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Original Article

Comparison of Epidural and Spinal Anaesthesia for Total Abdominal Hysterectomy

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Objectives: To compare the time of onset, adequacy of surgical analgesia and motor blockade with epidural anaesthesia versus spinal anaesthesia for hysterectomy. To compare the frequency of hypotension and need for switching to general anaesthesia with spinal versus epidural anaesthesia for hysterectomy.

Material and Methods: One hundred patients with ASA I or II undergoing hysterectomy were included in the study. Fifty patients underwent surgical procedure under epidural (E) and fifty under spinal (S) anaesthesia. Both groups were monitored for onset and quality of surgical analgesia, degree of motor blockade, frequency of hypotension and need for conversion to general anaesthesia.

Results: The time of onset of surgical analgesia was significantly shorter in spinal group compared with epidural group (9.12+1.56 vs 21.7+3.59 minutes, $p<0.001$). The quality of surgical analgesia was not significantly different in both groups. The degree of motor blockage was significantly more pronounced in the spinal group (mean modified Broomage scores 1.08 vs 2.10 $p<0.01$). The frequency of hypotension was more in the spinal group (8 vs 2 patients $p<0.05$). The need to convert to general anaesthesia was more common in spinal compared to epidural group (8 vs 1 patient $p<0.05$).

Conclusion: Spinal anaesthesia for hysterectomy is associated with quicker onset of action, better motor blockade. However, both techniques allow adequate level of surgical analgesia which is not significantly different with spinal or epidural anaesthesia. Frequency of hypotension and need for conversion to general anaesthesia is more common with spinal compared with epidural anaesthesia for hysterectomy.

Keywords: Epidural Anaesthesia, Spinal Anaesthesia, Surgical Analgesia, Motor Blockade, Hypotension.

Introduction

Epidural and spinal blocks are major regional techniques with a long history of effective use for a variety of surgical procedures and pain relief. Both the techniques have merits and demerits. Spinal anaesthesia is relatively cheap and is easy to perform.[1,2] It has quick onset of action and the block is profoundly dense. However, inability to control the level of block and hypotension are major drawbacks of spinal anaesthesia. Further, there is no way to reinforce the block if it is found to be inadequate. Epidural anaesthesia though requires more expertise, this catheter technique is a well controlled method in which the level of block can be monitored and enhanced frequently. Moreover, post operative analgesia can also be achieved with epidural catheter.[3] Use of epidural anaesthesia may allow early ambulation of patients and lower rate of post-operative complications.[4-7] Epidural technique is associated with greater patient satisfaction during surgery and post operative period.[8-10] However, relatively slow onset of action and patchy block are drawbacks of this technique.[11]

The degree of motor blockade and surgical analgesia are of utmost importance from surgeons perspective. Objectively measuring the degree of motor block and sensory analgesia would promote quality of anaesthesia practice. There is need to study both epidural and spinal anaesthesia techinques.

Objectives

1. To compare the time of onset and adequacy of surgical analgesia and motor blockade with epidural anaesthesia versus spinal anaesthesia for hysterectomy.
2. To compare the frequency of hypotension and need for switching to general anaesthesia in patients undergoing hysterectomy under epidural versus spinal anaesthesia.

Patients and Methods

A prospective comparative study was performed in Anaesthesia Department of Services Hospital /

Services Institute of Medical Sciences, Lahore from April 2006 to April 2007 after taking approval from the hospital ethical committee and informed consent from the patients. One hundred females with planned hysterectomy were enrolled in the study. Allocation was done in advance to epidural (E) or spinal (S) groups by randomization using envelope methods.

Inclusion Criteria

1. ASA I and II patients with planned hysterectomy
2. Body weight equal or less than 75 kg

Exclusion Criteria

1. Patient refusal
2. Contraindications to regional anaesthesia, e.g., bleeding diathesis or local infection
3. Very apprehensive patients.
4. Unmarried and primary infertility patients.

All patients underwent regular baseline blood pressure and pulse examination. Pre loading was done with Ringers lactate (10 ml/kg body weight) over a period of 15 to 20 minutes. Blocks were given in upright posture using aseptic technique in both groups.

Epidural Anaesthesia:

Using aseptic technique, 16G Tuohy needle was introduced at L3-L4 or L2-L3 level into epidural space using loss of resistance technique with air. An 18 G catheter was introduced 3-4 cm within epidural space. A test dose of 3 ml 2% lignocaine with 1:100,000 adrenaline was given after confirming no blood or CSF aspiration from the catheter. Patients' heart rate was observed for two minutes to rule out intravascular or intrathecal injection. Thereafter, 12-20 ml of 2% lignocaine with 1:100,000 adrenaline was given followed by 10-15 ml of 0.5% bupivacaine after 5-10 minutes, depending on the level of desired block to the level of dermatome. The guide used was 1.5 to 2.0 ml / vertebrae. The top-up doses were guided accordingly. The patient was made to lie down and blood pressure was monitored at 1 minute, 2 minute and every 5 minutes throughout the procedure.

Spinal Anaesthesia:

The patients were prepared in the same way as epidural group. Through Whitacare 25G spinal needle, 2.5 ml of 0.5% hyperbaric bupivacaine was injected. The patient was made to lie down and blood pressure was monitored at 1 minute, 2 minute and every 5 minutes throughout the procedure.

Assessment of Surgical Analgesia :

The level of sensory block was tested in both groups by an operator unaware of the type of block instituted, using a 25G blunt tipped needle. Sensory levels checked at one minute, five minutes and at start of surgery. The quality of surgical analgesia was assessed by anesthesiologist and graded as:

1. Excellent: no supplementary analgesic or sedative required.
2. Good: only sedative required
3. Fair: both sedative and analgesic required
4. Poor: general anaethesia with LMA (laryngeal mask airway)

The degree of motor block of lower limb was assessed according to modified Bromage scale as:[12]

Grade-1: Complete block (unable to move)
Grade-2: Almost complete block (able to move feet only)
Grade 3: Partial block (just able to move knees)
Grade-4: Detectable weakness of hip flexion
Grade-5:No Detectable weakness of hip flexion while supine
Grade- 6: Able to perform partial knee bend

ECG and SPO_2 were monitored continuously during the procedure. Blood pressure was recorded every five minutes in both groups. Hypotension was defined as 20% decrease from baseline systolic blood pressure or if systolic pressure fell below 100mmHg.[13] It was treated with 3 mg ephedrine injection intravenously, titrated to the affect. In both groups, patients were given 1-2 mg midazolam IV sedation. Supplementary analgesia was given with 1-4 mg nalbuphine IV.

Conversion to General Anaesthesia

Patients in the spinal group were switched to general anaesthesia if level of block was inadequate or when surgery was prolonged and the effect of spinal anaesthesia was wearing off. In epidural group, injection lignocaine top-ups were given to patients complaining of pain or when surgeon was not comfortable with the degree of relaxation, after assessing the regression level. Patients with inadequate analgesia were switched to general anaesthesia.

Statistics

Statistical analysis was done using statistical package for social sciences (SPSS) version 15 for microsoft windows. Quantitative variables, e.g., time of onset of surgical anaesthesia and modified Broomage scores in spinal and epidural groups were compared using student's t test. The quality of surgical analgesia and motor blockade were compared in both groups using

Results

Spinal and epidural group patients were similar with respect to age, weight and duration of surgery (**table 1).** The time of onset of surgical analgesia was 9.12+1.56 in spinal group and 21.7+3.59 minutes in epidural group **(figure 1).** It was significantly shorter in spinal group compared with epidural group ($p<0.001$).

There were 37 patients with excellent surgical analgesia in spinal group compared to 29 patients in epidural group **(figure 2).** However, the difference was not statistically significant. In epidural group, there was one patient with poor surgical analgesia and had to be switched to general anaesthesia.

Motor blockade was also more pronounced in spinal anaesthesia group compared with epidural anaesthesia group. The mean score on modified Bromage scale was 1.08 in spinal group and 2.10 in epidural group. The difference was highly significant ($p<0.01$). There were 46 patients with modified Bromage score 1 in spinal group compared with only 8 in epidural group **(figure 3).**

Hypotension was observed in 8 patients in spinal group compared and 2 patients in epidural group **(figure 4).** The difference was statistically significant ($p<0.05$).

The need for conversion to general anaesthesia was also higher in the spinal group compared to epidural group **(figure 5).** Eight patients were converted to general anaesthesia compared to only one patient in the epidural group. The difference was highly significant ($p<0.01$). The reason for conversion to

Table-1: Epidural and spinal anaesthesia groups; basic parameters

Variable	Spinal Group	Epidural Group	
Number	50	50	
Age	47.8±10.8	46.3±8.9	NS
Weight	59.2±5.9	58.4±6.2	NS
Duration of surgery (minutes)	57.4±19.6	55.2±20.3	NS

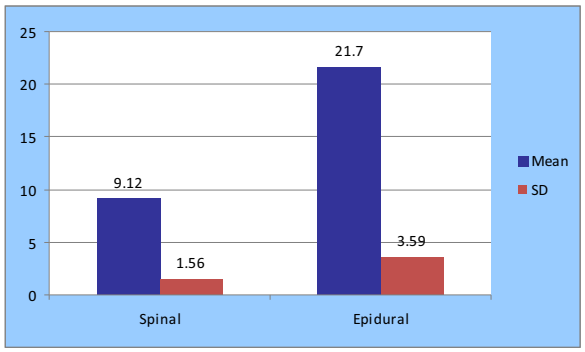

Figure-1: Time of onset (minutes) in spinal and epidural anaesthesia

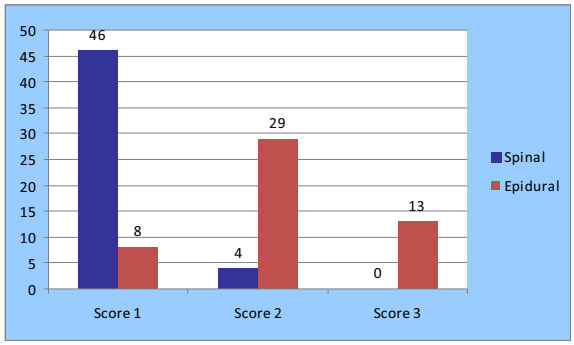

Figure-3: Degree of motor blockade in spinal and epidural groups.

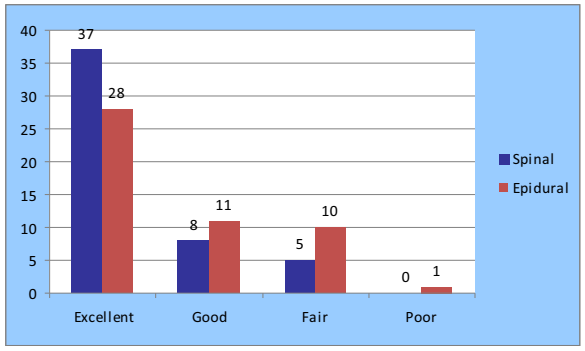

Figure-2: Quality of surgical analgesia observed in spinal and epidural groups.

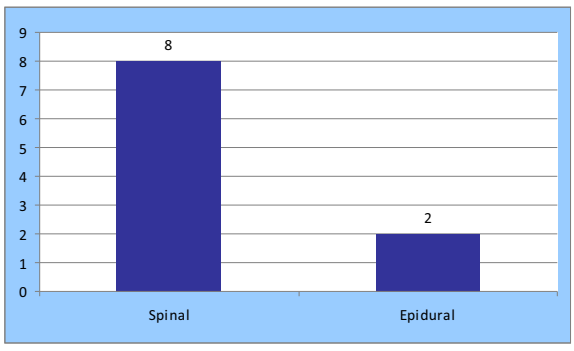

Figure-4: Hypotension in spinal and epidural groups.

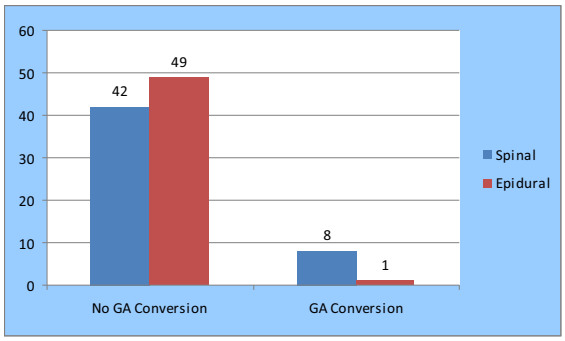

Figure-5: Conversion to general anaesthesia in spinal and epidural groups.

general anaesthesia in all 8 patients in spinal group was prolonged surgical time resulting in the wearing off effect of spinal anaesthesia. On the other hand, only 1 patient in epidural group was converted to general anaesthesia due to inadequate surgical analgesia. Patients with prolonged surgery in the epidural group were managed with additional top up.

Discussion

Both spinal and epidural anaesthesia are good techniques with their own merits and demerits. In our study spinal anaesthesia was better than epidural anaesthesia with respect to time of onset of surgical analgesia. The onset of surgical analgesia was earlier in the spinal group (9.12±1.56 vs 21.7±3.59 minutes). This finding is in agreement with that of other researchers. Riley et al also found shorter time of onset of surgical analgesia with spinal anaesthesia compared with epidural anaesthesia.[1] There were more patients with excellent surgical analgesia in spinal group than in epidural group **(figure-1)**. However, the difference was not statistically significant. Other researchers have also found no significant difference in surgical analgesia between spinal and epidural anaesthesia.[9] Motor blockade was also better with spinal anaesthesia compared with epidural anaesthesia. The mean modified Broomage score in spinal group was 1.08 compared to 2.10 in epidural group. The difference was highly significant ($p<0.01$). There were more patients with modified Broomage score 1 in spinal than epidural group (46 vs 8). Greater motor blockade with spinal anaesthesia may be advantageous when better muscles relaxation is required during surgery.[14] However, prolonged motor blockade may result in additional stay in post-anaesthesia care unit and delayed ambulation after the surgical procedure.[15,16]

In our study, more number of patients developed hypotension in the spinal group than in epidural group (8 vs 2). This difference was statistically significant ($p<0.05$). Other observers have also reported significantly higher frequency of hypotension with spinal anaesthesia compared with epidural anaesthesia.[17] Different researchers have used different criteria for defining hypotension resulting in variable frequency of hypotension with spinal and epidural anaesthesia. Anyway, hypotension induced by spinal or epidural anaesthesia is not a serious complication and can be managed easily with the administration of ephedrine, crystalloids and colloids.[18-20]

The need for conversion to general anaesthesia was higher in spinal anaesthesia group compared with epidural anaesthesia group (8 vs 1). This difference was highly significant ($p<0.01$). Conversion to general anaesthesia was required in 8 cases in spinal group when surgery was prolonged and the affect of spinal anaesthesia was wearing off. Spinal anaesthesia has a finite block duration that may not always correspond with the duration of surgery.[15] On the other hand there was need to convert to general anaesthesia only in one patient in epidural group as top ups could be given in this group thus obviating the need for conversion to general anaesthesia.

Conclusion

Spinal anaesthesia for hysterectomy is associated with quicker onset of action and better motor blockade. Both techniques allow adequate level of surgical analgesia which is not significantly different with spinal or epidural anaesthesia. Frequency of hypotension and need for conversion to general anaesthesia is more common with spinal compared with epidural anaesthesia for hysterectomy.

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Picture Quiz

Please see this picture and answer the following question?

1. What is this lesion called?
2. What are the common causes?
3. What is the pathogenesis of this lesion?

See answer on Page 37