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SPINAL ANESTHESIA FOR ELECTIVE LUMBAR SPINE SURGERY: IS IT EFFECTIVE?

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ABSTRACT

Background: Lower back pain is a common problem in society leading to a decrease in work forces. Clinical studies indicate that the source of back pain is intervertebral disc and lumbar stenosis. Surgery for lumbar disc and lumbar stenosis can be performed under general or local anesthesia. In this study, we aimed retrospectively examination lumbar disc and lumbar stenosis patients, operated under SA, and evaluate advantages and disadvantages of this technique.

Methods: Two hundred twenty two patients who were operated for lumbar disc herniation (LDH) and lumbar stenosis (LS) under SA between March 2012 and September 2013 were included in this study. Clinical data, neurological examination, additional diseases, VAS scores, operation duration, intraoperative complication, first ambulation time, postoperative headache and hospital stay durations were collected for statistical analysis.

Results: Ninety-four (42.3 %) patients were male, and 128 (57.7 %) were female. Mean age of the males and females were 47.6 and 48 years, respectively (p=0.74). Most frequent operation technique was hemipartial laminectomy and microdiscectomy (73.9 %), followed by HPL and foraminotomy (25.2 %). Comparisons between males and females revealed operation type (p=0.39), diagnosis (p=0.17), and localization (p=0.25) not to be statistically significant between genders. There was statistically significant decrease in the VAS scores immediately after surgery (p<0.001). 7 (3%) patients needed additional intraoperative anesthetic. 8 (3.6 %) patients experienced hypotension and nausea during surgery. 153 (68.9 %) patient did not suffer from postoperative headache, while 11 (4.9 %) patient had severe headache.

Conclusion: Our study also supports spinal anesthesia in elective lumbar surgeries to decrease the surgical procedure time, loss of blood, earlier postoperative mobilization and oral feeding. However, disadvantages include post-op headache and the hypotension due to spinal anesthesia level getting higher, nausea and vomiting. In well-selected cases, the effectiveness of spinal anesthesia is proven high.

Key Words: Elective lumbar surgery, spinal anesthesia, general anesthesia.

Level of Evidence: Retrospective clinical study, Level III.

INTRODUCTION

Lower back pain is a common problem in society leading to a decrease in work forces. The lifetime prevalence reaches 80 % and annual hospital admission rates of the adult population are 15 %. Clinical studies indicate that the source of back pain are intervertebral disc pathologies in up to 39 % [(2)]. Open discectomy is the most commonly used surgical technique for lumbar disc herniation cases. Surgery can be performed under general or local anesthesia. Patient satisfaction and the ability to carry out prolonged operations in prone position without airway compromise are of advantages of using GA.

Regional anesthesia can be used for lower thoracic or lumbar spinal procedures [(1-2)]. Alternatively, the most important advantages of regional

anesthesia are the decrease of intraoperative blood loss and consequently improving operating conditions, the decrease in perioperative cardiac ischemic incidents, postoperative hypoxic episodes, arterial and venous thrombosis, and to provide proper postoperative pain control [1,10].

Additionally, in order to prevent brachial plexus injury and facial pressure necrosis, it is better to allow patients to position themselves while they are awake.

For regional anesthesia, spinal or epidural anesthesia can be selected [1,12,15]. With SA, the nerves carrying pain to the lower body and to the muscles of the lower extremities are paralyzed for a short amount of time. SA does not affect the function of the brain, respiratory system and intestines, which is caused conventional anesthesia. Therefore, patients undergoing surgery with SA will be able to be fed orally and mobilized earlier post-operatively. SA and epidural anesthesia are very similar techniques but the effect of narcotic medication administered during epidural anesthesia is shorter, hence requiring the needle to be fixated at site. Thus, as the effect of anesthesia passes, the drug can be re-administered. Compared to epidural blockade, SA provides a more rapid onset, a more predictable level of analgesia, and a more profound degree of surgical anesthesia. On the other hand, SA is associated with a greater degree of hypotension compared to epidural anesthesia [4]. However, SA may cause cardiologic and neurologic difficulties.

In this study, we aimed retrospectively examination of lumbar disc and lumbar stenosis patients, operated under SA, and evaluate advantages and disadvantages of this technique.

MATERIALS AND METHODS

Patients

Two hundred twenty two patients who were operated for lumbar disc herniation (LDH) and lumbar stenosis (LS) under SA between March 2012 and September 2013 were included in this study. Patients with uncontrolled diabetes, malignant hypertension, contra-indication for regional anesthesia, hemorrhagic diathesis, the use of anticoagulants, infection on operation site, neurological problems other than those caused by the lumbar disc, Kobner positive (psoriasis, pemphigus vulgaris), allergies of local anesthetics allergic, patients with cooperation problems and who did not accept epidural anesthesia were excluded from the study. Patients included in the study were seen on the ward in their rooms and their pre-anesthesia examinations were performed one day prior to the operation. They were informed about both regional and GA and their informed consent was obtained.

Clinical data, neurological examination, additional diseases, VAS scores, operation duration, intraoperative complication, first ambulation time, postoperative headache and hospital stay durations were collected for statistical analysis.

Spinal Anesthesia Technique

Premedication was administered for all patients before transferred to the OR. Generally, preoperative opioid is helpful in relieving the pain associated with needle insertion. The patient must be monitored during the induction of spinal anesthetic with a pulse oxymeter, blood pressure cuff and ECG. Noninvasive blood pressure should be measured at 1-minute intervals initially as hypertension may occur suddenly.

After positioning of the patient (usually sitting position), the incision site is cleaned with preparation solution and area should be covered with sterile cover. A small wheal of local anesthetic is injected into the planned operation site. Spinal needle is inserted into subarachnoid space. After confirming placement by the outflow of spinal fluid, Bupivacaine and Fentanyl are administered into the intrathecal space and patients were placed in supine position. It takes around five to ten minutes to establish spinal block (which usually occurred between T-6 and T-10). After 15 minutes, the patient is placed in an appropriate prone position for lumbar disc surgery. Oxygen at 2L/min via nasal cannula was administered afterwards.

In condition of nausea, head elevation maneuver and antiemetic drugs were effective. If surgery takes longer than planned and the patient starts experiencing pain, additional intraoperative intrathecal anesthetics are applied.

Statistical Analyses

Descriptive data were presented as mean and standard deviations, and median and min-max for numerical variables, and frequencies and percent for categorical variables. Independent group comparisons were analyzed with Chi-square and Mann-Whitney U tests between genders. Multiple group comparisons were analyzed with Friedman non-parametric test of variances, and visualized using line graphs. A Type I error level of 5% was considered as statistical significance in analyses. SPSS 18 (IBM Inc., Armonk, USA) was used for the statistical assessments.

RESULTS

Two hundred twenty two patients were included in the study. Ninety-four (42.3 %) patients were male, and 128 (57.7 %) were female. Mean age of the males and females were 47.6 and 48 years, respectively (p=0.74).

Most frequent operation technique was hemipartial laminectomy and microdiscectomy (73.9 %), followed by HPL and foraminotomy (25.2 %). Patients were mostly diagnosed with LDH (73.9 %) and LS (24.8 %). Most frequently, the pathology was localized to the left (50%), and bilateral disease was present only in 14 % of the cases. Comparisons between males and females revealed operation type (p=0.39), diagnosis (p=0.17), and localization (p=0.25) not to be statistically significant between genders (Table-1).

The changes in the VAS score before and after surgery is presented in Table-2. As expected there was a sharp and statistically significant decrease in the VAS scores immediately after surgery (p<0.001) (Table-2). This decrease was also consistent among all subgroups (Figure-1).

Seven (3 %) patients needed additional intraoperative anesthetic. 8 (3.6 %) patients experienced hypotension and nausea during surgery. 153 (68.9 %) patient did not suffer from postoperative headache, while 11 (4.9 %) patient had severe headache. Mean duration of surgery was 65 minutes and the mean hospital stay was 1.1 days.

Table-1. General demographic characteristics of patients

	All patients	Males (n=94)	Females (n=128)	p
	Mean±SD	Mean±SD	Mean±SD	
Age (years)	47.8±12.83	47.6±13.7	48.0±12.2	0.74
	n (%)	n (%)	n (%)	p
Operation type				0.39
HPL-Microdiscectomy	164 (73.9)	74 (78.7)	90 (70.3)	
HPL, foraminotomy	56 (25.2)	20 (21.3)	36 (28.1)	
HPL-pedicule screw	1 (0.5)	-	1 (0.8)	
Total laminectomy, pedicule screw	1 (0.5)	-	1 (0.8)	
Diagnosis				0.17
LDH	164 (73.9)	74 (78.7)	90 (70.3)	
LS	55 (24.8)	20 (21.3)	35 (27.3)	
Instability + LS	3 (1.4)	-	3 (2.3)	
Localization				0.25
Bilateral	31 (14)	9 (9.6)	22 (17.2)	
Right	80 (36)	37 (39.4)	43 (33.6)	
Left	111 (50)	48 (51.1)	63 (49.2)	

Table-2. Changes in the VAS scores before and after surgery

	Preoperative	Postoperative 1st day	Postoperative 7th day	Postoperative 1st month	p
	Median [min-max]	Median [min-max]	Median [min-max]	Median [min-max]	
Gender					<0.001
Male	8 [6-10]	2 [1-4]	2 [1-3]	1 [0-2]	
Female	7 [6-10]	2 [1-5]	2 [1-3]	1 [0-3]	
Operation type					<0.001
HPL-Microdiscectomy	8 [6-10]	2 [1-4]	2 [1-3]	1 [0-2]	
HPL, foraminotomy	6 [6-8]	2 [1-4]	1 [1-3]	1 [0-2]	
HPL-pedicule screw	8 [8-8]	4 [4-4]	3 [3-3]	1 [1-1]	
Total laminectomy, pedicule screw	8 [8-8]	5 [5-5]	3 [3-3]	3 [3-3]	
Diagnosis					<0.001
LDH	8 [6-10]	2 [1-4]	2 [1-3]	1 [0-2]	
LRS	6 [6-10]	2 [1-3]	1 [1-3]	1 [0-2]	
Instability + LRS	8 [8-8]	4 [4-5]	3 [3-3]	1 [1-3]	
Localization					<0.001
Bilateral	7 [6-10]	2 [1-5]	1 [1-3]	0 [0-3]	
Right	7 [6-10]	2 [1-3]	2 [1-3]	1 [0-2]	
Left	8 [6-10]	2 [1-4]	2 [1-3]	1 [0-2]	

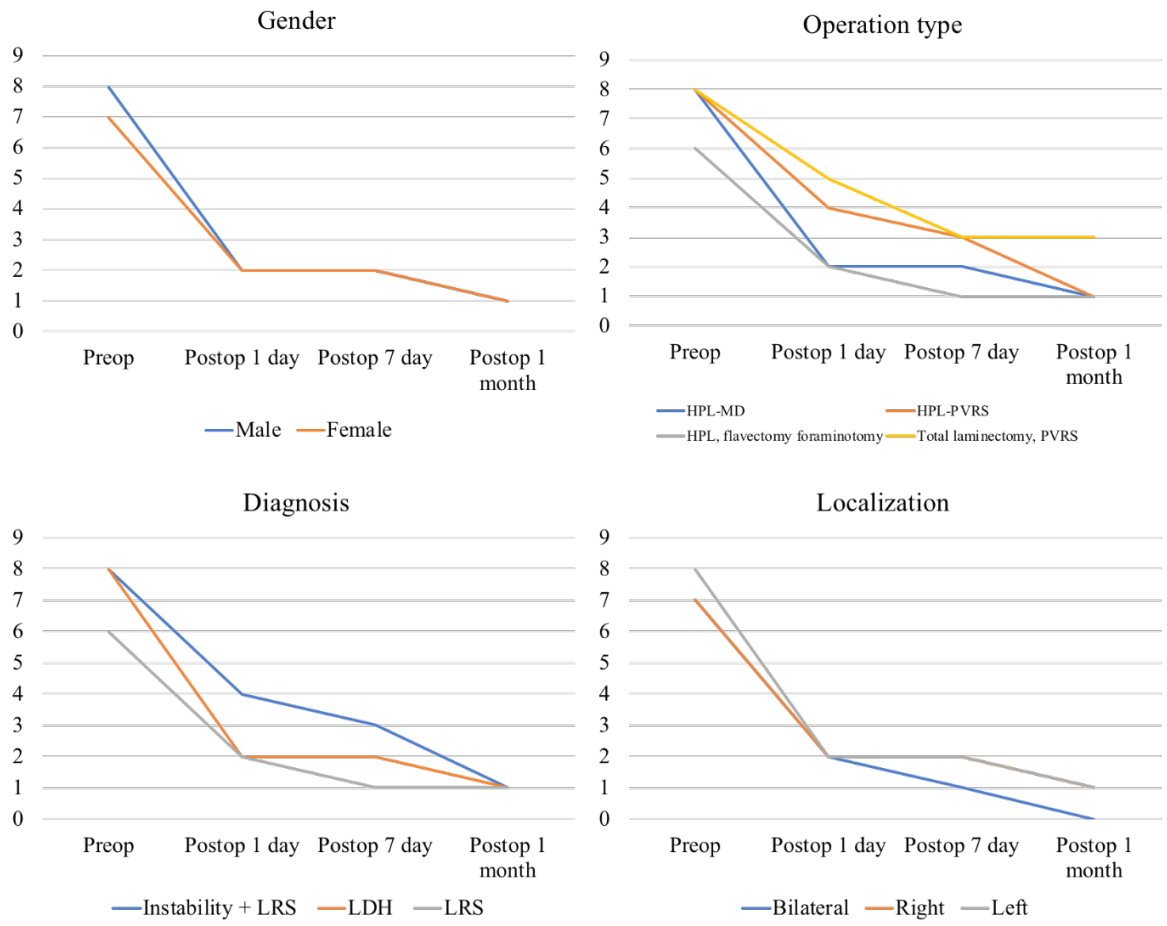

Figure-1. Changes in the VAS scores before and after surgery

DISCUSSION

Spinal, epidural or GA have been performed for lower spine surgery [1-6,8-14]. Greenbarg et al showed, SA reduced blood loss for lower limb orthopedic and vascular surgeries compared to GA [6]. Covino et al also repoted blood loss and thromboembolic complications to be reduced when SA is used [4]. In retrospective chart review, Tetzlaff et al [13] investigated the outcomes of a large series of elective lumbar spine surgical procedures performed under SA or GA. They concluded SA to be considered as an effective alternative to GA for lumbar spine surgery as it presented lower incidence of minor complications [15]. In another study of Tetzlaff et al preservation of BP on assumption of the prone position in patients during low SA suggested better preservation of autonomic nervous system compensatory mechanisms during low SA than with GA. Hassi et al reported 85.6% excellent results with SA [7]. Jellish et al compared GA and SA. They reported similar results between two groups when comparing intraoperative hemodynamics except that the incidence of increased blood pressure was more frequent with GA (26.2 % vs 3.3 %). Blood loss was less during SA (133 ± 18 mL vs 221 ± 32 mL). Postanesthesia care unit heart rates and mean arterial pressures were higher in the GA group.

McLain et al in a case-controlled study in 400 patients underwent either SA or GA for performing lumbar decompression, showed that SA was as effective as GA. They concluded that SA caused shorter anesthesia duration, decreased incidence of nausea and analgesic needs, and accompanied with fewer adverse effects [10].

Attari et al reported that SA may be better compared to GA. SA diminished blood loss, maximum blood pressure and heart rate changes, and postoperative analgesic use. In addition, surgeon and patients satisfaction was significantly more in SA [3].

Our study also supports spinal anesthesia in elective lumbar surgeries to decrease the surgical procedure time, loss of blood, earlier postoperative mobilization and oral feeding. However, disadvantages include post-op headache and the hypotension due to spinal anesthesia level getting higher, nausea and vomiting. In well-selected cases, the effectiveness of spinal anesthesia is proven high.

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