenous infusion line had been set up with normal saline solution and the patient's cardiovascular system preloaded. The amount of fluid used for preloading varied depending on the patient's age, size and preoperative condition but was generally between 500 to 1500mls over 15 to 30 minutes. The puncture was generally performed with the patient in the sitting position. In those patients who had surgery of the perineum, they remained seated for 3 minutes after which they were positioned supine. For surgery of the legs and lower abdomen below the umbilicus, the patients were laid supine immediately after the subarachnoid injection was administered with one pillow under their heads. Subarachnoid anaesthesia for caesarean section was, however, performed with the patient supported in the sitting position and then turned into the horizontal position but with the pelvis wedged to keep it tilted immediately after injection. Oxygen was given to all the mothers during the operation. Adequate postoperative hydration was ensured to reduce the risk of post spinal headache as the mothers needed to sit up to nurse their babies. Sizes 24-26 Quincke Backok pencil point spinal needles were used and the anaesthetic agent employed to achieve a subarachnoid block was either 0.5% bupivacaine hydrochloride in 8% glucose monohydrate (marcain heavy Astra) 2-4ml, or 5% lignocaine in % glucose (heavy xylocaine Astra) 1-2mls. The choice of the anaesthetic agent being guided by the anticipated duration of the surgical procedure. The blood pressure was measured every 2 minutes during the first 15 minutes after injection of the drug and then every other 5 minutes for the rest of duration of the anaesthesia while the operation lasted. Also monitored was the height of the block as determined by a pinprick. The patients were confined to bed postoperatively for at least 12 hours and encouraged to take liberal amount of oral fluids if their conditions permitted. The duration of action of the anaesthetic agent was the period between loss of sensation determined by a needle prick after injection of the agent and regain of power in the lower limb postoperatively. The intraoperative and postoperative outcome of subarachnoid anaesthesia was carefully documented. Post spinal headache was considered when headache was described as being worse or more intense in the upright position and relieved by lying down. Hypotension was defined by a fall in blood pressure of more than or equal to 20mmHg from the base line and bradycardia when the pulse rate was less than or equal to 65 beats per minute. Hypotension was corrected by increasing the drip rate and administering oxygen. All collected data were then entered into a data collection form designed for the study.

Results

Two hundred patients were involved in the study. The age range of the patients involved is contained chart, fig 1. Their ages ranged between 15-90 years with a mean of 34.48 years. The male to female ratio was 1:1.74. The procedures carried out are outlined in Table 1. Bupivacaine hydrochloride (0.5%) was used in 89 patients and the average duration of action was 3 hours 4 minutes while lignocaine (5%) was employed in 111 patients and its average duration of action was 1 hour 30 minutes. The height of the subarachnoid block was between T_8 and T_{10}. The average duration of operation for major surgical procedures was 3 hours while that for minor surgical procedures was 1 hour 20 minutes. There were no failed procedures in our patients. The complications are presented in Table 2 . Nausea was noted in 35 (17.5%) women undergoing spinal anaesthesia for caesarean sections. Only 7 (3.5%) of nauseated patients actually vomited. Six of these patients had caesarean section while the seventh patient had appendicectomy. Hypotension occurred in six (3%)

patients who had caesarean section. Headache due to spinal anaesthesia lasting 3 days was observed in one (0.5%) female patient. She had caesarean section and was aged 35 years. The patient was successfully managed with analgesics, liberal fluid were satisfied with the outcome of this form of anaesthesia

administration and confinement to bed. It was observed that patients having intraperitoneal procedures occasionally had a dull dragging chest pain when traction was applied on abdominal viscera. Of the 200 patients, 190 (95%)

Table1 surgical procedures performed and the number of patients

S/No	Operation	No(patients)%.
1	Caesarean section	80(40)
2	Prostatectomy	26(13)
3	Appendicectomy	24(12)
4	Herniorrhaphy	19(9.5)
5	Haemorrhoidectomy	11(5.5)
6	Fissurectomy	9(4.5)
7	Total abdominal hysterectomy	7(3.5)
8	Manchester operation	5(2.5)
9	Myomectomy	4(2.0)
10	Skin grafting	2(1.0)
11	Limb Amputation	2(1.0)
12	Internal fixation of tibial fractures	2(1.0)
13	Operation for varicose vein	2(1.0)
14	Charles operation for lymphodema	10(.5)
15	Urethroplasty	10.(5)
16	Partial cystectomy (cancer bladder	10.(5)
17	Orchidectomy	10.(5)
18	Vesico-vaginal fistula repair	10(.5)
19	Laparotomy for ectopic pregnancy	10(.5)
20	Salpingo-ophorectomy	1 0.5

Table 2 complications of anaesthesia.

Complications	No (Patients)	M:F	Percentage
Nausea	35	0:35	17.50
Pain at injection site	31	0:31	15.50
Chills/Shivering	30	4:26	15.00
Spinal headache	1	0:1	0.50
Vomiting	7	0:7	3.50
Hypotension	6	0:6	3.00

DISCUSSION

Augustus Bier performed the first spinal anaesthesia using cocaine in 1889.[5] Since his first report, regional anaesthesia including spinal has gained widespread popularity in the developed world.[2] In Nigeria, particularly in obstetrics, general anaesthesia is the most common form of anaesthesia for major surgical procedures. [3] The factors mitigating against the more widespread use of subarachnoid anaesthesia seems to be the frequency and severity of possible occurrence of the complications earlier stated in the text.[1] Nausea, pain at injection site and a feeling of chills/shivering are common occurrences that can easily be content with. However, postspinal headache, hypotension and vomiting could be potentially dangerous and disabling. The later complications may demand the availability of appropriate equipment and drugs to manage but they are however uncommon as is clearly demonstrated in the present study. Nausea was observed to occur soon after spinal anaesthesia in this study, but usually eased off spontaneously. Hypotension, use of ergometrine to contract the uterus after delivery of the baby and traction on the peritoneum were conditions that led to vomiting in nauseated patients. The use of oxytocin rather than ergometrine to contract the uterus after delivery of the baby as noted previously[6], gentle surgery and avoidance of hypotension will prevent vomiting ultimately. The pulse rate and blood pressure did not fall too low in any of our patients after premedication (pulse rate less than or equal to 65 beats a minute, a fall in blood pressure of more than or equal to 20mmHg from the baseline) to demand administration of atropine and a vasopressor drug such as ephedrine respectively.

All those who had hypotension were undergoing spinal anaesthesia for caesarean section. The explanation may not be too far from the fact that vascular tone is more dependent upon sympathetic control in pregnant than in the non-pregnant state, so that hypotension develops more readily and more markedly consequent to sympathetic blockade following spinal or epidural anaesthesia.[7] Aortocaval compression in pregnant women in the supine position is another contributory factor. Cautious and adequate preloading of the patient using saline through a wide bore needle and right hip wedge to displace the uterus to the left lateral side immediately after the injection of spinal drug is advised to prevent a severe drop in blood pressure.[6,8]

The incidence of postspinal headache was recorded as 0.5% compared to 2.8 percent noted amongst Africans in a similar study using size 22G - Spinal needle.[2] The low incidence might be accounted for by the fewer number of patients and also the fact that we used sizes 24-26 Quincke Backok pencil point spinal needle. While different hypothesis have been suggested to explain the pathogenesis of postspinal headache, the exact cause to date still remains in doubt. However, we still confined our patients to bed for at least 12 hours and longer since they had procedures necessitating prolonged observation and bed rest.

Chills/shivering was relieved by keeping the patient warm with hot water bottle, blanket cover and occasionally warming the intravenous fluids while pain at injection site was treated with oral analgesics. Gentle surgery, sedation and analgesia would seem to prevent the dull dragging chest pain experienced by some of our patients.

The reasons for accepting spinal anaesthesia ranged from the perceived financial benefits, greater patient safety, earlier maternal neonatal bonding to early establishment of breast-feeding. The above reasons given by our patients and others [1,3,9.] put forward by countries that have widely adopted this form of anaesthesia would seem to make the use of this technique more desirable. These other reasons included: Reduction in the risk of gastric aspiration and failed tracheal intubation, avoidance of neonatal drug-induced respiratory depression, reduction in operative blood loss, extension of excellent analgesia into the postoperative period, early mobilization and return to normal diet. [3,8] .

There has been a renewed interest and great resurgence in the use of spinal anaesthesia for various surgical procedures. [2] Despite the small sample size and short study period, this study indicates that spinal anaesthesia though safe is not without hazards. Both general and spinal anaesthetic techniques will continue to be used in varying proportion depending on patient's condition, experience of personnel and availability of facilities. However, a technique that is simple and subjected to less constraint on personnel equipment and drugs would be necessary. This is very important in our environment where patients are poor, hospital bills are high and resources available for healthcare are limited.

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