Original research article

A Prospective Clinical Study of Comparison Between General Anaesthesiaand Epidural Anaesthesia in Lumbar Microdiscectomies

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ABSTRACT

Background: The main aim of our study was to compare the intraoperative and postoperative outcomes of general anaesthesia and epidural anaesthesia in single level lumbar microdiscectomies.

Methods & materials: 40 ASA I and II, both male and female patients, posted for single level lumbar microdiscectomies were chosen for the study. Group GA underwent the operation under general anaesthesia and group EA underwent the surgery under epidural anaesthesia. Patients were observed in the recovery room for 24hrs.

Conclusion: Epidural anaesthesia may be used as an alternative to general anaesthesia in single level lumbar microdiscectomies.

Keywords: Epidural anaesthesia, general anaesthesia, lumbar microdiscectomies

Introduction

Life is short, and art long; the crisis fleeting; experience perilous, and decision difficult. The physician must not only be prepared to do what is right himself, but also to make the patient, the attendants, and externals cooperate. [1]Lumbar microdiscectomy, one of the best methods, with minimal invasiveness, minimal soft tissue injury, and short hospital stay, is most commonly performed under general anaesthesia (GA). This technique can be accompanied by several perioperative morbidities including blood loss, increased mean arterial pressure and heart rate, post operative pain, nausea, vomiting and prolonged post anaesthesia recovery period. [2] Patient satisfaction and the ability to carry out prolonged operation in prone position without airway compromise are the main advantages of using GA. [3] There are a variety of anaesthetic options available for use during spine surgery, broadly classified as general, regional and local anaesthesia. Regional techniques are however, quite common and are being used more widely and frequently, with epidural anaesthesia being more safer than spinal with respect to cardiac and neurological complications. Epidural anaesthesia and analgesia have the potential to reduce or eliminate the perioperative physiologic stress responses to surgery and thereby decrease surgical complications and improve outcome. The potential advantages of epidural anaesthesia in spine surgery include avoidance of airway manipulation, self positioning of awake patient that lessens the brachial plexus and face injury, decreased need for narcotics, preservation of protective reflexes, and decreased operative blood loss, postoperative recovery time; nausea, vomiting, stress responses and thromboembolic phenomena. Postoperative pain relief is one of the main advantages of using this technique. [4-7] Potential drawbacks and complications include inadvertent injection of local anaesthetic intravascularly or into the intradural (subarachnoid) space, epidural abscess, infection, neurological injury, urinary retention and slow onset. [8, 9]

Aims and objectives

To compare the intraoperative and postoperative outcomes of general anaesthesia and epidural anaesthesia in single level lumbar microdiscectomies.

Intra operatively: Surgical onset time, Total anaesthesia time, Surgical time, Haemodynamic stability, Oxygen saturation, Complications like hypotension, bradycardia

Post operatively: Pain scores in the first 24 hrs, Total analgesic dose, Time of first analgesic dose, Complications like respiratory depression, hypotension, bradycardia, pruritus and headache, Occurrence of Postoperative nausea and vomiting (PONV).

Methods & materials

40 ASA I and II, both male and female patients, posted for single level lumbar microdiscectomies were chosen for the study. Group GA underwent the operation under general anaesthesia and group EA underwent the surgery under epidural anaesthesia. Patients were observed in the recovery room for 24hrs. Patients aged between 18 to 60 years undergoing single level lumbar microdiscectomies in Indira Gandhi Institute Of Medical Sciences Patna , Bihar. Study duration of Two years.

Inclusion criteria

Age group of 18-60 years.
Both male and female patients.
Patients coming for elective single level lumbar microdiscectomy.

Exclusion criteria

American Society of Anaesthesiologist (ASA) grade III and IV.
Coagulopathy or anti coagulation treatment (INR>1.5)
Infection at the site of injection.
Congenital abnormalities of lower spine.
Raised intracranial tension and active disease of CNS.

forty patients belonging to ASA I-II, aged between 18-60 years scheduled for elective lumbar microdiscectomies were enrolled in the study. All patients underwent pre anesthetic evaluation on the previous day of surgery. The ASA and MPC classification were recorded. Basic lab investigations like haemoglobin (Hb), fasting blood sugar (FBS) or random blood sugar (RBS), blood urea, serum creatinine and electrocardiography (ECG) were carried out routinely in all patients. Chest Radiography was taken when indicated. Patients were premedicated with Tab Rantac 150 mg and Tab Anxit 0.5 mg H.S. In both groups intravenous (IV) line was obtained with 18 gauge cannula. Inj Ondansetron 4 mgs IV and Inj Rantac 50 mgs IV were given and the patients were preloaded with Ringer lactate 500 ml half an hour before the procedure. The anaesthesia machine was checked before the start of the procedure. Drugs and equipments necessary for general anaesthesia and resuscitation were kept ready. A single surgeon and a group of anaesthesiologists were responsible for performing all the operations. Routine monitors like electrocardiograph (ECG), non invasive blood pressure (NIBP) and pulse oximetry (SpO2) were applied in the operating room. Baseline readings were recorded. Glycopyrrolate 0.01 mg/kg and midazolam 0.05 mg/kg were given for sedation and intraoperative amnesia. Fentanyl 2 microgram/kg was given for intraoperative analgesia. Patients were induced with propofol 2 mg/kg. Tracheal intubation facilitated with succinyl choline 1.5 mg/kg. Intratracheal tube placement was confirmed by auscultation of the chest and capnography. Patients were put in prone position after giving vecuronium 0.1 mg/kg. Silicone horse shoe gel pad and prone position gel bed (@LENVITZ) were used to minimize discomfort. Endobronchial tube displacement was checked after turning the patients to prone position. Anaesthesia was maintained with intermittent vecuronium 0.05 mg/kg, isoflurane (0.4 – 1.5%), nitrous oxide and oxygen. The lungs were ventilated to maintain end-tidal carbon dioxide between 32 and 36 mm Hg. Nitrous oxide was discontinued after the patients were fully awake. Patients were put in supine position. Neuromuscular reversal was achieved with neostigmine 0.05 mg/kg and glycopyrrolate 0.01 mg/kg. Extubation was done in supine position after confirming the patient's response to verbal commands.

The patients were placed in left lateral position. With all aseptic precautions a skin wheel was raised in the T10 - T11 or T11 – T12 interspace with 2 ml 2% Lignocaine. An 18 G Tuohy's (@B BRAUN) needle was passed through the space for a depth about 1 cm. The stylet was removed and a 10 ml Loss of Resistance (LOR) syringe was firmly attached to the hub of the Tuohy's needle. The needle was slowly advanced until it enters the epidural space, which was identified by piston being drawn inside (loss of resistance technique). The epidural space was confirmed by hanging drop sign after disconnecting the LOR syringe. Absence of blood or CSF was verified by negative aspiration. An 18 G epidural catheter was passed through the epidural space with the catheter tip downwards 5 cm into the space. 3 ml of 2% Lignocaine with epinephrine 1:200000 was given as test dose. This was to exclude the presence of needle in the intravascular (hypertension and tachycardia) or subarachnoid (numbness) space.

Results

Table 1: age, weight and height distribution in both groups

	Groups (Anaesthesia)	N	Mean	Std. Deviation	P value
AGE (in yrs)	General (GA) Epidural (E)	20 20	46.35 46.40	5.887 7.111	0.981
WEIGHT (in kgs)	General Epidural	20 20	69.55 68.30	5.501 6.105	0.501
HE GHT (in ms)	General Epidural	20 20	166.35 166.85	7.15 7.05	0.825

Table 2: gender distribution in both groups

Groups	SEX		Total
	Female (%)	Male (%)	
GENERAL (GA)	9 52.9%	11 47.8%	20 50.0%
EPIDURAL (EA)	8 47.1%	12 52.2%	20 50.0%
Total	17 100.0%	23 100.0%	40 100.0%

There were a total of 23 males (58%) and 17 females (42%) who participated in this study. The average BMI among females was 25.04 and the average BMI among males was 24.75. On statistical analysis, gender distribution between both the groups showed no difference (p>0.05).

Table 3: asa grade among patients

ASA	Frequency	Percent
1	29	72.5
2	11	27.5
Total	40	100.0

Out of 40 patients, 29 (72.5%) belonged to ASA 1 and rest of them were ASA 2.

Table 4: mallampati classification (mpc) crosstabulationbetween both groups

MPC	ANAESTHESIA		Total
	GENERAL	EPIDURAL	
1	12 (60%)	14 (70%)	26
2	8 (40%)	6 (30%)	14
Total	20	20	40

There were no statistically significant difference in mallampati classification between both groups (p>0.05). Spine was palpable in all patients.

Table 5: time (in mins) taken for the onset (osb) and maximumlevel of sensory block (mlsbt) among patients in ea group

	OSB	**MLSBT**
Mean	6.70	16.75
Std. Deviation	1.174	2.447
Minimu	4	15
Maximum	8	20

The time taken for the onset of sensory block was 6.70 +/- 1.174 (mean +/- SD) mins. The maximum level of sensory block was attained in 16.75 +/- 2.447 mins.

The intraoperative heart rate was compared using student T test. The baseline HR in group GA was 73.25 +/- 7.793 mmHg and in group EA was 71.55 +/- 4.536 mmHg which showed The surgical onset time (SOT) was more in the EA group (24.30 +/- 2.958 mins) Headache was seen in a total of 5 (12.5%) patients with 3 patients in GA group and rest in EA group. Pruritus and bradycardia was noticed in 3 (7.5%) patients with 2 patients in GA group and 1 patientin EAgroup. Hypotension was seen in 4(10%) patients with 3 patients in GA group and 1 patient in EA group. None of the patients had respiratory depression. 16 (40%) patients were totally satisfied with regard to pain relief for the initial postoperative period, out of which 14 (70%) patients were from the epidural group. 9 (45%) patients in GA group and 5 (25%) patients in EA group were reasonably satisfied with pain relief. 9 (45%) patients in GA group were moderately dissatisfied whereas only 1 (5%) was moderately dissatisfied in the EA group. None of the patients were totally dissatisfied with the pain relief.

Discussion

First discectomy was done by Oppenheim and Fedre Krause in 1906 though the first publication was done by Mixter and Bar. [10] Since then laminectomy, hemilaminectomy and fenestration were introduced and are still being widely practiced world over. Yasargil and Caspar (1977) [11,12] started the use of microscopes for posterior discectomy which limited the skin incision and less muscle and epidural scarring. Patients had less postoperative pain, early rehabilitation, and early return to work. Eversince then, microdiscectomy has become a gold standard procedure. Nowadays, microendoscoic discectomies (MED) and endoscopic laser discectomies also are becoming popular. Traditionally, administration of general (GA), regional or combined anesthetic techniques have been described for performing lumbar laminectomies. GA is used routinely; it is preferred by anaesthesiologists because it allows standard monitoring of vital parameters of the patient. Also, GA is often preferred by patients because it can avoid the anxiety linked to the awareness of undergoing a surgical operation and the fear of feeling pain. [13] Though general anaesthesia has the advantages of carrying out prolonged surgeries in the prone position without airway compromise, its disadvantages such as increased blood loss, increased mean arterial pressure and heart rate along with higher incidences of post-operative arterial and venous emboli injuries from peripheral nerve compression during patient positioning and postoperative nausea and vomiting exist. To add, decreased incidence of nausea and vomiting favored the use of regional anaesthesia in such cases. [14] Regional anesthetic techniques such as spinal, continuous epidural and combined spinal epidural can provide stable haemodynamics, minimizing intra-operative bleeding resulting in a better surgical field. Regional anaesthesia also provides better muscle relaxation with early post-operative analgesia. It presumably decreases blood loss by two mechanisms. One mechanism is vasodilatation and hypotension caused by sympathetic blockade. Patients under regional anaesthesia have spontaneous ventilation which causes lower intrathoracic pressure and consequently less distension of epidural veins. This is another and more important mechanism of decreasing bleeding after regional anaesthesia. Less bleeding would facilitate dissection and removal of disc in less time as less time is needed to achieve haemostasis. Awake patient can self position to avoid nerve injury to brachial plexus and pressure necrosis to face which may occur in the malpositioned patient under general anaesthesia. [15] Spinal anaesthesia has previously been reported for lumbar spine surgeries and is mentioned in anesthetic textbooks, it is unclear exactly how widely the technique has been practiced. [3] McLain's randomized and controlled case–control study of 400 patients [16] concluded that SA was at least as effective as GA for performing elective lumbar decompression surgeries and proposed some advantages of SA over GA. However it was associated with side effects like intense hypotension and bradycardia. More recently, epidural anaesthesia is being administered for lumbar microdiscectomies. The advantages of epidural anaesthesia are as follows: reduced blood loss, prevention of thromboembolism and facilitation of intraoperative assessments of the adequacy of spinal decompression. Epidural anaesthesia may offer potential advantages over spinal anaesthesia for lumbar spine surgeries, including the ability to provide analgesia for virtually an unlimited amount of time, and to avoid violating the dura and possible resulting headaches. [5] Epidural anaesthesia also resulted in decreased postoperative pain scores and analgesic requirements, decreased postoperative nausea, decreased postoperative urinary retention and pulmonary complications. Therefore, the present study was performed to compare the intraoperative and postoperative outcomes of general anaesthesia and epidural anaesthesia for single level lumbar microdiscectomies. The procedural and/or anaesthesia time may be equal to longer than in case of general anaesthesia. During the surgical procedure itself, less blood loss may also shorten surgical time. A cleaner operative field may be explained by either spontaneous breathing of the patient, causing lower intra-thoracic pressure with subsequent less distention of the epidural veins, or otherwise the induction of hypotension and vasodilatation due to the sympathetic block. McLain et al. [16], Papadopoulos et al., Sadrolsadat et al. and Chen et al. showed similar findings. In our study, the surgical onset time (SOT) was more in the EA group (24.30 +/- 2.958 mins) when compared to the GA group (14.05 +/- 2.259) and the difference was highly significant. But surgical time (128.75 +/- 15.13 in GA vs 124.20 +/- 18.79 in EA) and total anaesthesia time (160.75 +/- 16.73 vs 154.05 +/-

17.92) were comparable among pateints in both the groups. Our results were similar to Demirel et al.'s study.Despite common occurrence of some degree of hypotension, it was found that haemodynamic stability may be better maintained with somewhat lower heart rates and blood pressures than in patients under GA, possibly due to inhibited release of stress hormones, glucose, and interleukins intra-operatively. A reduction in thromboembolic complications has also been reported in patients receiving epidural anaesthesia for back surgery, most probably related to either faster mobility and/or modulation of the hypercoagulable state that occurs and persists after major surgery. Another benefit of regional anaesthesia is the ability of the patient to self position. Being awake or, at the most slightly, sedated, this may prevent complications related to malpositioning of the head, eyes, and upper extremity, and resulting in blindness, brachial plexus pathology, or pressure sores. Although urinary retention is commonly considered to be a problem after all central nerve blocks, mostly due to the local anesthetic and/or opioid effect, others found the incidence after spine surgery to be similar or even more frequent among patients operated under GA. [17] GA will be a better choice for procedures lasting longer than 2 hours or procedures with a possibility of excessive blood loss, such as multiple level laminectomies, extended spinal fusions, and spine distraction procedures using rods or pedicle screws. The upper sensory level should be at T10 or higher, to provide adequate surgical anaesthesia, but high levels of motor block are poorly tolerated in the prone position, because of lack of abdominal muscle strength and the inability to breathe deeply against possibly increased abdominal pressure. Obese patients with protuberant abdomens are also more likely to be candidates for GA, because their ability to breathe in the prone position may be compromised. As a consequence, epidural anaesthesia will be mostly restricted to lumbar (micro) discectomies, laminectomies, MED's or endoscopic laser discectomies.

Conclusion

The main aim of our study was to compare the intraoperative and postoperative outcomes of general anaesthesia and epidural anaesthesia in single level lumbar microdiscectomies. 40 ASA I and II, both male and female patients, posted for single level lumbar microdiscectomies were chosen for the study and the patients were divided into two groups of 20 each. Group GA underwent the operation under general anaesthesia and group EA underwent the surgery under epidural anaesthesia. Patients were observed in the recovery room for 24hrs.

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