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Comparing Pain Intensity after Surgery for Patients with Spinal Stenosis using with and without Instrumentation

Zahra Rahimi [1*], Mohsen Taghavi [2], Maryam Papi [3], Shahla Hajizadeh [3], Mohsen Davarpanah [3], Abdol-Majid Parand [4]

[1] Medicine Faculty, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, IRAN
[2] Education Center, Aria Hospital, Ahvaz, IRAN
[3] Department of Medical Sciences, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, IRAN
[4] Department of Medical Sciences, University of Medical Sciences, Boshehr, IRAN

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ABSTRACT

Spinal stenosis has been diagnosed as a factor leading to low back pain; medicinal and surgical actions play a vital role in reducing spinal stenosis and low back pain. The purpose of this study was to compare pain intensity after surgery for patients with spinal stenosis with and without instrumentation. This was a descriptive-analytical study. Considering the sample size formula, 144 patients who had spinal stenosis surgery through target-based method were entered in this research. Patients with spinal stenosis divided to two groups of group 1 consisting of 72 patients who had non-instrumented spinal stenosis surgery (Laminectomy) and group 2 consisting of 72 patients who had instrumented spinal stenosis surgery (Pedicular Screw Fixation). Demographic data questionnaire of Numeric Pain Rating Scale was used as data collection tool in this study. In this research, patient expressed and recorded his/her pain intensity in checklist using vas scale under the supervision of researcher. Data were analyzed using statistical tests of paired t test, independent t test, and Chi-square through SPSS22 Software. Findings indicated no significant statistical difference ($P>0.05$) between studied group in terms of age, sex, education, marital status, and job. In case of pain intensity considering the value of $p=0.0001$, mean difference in pain intensity of the group with instrumentation was significant before and after intervention and considering the obtained $p=1.000$, this mean difference was not significant before and after intervention in the group without instrumentation. Moreover, mean of changes in pain intensity scores of two groups indicted no significant difference ($P<0.0001$). This means that pain intensity among group members with instrument was lower than group without instrument ($P<0.098$). Pedicular Screw Fixation can be named as one of effective methods in treating lumbar disc that not only reduces pain after surgery but also enables patient to do daily activities.

Keywords: spinal stenosis, laminectomy, pedicular screw fixation

INTRODUCTION

Low back pain is one of prevalent disease that many suffer from it. Increasing expansion of technology, changes in lifestyle, sedentary life, awkward positions in sitting and standing, etc. weaken body muscles, in particular muscles that support spinal cord leading to various implications for physical and mental health [1].

According to studies conducted in U.K, more than half million people suffer from low back pain with estimated direct treatment cost of 1632 Euro and informal costs above 10688 million Euros [2]. Other studies in this field show

✉ Dr.zahrarahimi@yahoo.com **(*Correspondence)** ✉ info@arya-hospital.ir ✉ info@ajums.ac.ir
✉ info@ajums.ac.ir ✉ info@ajums.ac.ir ✉ info@bpums.ac.ir

that about 60-80% of people may sometimes suffer from low back pain in life; although low back pain may occur at different ages, it is more seen among people above 45. Various studies have indicated that low back pain is more prevalent among men compared to women due to hard work and lifting heavy objects [3].

Although low back pain occurs due to harms related to job and age, spinal stenosis has been investigated and discussed in various studies introducing it as a factor leading to low back pain [4]. Spinal stenosis occurs when spinal cord and neural foramen are narrowed in back making pressure on spinal cord and nerve roots that lead to pain in hips, legs, waist and other organs of the body [5].

Spinal stenosis is a chronic disease with various side effects on body, mind, mental and social performance. Although medical treatments such as surgery can reduce symptoms, their implications disturb life style [6, 7]. Pain has been recognized as a significant stressful physiological and mental factor in patients. American Pain Association introduces the pain as the fifth symptom of vital signs and those who had surgery on their spinal cord are a group of specific patients with requiring pain control [8].

Pain control is one of oldest needs of human with significant priority in medical cares. Pain control is the right of patient consisting of pain expression, suitable appraisal and control of pain, recognition of mental aspect of pain that should be evaluated and managed by specialists [9]. Pain control not only makes the patient convenient but also accelerates patient rehabilitation and reduces implications after surgery so that the mentioned consequences contribute to patient rehab [10].

Spinal stenosis treatment consists of rest, weight loss, physiotherapy, and medicinal treatments [11]; regardless of medicinal treatments presented in spinal cord stenosis treatment over the recent years, surgical indication can be observed for patients who cannot adjust themselves with life constraints and this disease can effect on patient's life [12]. Surgical treatments are done to open up the spinal cord and decompress it. Since spinal cord stenosis leads to narrowing bony canal, the objective is to open he bony canal in order to improve and increase the space for nerves. This action is named decompression surgery or laminectomy [13]. In this common surgery, the surgeon removes the pressure caused by bone segments and ligaments. Surgery lessens leg pain and low back pain. In this case, patients can begin to do their daily activities within several weeks. Rehabilitation after surgery is recommended for patients to do their daily activities [14].

Sometimes, spondylolisthesis or vertebra shifting occurs in spinal cord stenosis leading to abnormal movement between the vertebrae. If the surgeon diagnoses spondylolisthesis, can perform decompression or laminectomy along with fusion surgery to stabilize affected vertebrae [15]. Fusion surgery is undergone for patients that intervertebral joints erosion in them has led to instability of vertebrae. In the method of surgery after decompression, the adjacent vertebrae are fused together [16]. In this method, bone graft and metal devices such as screws and rods may be used in order to fuse the vertebrae sooner the better. Fusion is accomplished through the anterior (front) or posterior (back) or both methods. Method selection is affected by various factors such as required spur removal, anatomic changes in patient, and instability rate [18].

According to meta-analysis performed by American Neurological Association published in 2012, 14 papers considered natural process of patient; according to meta-analysis, natural process of patient was mentioned so that 20% of patients reported worse symptoms after surgery and 33% expressed recovery after surgery [18]. Atlasi et al. expressed surgery results equal to 77%, 79%, and 89% for low back pain improvement, leg pain improvement, and improved quality of life of patients, respectively [19]. Moreover, study conducted by Catez et al. reported patients' satisfaction after spinal stenosis surgery equal to 63% [20].

Results obtained from analysis of several studies indicated that 92% of patients experienced good result 6 weeks after spinal stenosis surgery and 85% reported the same result after long-term follow up; this comprehensive therapeutic strategy has improved disease' implications having desirable effect on quality of life of patients [21].

Therefore, considering the unfavorable effects of drugs and negative implications of it on one hand and key role of some activities such as physiotherapy, sport, corrective exercises, acupuncture, and chiropractic that lead to relative improvement of patient, surgical treatments can be suitable alternatives to progress disease improvement and pain control reducing hospitalization costs. Since there has not been any study in field of comparing pain quality after spinal stenosis surgery with and without instrumentation, the necessity of such research was revealed.

METHOD

This is a descriptive-analytical study in which, the researcher obtained the license from Ethics Committee of the University and letter of introduction from Research Deputy of university then referred to research environment (Neurology Clinic of Amir Al-Momenin Hospital in Ahvaz, Iran) introducing himself and explaining research objectives and then obtained the consent of relevant officials. At next step, the researcher presented his letter of introduction and described research necessity and objectives then explained about information confidentiality and gained participants' consent to fill out questionnaire and checklist for pain assessment. Considering the sample size formula, 144 patients who had spinal stenosis surgery through target-based method were entered in this research.

Table 1. Comparing the age of patients in two studied groups

Specifications		Number	Standard Deviation ± Mean	P-value
age (based on year)	with instrumentation	72	54.6±01.72	P=0.39
	without instrumentation	72	58.5±2.97	

Table 2. Comparing the gender of patients in two studied groups

Specifications gender	with instrumentation	without instrumentation	P-value
male	23 (31.9)	9 (12.5)	P=0.65
female	49 (68.1)	63 (87.5)	
total	72 (0.100)	72 (0.100)	

Table 3. Comparing frequency distribution and percent of education in two studied groups

Specifications		With instrumentation number (%)	Without instrumentation number (%)	P-value
Education	Illiterate	41 (56.9)	47 (65.2)	P=0.33
	elementary	14 (19.4)	14 (19.4)	
	secondary	10 (13.8)	6 (8.3)	
	high school and above	7 (9.7)	5 (6.9)	

Table 4. Comparing frequency distribution and percent of marital status in two studied groups

Specifications		With instrumentation number (%)	Without instrumentation number (%)	P-value
marital status	single	28 (38.8)	26 (36.1)	P=0.641
	married	44 (61.1)	46 (63.8)	

Table 5. Comparing frequency distribution and percent of job status in two studied groups

Specifications		With instrumentation number (%)	Without instrumentation number (%)	P-value
marital status	unemployed	47 (65.3)	44 (61.1)	P=0.988
	employed	25 (34.7)	28 (38.8)	

Patients with spinal stenosis divided to two groups of group 1 consisting of 72 patients who had non-instrumented spinal stenosis surgery (Laminectomy) and group 2 consisting of 72 patients who had instrumented spinal stenosis surgery (Pedicular Screw Fixation). Demographic data questionnaire of Numeric Pain Rating Scale was used as data collection tool in this study. In this research, patients expressed and recorded his/her pain intensity in checklist using vas scale under the supervision of researcher. Validity and reliability of this instrument entitled "golden standard" for pain intensity measurement had been confirmed for patients' society. Data were analyzed using statistical tests of paired t test, independent t test, and Chi-square through SPSS22 Software.

FINDINGS

In this research, patients in two studied groups were at age range of (45.5±01.92) and (58.5±2.57). In case of sex, 49 members (68.1%) in group with instrumentation and 63 members (87.5%) in group without instrumentation were female. In terms of education, the majority of members (41 patients) in the group with instrumentation and 47 members (65.2%) in the group without instrumentation were illiterate. Among patients in the group with instrumentation, 44 members (61.1%) and among patient in the group without instrumentation, 46 members (63.8%) were married. In terms of job, 47 members (65.3%) in the group with instrumentation and 44 members (61.1%) in the group without instrumentation were not employed. According to Chi-square test, there was not any significant statistical difference (P>0.05) in terms of age, sex, education, marital status, and job (**Tables 1-5**).

To compare pain intensity in two studied groups, paired-t test was used. Considering the value of p=0.0001, there was a significant mean difference of pain intensity in the group with instrumentation before and after intervention; considering the value of p=1.000, there was not any significant mean difference of pain intensity in the group without instrumentation before and after intervention (**Table 6**).

According to **Table 7**, mean of changes in pain intensity in two studied groups was obtained using independent t test and there was some different changes in two groups (p<0.0001); it means that pain intensity in the group with instrumentation (P<0.0001) was lower than the group without instrumentation (P<0.098) (**Table 7**).

Table 6. Comparing pain intensity in studied samples before and after surgery

variable	value	with instrumentation		without instrumentation	
		before surgery	after surgery	before surgery	after surgery
pain intensity	mean	3.7	4.23	3.97	3.97
	standard deviation	0.679	0.365	0.669	0.519
	p-value	p=0.0001		p=1.000	

Table 7. Comparing mean of changes before and after pain intensity in two studied groups

difference	Standard Deviation ± Mean	Standard Deviation ± Mean	P-value
with instrumentation	4.09±3.93	0.472±2.27	p<0.0001
without instrumentation	8.05±0.47	0.527±2.59	p<0.098

DISCUSSION

Pain after surgery is one of the most common implications of surgery; according to studies, about 80% of patients experience acute pain after surgery. Complete release from pain after surgery is one of major concerns among surgeons and anesthesiologists, because this issue is closely related to clinical results and comfortable feeling of patient after surgery [22]. Lumbar disc surgery usually is along with pain after surgery due to surgical intervention and tissue invasion during surgery. Pain control and reduction after surgery is an important point leading to decrease in treatment costs, increase in welfare, and improvement of quality of life of patient [21]. In this case, the study conducted by Zhonghua et al. about the situation of two groups (with and without instrumentation) after spinal stenosis surgery indicated lower pain intensity in group with Pedicular Screw Fixation compared to group under the laminectomy; so, there was a statistically significant difference between two groups that is in line with results of present paper [23]. Moreover, results obtained from study conducted by Li AM et al. under the title of "comparing inability and pain intensity after spinal stenosis surgery using two simple (without instrumentation) and complicated (with instrumentation, screw)" determined a significant difference between two groups in terms of inability; physical inabilities were lower in complicated group compared to simple method, while there was not any significant difference between two groups in terms of pain intensity [24, 25]. Also, study of Jayarao et al. was carried out to compare transspinous method (method A) with laminotomies with and without discectomies (method B) and it was determined that patients under the surgery with method A had lower pain intensity and physical inability compared to patients in group B [24, 25].

CONCLUSION

As results revealed, those patients who have used Pedicular Screw Fixation reported lower pain intensity compared to patients under laminectomy. Therefore, Pedicular Screw Fixation can be named as a lumbar disc treatment not only reduces pain after surgery but also accelerates patients' recovery and return to routine activities.

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