EVALUATION OF OUTCOMES OF LUMBAR INTERBODY FUSION FOR L4-L5 SPONDYLOLISTHESIS AT THAI BINH GENERAL HOSPITAL

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ABSTRACT

Objective: To evaluate the outcomes of lumbar interbody fusion surgery for L4-L5 spondylolisthesis at Thai Binh general hospital from January 2022 to January 2024.

Method: A retrospective cross-sectional study was conducted among 68 patients suffered from L4 - L5 lumbar spondylolisthesis and had operated at the Neurospine Surgery Department in Thai Binh general hospital.

Results: The median age of patients undergone lumbar interbody fusion was 49,5 ± 10 (years old). Gender ratio was 3 females per 1 male, the duration of disease detection was 38±18 (months). Postoperative outcomes verified that lumbar interbody fusion was the safe and effective surgery with short operation duration (123,9 ±13,2 minutes), 5,9% of intraoperative adverse incidents, 25% of short-term postoperative complications, 5,8% of long-term complications of the surgery. Good and satisfactory outcomes achieved 86 8% without any poor outcomes based on Macnab criteria.

Conclusion: lumbar interbody fusion for L4-L5 spondylolisthesis is a safe and highly effective surgery.

Keywords: *lumbar spondylolisthesis,lumbar interbody fusion, pedicle screw, interbody cage.*

I. INTRODUCTION

Spondylolisthesis is the displacement of the upper vertebrae to lower one. There are many causes, but the main causes were spondylosis and spondylolysis [1]. In addition, lumbar spondylolisthesis can also be caused by congenital abnomalities, trauma or tumors. Most patients with lumbar spondylolisthesis have a silent progression without symptoms. When going to the hospital for examination, patients often suffered from symptoms of nerve compression, lumbar spine pain due to instability, and in the late stages, it can even cause more severe nerve lesions such as paralysis, changes in posture of the lumbar spine and affect gait [2].

Researches in Vietnam demonstrate that spondylolisthesis usually occurs in the lumbar (low back) spine, more commonly at L4-L5 (4th and 5th lumbar vertebral levels) [3-7].

Lumbar interbody fusion surgery is indicated after nonoperative treatment and rehabilitation are ineffective for the purpose of nerve root decompression and vertebral fusion. There are many surgical methods applied and intensively studied by many reseachers. Several forein reseachers have assessed outcomes of lumbar interbody fusion for L4-L5 spondylolisthesis. There are only a few reseaches in Vietnam into this subject, especially at provincial hospitals. Therefore, we conducted this study to aim at evaluating the outcomes of lumbar interbody fusion for L4-L5 spondylolisthesis at Thai Binh general hospital from January 2022 to January 2024.

II. SUBJECTS AND METHODS

2.1. Subjects

68 patients diagnosed with L4-L5 spondylolisthesis and undergone lumbar interbody fusion surgery at Thai Binh general hospital from January 2022 to January 2024.

2.2. Methods:

Type of reseach: retrospective cross-sectional study

Patient list was created from medical records of Neurospine Surgery Department (clinical and radiographic manifestations) before, during and after treatment

Contact to patients for re-examination (by by phone and mail). Patients were re-examined with postoperative radiographs archived were received questionnaire for data collection. Patients who could not be contacted were removed from the list.

2.3. Data processing:

Data coding, entry, and analysis were conducted using SPSS version 22.0. Descriptive statistical methods were employed to characterize the dataset, including the calculation of frequencies, percentages, and mean values. Comparative analyses between groups were performed using

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appropriate statistical tests: ANOVA for the comparison of two or more mean values and the χ^2 test for the comparison of proportions. Statistical significance was defined as $p < 0.05$.

2.4. Research ethics

All participants in this study were provided with comprehensive information regarding the research objectives, significance, and methodology. They subsequently provided explicit written consent to participate. Participants retained the right to withdraw from the study at any time without facing any repercussions. All collected data were utilized exclusively for research purposes, and the confidentiality and anonymity of participant information were rigorously maintained through secure encryption protocols. This study was conducted and presented to the council in accordance with Decision No. 1703 dated September 20, 2024, issued by Thai Binh University of Medicine and Pharmacy.

III. RESULTS

Age and gender characteristics: The median age of patients in the study was 49.5 ± 10.1 years old with the lowest being 28 years old and the highest being 73 years old. The most common age group in the study was from 50 to 59 years old with 24 patients accounting for 35.3%. Including both groups, the most common age group was from 40 to 59 years old with a total of 44 patients, forming 64.7%. L4-L5 spondylolisthesis mainly occurs females with a female/male ratio of approximately 3/1.

Table 1. Duration of disease detection (n = 68)

Duration of disease detection	Cases	Rate
Under 6 months	15	22,1%
6 - 12 months	27	30,9%
Over 12 months	26	47%

Most patients admitted had symptoms onset for more than 1 year (47.0%), the average time was 38 ± 18 months, the shortest was 2 months, the longest was 62 months.

Tablet 2. Intraoperative adverse incidents (n = 68)

Incidents	Cases	Rate (%)
Dural tears	2	2,9
Nerve root injuries	1	1,5
Broken pedicles	1	1,5

In our study, there were 2 cases of dural tear, 1 case of L5 root injury during surgery, and 1 case of broken pedicle encountered in the course of surgery.

Tablet 3. Short-term postoperative complications (n = 68)

Complications	Cases	Rate (%)
Blood transfusions	11	16,2
Urinary retentions	2	2,9
Surgical site infections	3	4,4
Length of hospital stay	6,5 ± 2,6 (4-13)	

Short-term postoperative complications: 11 patients required blood transfusion, accounting for 16.2%. 02 patients had urinary retention requiring catheter placement. 03 patients had surgical site infection. There was no implant failure.

Tablet 4: Comparison of functional symptoms before and after surgery (n = 68)

Symptom assessment	Preoperative VAS	Long-term postoperative VAS
Low back pain	5,6 ± 1,6	1,7 ± 0,8
Radicular pain	5,3 ± 2,3	0,9 ± 0,7

Before the surgery, low back pain VAS (Visual Analogue Scale) of the patients was 5,6 ± 1,6 points, radicular pain VAS was 5,3 ± 2,3 points. These functional symptoms were significantly improved with low back pain VAS of 1,7 ± 0,8 points and radicular pain VAS of 0,9 ± 0,7 points at last examinations.

Tablet 5. Long-term complications (n = 68)

Long-term complications	Cases	Rate (%)
Cage displacements	2	2,9
Progressive spondylolisthesis	2	2,9

There were 2 patients suffered from cage displacements and 2 of progressive spondylolisthesis in the period of our research

Table 6. Outcomes according to Macnab criteria (n = 68)

Macnab criteria	Cases	Rate (%)
Good	36	51,5
Satisfactory	24	35,3
Moderate	9	13,2

35/68 patients (51.5%) had good outcomes, 24/68 patients (35.3%) satisfactory outcomes, 9/68 patients (13.2%) had moderate outcomes, no poor outcomes.

IV. DISCUSSION

In the 68 patients studied, the median age was 49.5 ± 10 years old (from 28-73). The most common age group was 40 - 59 years old with a total of 44 patients, accounting for 64.7%, this data is consistent with the research results of Kim K.R [8] at 52,5 years old of median age. Our study found that the female rate was 3 times higher than that of male, with the female and male rates being 72.5% and 26.5% respectively. This result was consistent with Nguyen Vu's research of approximately 3% [3]. However, according to Yingsakmongkol W's research, the males were dominant, accounting for 81%. In our opinion, the higher rate of female patients with lumbar spondylolisthesis may be due to the fact that our country's economy is still developing, so the number of women who have to do heavy labor is approximately equal to that of men. In addition, some studies have also shown that spondylolisthesis in women is often more painful and tends to progress more than in men [10].

Most patients were hospitalized when they had symptoms for more than 1 year (47.0%), the average time was 38 ± 18 months (2 - 62 months). The research results of some domestic authors were 14.8 months and foreign authors were 18.6 months [3;7] also demonstrated that patients came to the hospital for treatment late from the time symptoms were detected. The fact that patients came to the hospital for treatment late often had a negative impact on their treatment outcomes and recovery.

In our research, the average operative time was 123.9 ± 13.2 minutes. Kim K.R's research had a average operative time of 130 minutes [8]. This is explained by the fact that our patient group had low slippage, modern surgical equipment was used, thus operative time in our reseach was shorter. 100% of patients did not require blood transfusion during surgery.

There were 4/68 cases of intraoperative adverse incidents made of 5.9%, including 2 cases of dural tears, 1 case of nerve root injury and 1 case of broken vertebral pedicle. The first 2 patients had dural repair, they had good progress after treatment. There was 01 patient with nerve root injury during the surgery due to a broken pedicle in the process of screwing, the impact of the screw caused the root to be constused and swollen. In the studied patients, there were no cases of major vascular injury during surgery. Some studies by other domestic authors also studied this topic such as Nguyen Vu, Kieu Dinh Hung, there were no patients with intraoperative adverse incidents [3, 5]. Le Duy Tram's research [7] mentioned 04 patients with intraoperative nerve root injuries. In Kim YH, Ha KY.'s research [10], there were 02 cases of intraoperative nerve root injuries due to anatomical abnormalities of neural foramina.

Short-term postoperative complications: 11 patients (16.2%) required blood transfusion short after surgery. The patient with nerve root injury was gradually recovering by medications. We noted that although no patient required blood transfusion during surgery, 11 patients required additional blood transfusion short after surgery. We believe that most of the patients in the research group were elderly, and after surgery, the amount of blood in the body was not able to recover, so blood transfusion was necessary. There were 2 patients with bladder sphincter dyssynergia who

had to catheterize. After 2 days, the catheter was removed and they were able to urinate on their own, which could be explained by complications of anesthesia. There were 3 patients endured superficial surgical site infections who had to have the wound dressing changed and vacuum-assisted closure performed. Average length of hospital stay was 6.5 ± 2.6 days, with a minimum of 04 days and a maximum of 13 days.

Before surgery, VAS of low back pain was 5.6 ± 1.6 points, VAS of radicular pain was 5.3 ± 2.3 points. After evaluating the long-term outcomes, VAS of low back pain was 1.7 ± 0.8, VAS of radicular pain was 0.9 ± 0.7. Compared with preoperative and short-term postoperative symptoms, this difference was statistically significant. Hoang Gia Du's study [4] evaluated the long-term outcomes after showed that the improvement was not much, in our opinion, it may be because the average follow-up time in the author's study was only 6 months. It can be affirmed that the level of low back pain and radicular pain of the patient has improved significantly in the long-term.

In our study, there were 02 patients with cage displacement and Progressive spondylolisthesis in the long-term after surgery. These 02 patients were advised on how to exercise, live and wear a brace. Nguyen Vu's study [3] had 01 patient with a hardware loosening after 09 months and had to be re-operated and 05 patients with hardware breakage but had no clinical manifestations so they did not have surgery.

Overall assessment of surgical outcomes based on Macnab criteria: 35/68 patients (51.5%) had good outcomes, 24/68 patients (35.3%) had satisfactory outcomes, 9/68 patients (13.2%) had moderate outcomes. These outcomes are consistent with the outcomes in research of Yingsakmongkol W [9] with 11/27 patients (40.7%) having good outcomes, 16/27 patients having satisfactory and moderate outcomes.

V. CONCLUSION

Lumbar interbody fusion for L4-L5 spondylolisthesis is a safe and highly effective surgery.

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