DOI: 10.5137/1019-5149.JTN.8715-13.1
Received: 14.06.2013 / Accepted: 01.10.2013
Published Online: 16.02.2016

Original Investigation

Lumbar Disc Surgery with Epidural Anesthesia: Review of 700 Cases

Serdal ALBAYRAK[1], Fatih S. EROL[2], Ismail DEMIREL[3], Omer AYDEN[1], Necati UCLER[4]

[1]Elazig Education and Research Hospital, Department of Neurosurgery, Elazig, Turkey
[2]Firat University, School of Medicine, Department of Neurosurgery, Elazig, Turkey
[3]Firat University, School of Medicine, Department of Anesthesiology and Reanimation, Elazig, Turkey
[4]Adiyaman University, Education and Research Hospital, Department of Neurosurgery, Adiyaman, Turkey

ABSTRACT

AIM: Lumbar disc surgery can be performed under general anesthesia or regional anesthesia methods. There are long-standing discussions between neurosurgeons, orthopedic surgeons and anesthesiologists concerning the use of epidural anesthesia in lumbar surgery. The results of this study's 700 lumbar disc surgery cases operated with epidural anesthesia in our clinic between September 2006 and December 2011 will contribute to these discussions.

MATERIAL and METHODS: This study included 700 patients underwent lumbar disc surgery with epidural anesthesia, which consisted of 388 males (55%) and 312 females (45%). Forty-two of these cases had recurrence disc herniation and only 11 of 42 cases were operated in our department.

RESULTS: Eleven of 700 cases had dural injury and were repaired intraoperatively by primary sutures and tissue sealants. Infection of the incision site developed in six patients, who healed with appropriate antibiotic treatment with no problems. In addition to those 700 cases, 22 patients received general anesthesia in which we started with epidural anesthesia. Microdiscectomies were performed in 578 of 700 cases, and open surgery in 122 cases.

CONCLUSION: This study showed that epidural anesthesia seems more advantageous for some patients since it does not have some of the risks that general anesthesia bears.

KEYWORDS: Epidural anesthesia, Lumbar disc surgery, General anesthesia

INTRODUCTION

The results of various lumbar disc surgery methods are similar, independent of the surgical technique and the type of anesthesia (7-16). Though general anesthesia (GA) is used more frequently than regional anesthesia (RA) methods (epidural anesthesia [EA] and spinal anesthesia [SA]) in lumbar disc surgery, the use of RA is becoming widespread (19). RA is known to decrease blood loss through decreasing peripheral venous pressure and prevents complications resulting from malpositioning in GA (peripheral nerve injuries, brachial plexus injury, and pressure necrosis in the face and eyes). This is because the operation is usually performed in the prone position by enabling the patient to position him/herself (10). In addition, it has been reported that pulmonary and vascular complications are less common with RA than with GA (18). EA can be a stronger alternative to GA since the perioperative complications are lower, the patient recovers more rapidly in the postoperative phase in comparison to GA, and pain, nausea and vomiting, and the need for analgesics are less. In this study

Corresponding author: Necati UCLER
E-mail: necati_ucler@yahoo.com

we aimed to discuss EA procedure's advantages and disadvantages to GA with review of our 700 cases.

MATERIAL and METHODS

Lumbar disc patients that underwent surgery in the Neurosurgery Department of the Elazig Education and Research Hospital between September 2006 and December 2011 were studied retrospectively. A total of 700 lumbar disc patients to whom EA was applied were included in the evaluation. All of these patients had lumbar magnetic resonance imaging. In addition, 30 patients had lumbar computerized tomographic evaluation preoperatively.

All patients operated on with EA had an ASA classification between I-IV. Patients with uncontrolled diabetes, malign hypertension, patients having contra-indication for regional anesthesia, patients with haemorrhagic diathesis, the use of anticoagulants, infection in the operation site, patients with neurological problems other than those caused by the lumbar disc, Kobner positive patients such as psoriasis, pemphigus vulgaris, patients who are allergic to local anesthetics, patients who had cooperation problems and patients who did not accept epidural anesthesia were excluded from the study. Patients included in the study were seen in their bed and their pre-anesthesia examinations were done one day before the operation. They were informed about both regional and general anesthesia and their informed consent was obtained.

Pre-medication was not performed on patients on the day of the operation. Patients taken to the operating room first had venous access secured from the back of the hand with a 20 gauge angio-cut, and 10 ml/kg isotonic liquid perfusion was started. Continuous ECG, non-invasive blood pressure, and peripheral oxygen saturation (SaO2) monitoring was initiated. With the patient in a seated position, the intervention location for the patients who will have EA was determined to be one level higher than the protruded disc location (for example, the L4-L5 location for the L5-S1 disc) (Figure 1A, B). After two basal blood pressure (BP) measurements, BP was measured every three minutes during the first 20 minutes of EA, and every five minutes after, if BP was stable. All the catheters were placed while in the seated position. After cleaning the area, infiltration anesthesia was administered to the insertion location with 3 ml prilocaine. The epidural location was determined from the middle line with 18 Gauge Tuohy syringe using the hanging-drop technique. After determining the epidural location, a 20-Gauge catheter was forwarded 3-4 cm towards the cephal from the epidural syringe and was placed there. A 3 ml test dose of prilocaine was administered through the epidural catheter. After five minutes, the patient was questioned for symptoms such as numbness in the leg, tingling, lethargy or findings for intravascular injection vertigo, metallic taste in the mouth, tachycardia or tinnitus, to determine the presence of subarachnoid bleeding. If no symptoms were present, 15 ml of levobupivacaine and 50 mcg of fentanyl were administered. After 15 minutes, the patient was brought to the prone position and was placed in the appropriate position for lumbar disc surgery. Immediately

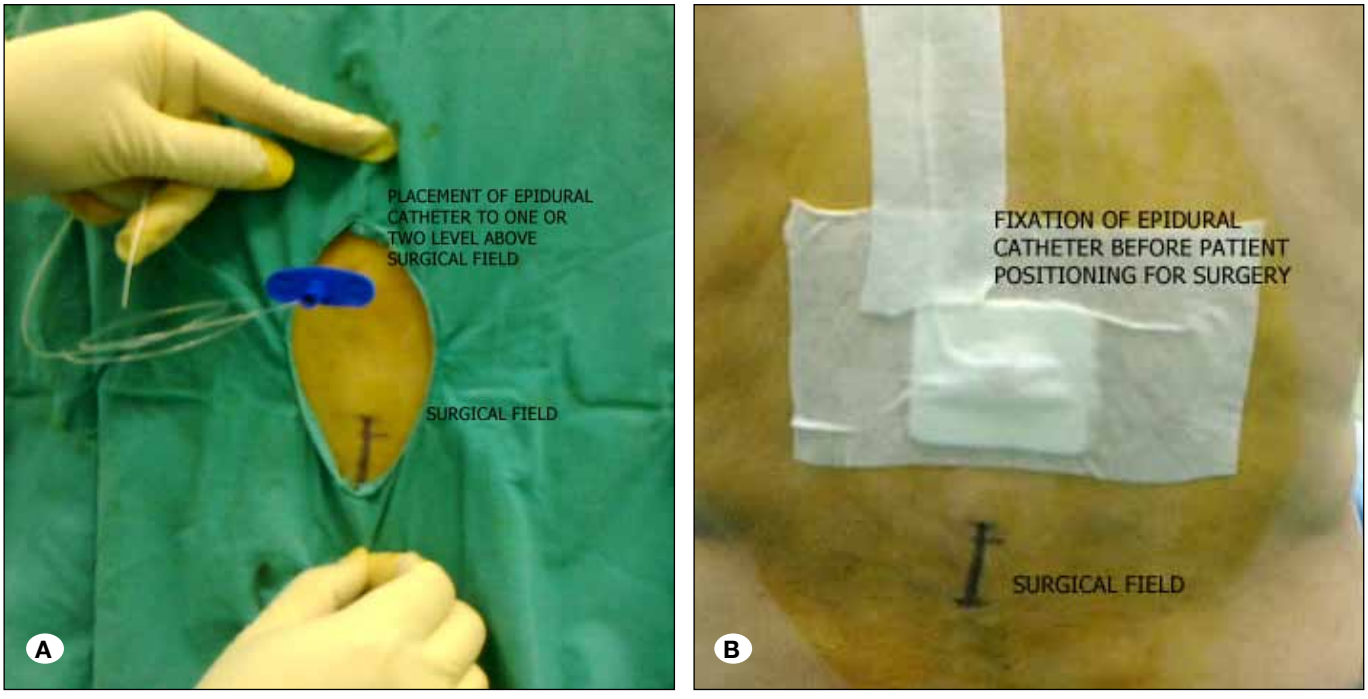

Figure 1A,B: Photos showing position of patients, epidural catheter, and surgical field and fixation of epidural catheter to one or two level above surgical field.

after completion of the surgery, the epidural catheter was withdrawn and analgesia was administered intravenously.

RESULTS

The male/female ratio within 700 cases requiring epidural anesthesia was 1.24 (55% male, 45% female). The average age of such patients was 45.18 and the age range was 18-82. Moreover, 82% (578/700) of them were operated by micodiscectomy.

Admission symptoms and findings were shown in the Table II. 642 patients' disc pathology (91.8%) was at one level, 45 (6.4%) were at two level, 10 (1.4%) were at bilateral, and 3 (0.4%) were at three level. 42 of the 700 patients (6%) had recurrent disc pathologies. The most frequently operated disc level was L4-L5 in 337 patients (48%). 166 of 377 were on the left and 171 on the right. Out of 700 cases, 339 (48.4%) were extruded, 150 (21.4%) were sequestrated, 176 (25.2%) had protrusion, and 35 (5%) had spinal central stenosis-bulging-lateral recess stenosis findings.

Dural laceration occurred in 11 patients (1.5%), who had been repaired primary sutures and with tissue sealant. The average operation duration was 55 minutes (ranging between 30-120 minutes). Postoperative blood transfusions were required in 5 patients (0.7%) of 700, including two with chronic anemia. Horner syndrome, resulting from the epidural anesthesia developed in one patient. Symptoms of Horner syndrome developed 30 minutes after the injection of the local anesthetic drugs and disappeared completely after 180 minutes. None of the patients developed discitis or epidural catheter infection. Patients with dural laceration were mobilized one day after the operation, while patients without dural damage were mobilized two hours after the operation. Ten patients, whose complaints continued after the operation, were re-operated on with EA within one week, and one patient within two weeks.

Eight patients were operated on at the same level, and three patients on a different level (11/700, 1.57%). Of these 11 patients, one of them developed foot drop in the first post-operative day and was re-operated on the same day. The average hospitalization duration was 4.9 days (3-9 days). Urinary retention developed in 20 patients (2.85%). Though EA was provided in 700 patients in the Neurosurgery Department of Elazig Education and Research Hospital between September 2006 and December 2011, general anesthesia was used in 22 patients in whom EA could not be provided (not included in the 700 patients). In addition, 74 patients during these dates preferred lumbar disc surgery with GA. The total number of disc surgery cases in this period was 774 and epidural anesthesia preference was 90.4% (700/774). Table III shows disc pathologies and surgical techniques in 700 cases.

DISCUSSION

There are many satisfactory publications about the use of every anesthetic technique in lumbar disc surgery. Their usage is primarily determined by the surgeon, anesthesiologist and the patient. On the other hand, it has been proven

Table I: Demographic and Clinical Features of 700 Cases Operated under Epidural Anesthesia

Patient Characteristic		
Average age (range)	45.18 (18-82) years	
	n	**(%)**
Gender		
Male	388	(55)
Female	312	(45)
Recurrent disc herniation	11	(1.57)
Operative Characteristic		
Average time	55 (30-120) minutes	
	n	**(%)**
Anesthesia type		
Epidural	700	(90.4)
General	74	(9.6)
Blood transfusion requirement	5	(0.7)
Dural damage	11	(1.5)

Table II: Symptoms and Findings of 700 Patients Requiring Epidural Anesthesia

Symptom/Finding	**n**	**(%)**
Radicular pain	420	(60)
Weakness	35	(5)
Radicular pain and weakness	238	(34)
Cauda equina syndrome	7	(1)

Table III: Surgical Technique and Lumbar Disc Pathology in 700 Patients Requiring Epidural Anesthesia

Characteristic	**n**	**(%)**
Surgical Technique		
Microdiscectomy	578	(82.6)
Macrodiscectomy	122	(17.4)
Disc Pathology		
One level	642	(91.8)
Bilateral	10	(1.4)
Two levels	45	(6.4)
Three levels	3	(0.4)

that EA is safe, well tolerated by the patient and effective (20). EA use in lumbar disc surgery was also preferred by the patients in this study (90.4% of the patients), since it enables the patient to be conscious, and provides verbal contact with the surgeon. There are also many potential disadvantages of regional anesthesia for this procedure including failed regional block, difficulties with conversion to general anesthesia and airway manipulation in the prone position; difficulties with sedation in the prone position; risk of epidural infection, hematoma, nerve damage, inadvertent intrathecal block, high neuraxial block with potential for cardiorespiratory collapse, cauda equina syndrome, spinal headache with inadvertent intrathecal block.

Similar to the study by Smrcka et al. (20), this evaluation concluded that patients during EA tolerate the movements of the nerve root, and when the nerve compression was relieved, most of patients felt this relief during the operation. The definite contra-indications to EA are: allergy to local anesthetic drugs, not being accepted by the patient, increased intra-cranial pressure, infection in the surgical area. Relative contra-indications are hypovolemia, coagulopathy, or anticoagulant treatment, systemic sepsis, progressive neurologic disease, and chronic lumbar pain (13). The advantages of EA are: easy application; low cost; feasibility in previous medical conditions, such as advanced pulmonary disease, renal insufficiency, and diabetes; causes no environmental pollution; avoids airway obstruction; maintains protective reflexes (8); protection against pulmonary embolism and deep venous thrombosis (14); decreased blood loss; and decrease in stress response after major surgery (11).

Nausea and vomiting, and the need for urinary catheterization after general anesthesia were seen less frequently in the patients that received EA, consistent with the study performed by Greenbarg et al. (9). The average hospitalization duration for the patients was 4.9 days, while Greenberg et al. reported that this period was 5.9 days for the patients who received GA in their study (9).

Only five patients in this study (0.7%) required blood transfusion in the postoperative period. Preoperative Hb/Htc values in these patients were borderline and two of them had chronic disease anemia. The reason for low blood loss with EA was decreased tension in the epidural veins due to decreased intra-thoracic pressure (3).

Since the patients are awake during EA, complications resulting from malposition occurring with GA do not occur with EA (10). In this study, there was no harm resulting from malposition in the patients. The patient can position him/herself and can change his/her position if needed and thus is protected from complications resulting from malposition under GA, such as pressure necrosis of the face, or damage to the brachial plexus and the ulnar nerve (10). Generally, patients may have some pain at the beginning of the operation under EA because of the nerve root, which is still under pressure. However, the pain is relieved after locating the nerve root and eliminating the pressure (20). When decompression is completed, a lack of pain will prove to the patient that the correct nerve root was decompressed. Thus EA provides advantages in location determination (20). This results in less radiation and environmental pollution and graphy cost. Use of fluoroscopy or ultrasound may be helpful for ensuring optimal epidural catheter placement particularly because fluoroscopy is typically present in the room for lumbar disc surgery.

Neuro-axial blockage decreased the postoperative mortality and other serious complications (1). The advantages of EA are: a lack of side effects resulting from intubation, enabling postoperative analgesia, decreased nausea/vomiting, decreased thrombo-embolism, better hemodynamic stability than spinal anesthesia, low or no motor block. while late start of the effect, the possibility to develop motor block are among the unwanted effects of epidural block (2). Myocardial infarction is a serious cause of postoperative death (1). Present systemic studies have demonstrated that neuro-axial blockage decreased postoperative mortality and other serious complications (1, 15). No serious systemic complications or mortality was seen in the 700 patients of this study.

One of the major advantages of EA is decreased nausea/vomiting and very good postoperative analgesia. In the study performed by Demirel et al., the need for analgesia was found to be higher in GA than EA (6). Though antiemetic drugs were not used routinely in this study, patients did not complain of nausea/vomiting during the postoperative phase. In addition, the epidural catheters were withdrawn early since the patients had no need for analgesia.

Dahlgren et al. reported that the rate of epidural abscess caused by the epidural catheter was zero out of 9232 patients in their study, while it was reported in two cases out of 13,000 obstetric patients by Kindler et al. (5, 12). In this study, the epidural abscess rate was zero in 700 patients.

The occasion of Horner Syndrome occurrence and the duration of its symptoms are also variable after local anesthetic application. Roth and Finck (17) reported a Horner Syndrome case starting at the 10^{th} minute after a lumbar epidural block was performed for labor analgesia and continued for 60 minutes. Chandrasekhar and Peterfreund (4) also reported that symptoms of Horner Syndrome developed in a case of a lumbar epidural block that disappeared two hours after the administration of the local anesthetic drug. Also in this case, symptoms developed 30 minutes after the injection of the local anesthetic and disappeared completely after 180 minutes.

Although GA may be preferred for the education of the resident, since the patient is fully conscious during epidural anesthesia, Smrcka M. et al. reported that residents can perform the operation of the patient for their education,

being accompanied by senior tutors and the patient will not feel uncomfortable (20). Also during operation performed by residents, operating room communications should be done with technical nuances for an awake patient.

CONCLUSION

The superiority of EA over GA is clear in lumbar disc surgery when comparing clinical results with the results of other studies in the literature. This study showed us that EA seems more advantageous for some group of patients since it does not have the risks that GA bears. However, multicentric, randomized, and prospective trials with different anesthesia and surgical techniques, evaluation of patients' satisfaction and monitoring pain scores during surgery should be performed in order to fully undertand the results of the current study.

REFERENCES

1. Beattie WS, Badner NH, Choi P: Epidural analgesia reduces postoperative myocardial infarction: A meta-analysis. Anesth Analg 93: 853-858, 2001
2. Bonica JC: The management of pain. 2nd ed. Philadelphia: Lea and Febriger, 1990: 1883
3. Bromage PR: Epidural analgesia. Philadelphia: W.B. Saunders, 1978: 746
4. Chandrasekhar S, Peterfreund RA: Horner's syndrome following very low concentration bupivacaine infusion for labor epidural analgesia. J Clin Anesth 15: 217-219, 2003
5. Dahlgren N, Törnebrandt K: Neurological complications after anesthesia. A follow-up of 18,000 spinal and epidural anesthetics performed over three years. Acta Anaesthesiol Scand 39: 872-880, 1995
6. Demirel CB, Kalayci M, Ozkocak I, Altunkaya H, Ozer Y, Acikgoz B: A prospective randomized study comparing perioperative outcome variables after epidural or general anesthesia for lumbar disc surgery. J Neurosurg Anesthesiol 15: 185-192, 2003
7. Goffin J: Microdiscectomy for lumbar disc herniation. Clin Neurol Neurosurg 96: 130-134, 1994
8. Grant IS: Intercurrent disease and anesthesia. In: Aitkenhead AR, Smith G (eds), Textbook of Anesthesia, 2nd ed. Edinburgh: Churchill Livingstone, 1990: 645-676
9. Greenbarg PE, Brown MD, Pallares VS, Tompkins JS, Mann NH: Epidural anesthesia for lumbar spine surgery. J Spinal Disord 1:139-143, 1988
10. Jellish WS, Thalji Z, Stevenson K, Shea J: A prospective randomized study comparing short- and intermediate-term perioperative outcome variables after spinal or general anesthesia for lumbar disc and laminectomy surgery. Anesth Analg 83: 559-564, 1996
11. Kehlet H: Modification of responses to surgery by neural blockade: Clinical implications. In: Cousins MJ, Bridenbaugh PO (eds), Neural blockade in Clinical Aneasthesia and Management of Pain, 2nd ed, Philadelphia: Lippincott, 1988: 145-188
12. Kindler C, Seeberger M, Siegemund M, Schneider M: Extradural abscess complicating lumbar extradural anesthesia and analgesia in an obstetric patient. Acta Anaesthesiol Scand 40: 858-861, 1996
13. Levine WC: Clinical Anesthesia Procedures of the Massachusetts General Hospital. 3rd ed. 1988: 207
14. Modig J, Borg T, Karlström G, Maripuu E, Sahlstedt B: Thromboembolism after total hip replacement: Role of epidural and general anesthesia. Anesth Analg 62:174-180, 1983
15. Riegel B, Aliebert F, Becq MC, Duckert I, Krivosic-Horber R: Lumbar disc herniation with surgical option: General versus local anesthesia (round table). Agressologie 34: 33-37, 1994
16. Roberts MP: Lumbar disc herniation. Standard approach. Neurosurg Clin N Am 4: 91-99, 1993
17. Rotke KF, von Finck M: Das Horner Syndrom in der Geburtshilfe. Regional Anaesthe 8: 36-38, 1985
18. Scott NB, Kehlet H: Regional anesthesia and surgical morbidity. Br J Surg 75:299-304, 1988
19. Smith DM, Zwerling AJ, Rocco MJ, Kumar J, Cwik JC: Spinal anesthesia for lumbar laminectomy: A technique revisited and revised. Regional Anesthesia 2:20, 1995
20. Smrcka M, Baudysová O, Jurán V, Vidlák M, Gál R, Smrcka V: Lumbar disc surgery in regional anesthesia-40 years of experience. Acta Neurochir (Wien) 143:377-381, 2001