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Comparative Study of the Clinical Outcomes of Unilateral Transforaminal Lumbar Interbody Fusion(TLIF) with Bilateral TLIF using Wiltse Approach and Conventional Approach

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Study Design: Comparative study.

Objectives: To compare the outcomes of unilateral TLIF, bilateral TLIF using Wiltse approach and bilateral TLIF using conventional midline approach.

Summary of Literature Review: There are many studies about outcomes of Unilateral TLIF, but few have compared the 3 different fusion procedures.

Materials and Methods: 60 patients were divided into 3 groups. Each group has enrolled 20 patients (Study group: unilateral TLIF, Control group 1: bilateral TLIF using Wiltse approach, Control group 2: bilateral TLIF using conventional midline approach). For clinical outcomes, we compared operative time, blood loss, time for ambulation and discharge, VAS for back pain and leg pain and ODI among three groups. For radiologic evaluation, disc height and segmental lordosis were examined.

Results: The mean operative time was 147 minutes in study group(SG), 172 minutes in control group 1(CG1), 167 minutes in control group 2(CG2). The mean total blood loss was 466ml in SG, 569ml in CG1, 1140ml in CG2 respectively. VAS for back pain at the third postoperative day significantly decreased in SG and CG1 compared with CG2. There was no significant difference in ODI, disc height and segmental lordosis among the groups.

Conclusion: Using Wiltse approach, there were several advantages in decreasing blood loss, immediate postoperative back pain, hospital stay and early ambulation. Clinical and radiological results of unilateral TLIF were comparable with bilateral TLIF.

Key Words: Minimally invasive surgery, Wiltse, Transforaminal lumbar interbody fusion

INTRODUCTION

Spinal decompression and fusion is commonly performed to relieve symptoms of lumbar degenerative diseases such as spinal stenosis or spondylolisthesis and there are various surgical approaches. Conventional posterior mid-line approach is the most well-known among these but complications associated with muscle damages due to extensive mediolateral muscle stripping has been reported.[1] To overcome this problem, Wiltse approach advancing through between multifidus and longissimus muscle was reported and most recently, minimally invasive direct approach using tubular retractor was introduced and being used widely.[2-4] As advantages of posterior interbody

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본 논문의 요지는 2010년도 대한정형외과학회 추계학술대회에서 발표되었음.

fusion were recognized and became popular, terms such as posterior lumbar interbody fusion (PLIF), transforaminal lumbar interbody fusion (TLIF) and extreme lateral interbody fusion (ExLIF) have been used. It is also possible to insert cages filled with autogenous or allogeneic bone graft unilaterally or bilaterally. Among these, unilateral transforaminal lumbar interbody fusion (unilateral TLIF) was developed by modifying established PLIF and was reported by Harms and Jeszenszky[5] in 1998. With Developments in minimally invasive spinal surgery, minimal invasive TLIF using tubular retractor or other instruments has been introduced and satisfactory results have been reported since the early 2000s.[6] However, minimal invasive TLIF required longer operating time due to the limited exposure and disadvantages such as doubts about sufficient decompression or challenging situation to solve complications such as accidental dural tear during the procedure were emerged. It was also questionable whether sufficient pressure could be applied to the interbody space through percutaneous pedicle screws. For these reasons, the authors took interest in the unilateral TLIF with Wiltse approach. This study aimed to compare the clinical and radiological outcomes of unilateral TLIF, bilateral TLIF using Wiltse approach and bilateral TLIF using conventional midline approach in the patients with degenerative spinal disease who complaining of back pain and radiating leg pain and discuss them with literature review (Fig. 1).

MATERIALS AND METHODS

1. Materials

From April 2006 to May 2008, 20 patients who had undergone contiguous unilateral TLIF procedure among those patients who needed surgical procedure due to their recurrence of symptoms that had been treated with selective epidural nerve root block were enrolled Study Group(SG). For a comparative study, through a retrospective analysis of a medical records, 20 contiguous surgical cases that had received interbody fusions through different methods but showing similar surgical indications were selected. Control Group 1(CG1) was comprised of 20 cases that had undergone bilateral TLIF using the bilateral Wiltse approach since 2003. Control Group 2(CG2) was comprised of 20 cases that had undergone bilateral TLIF using conventional posterior mid-line approach since 2001. The SG had 7 male and 13 female patients, the average age was 57.5 years (52-66), the average follow-up period was 38.2 months (24-47), there were 5 cases of spinal stenosis and 15 cases of spondylolisthesis. The CG1 had 6 male and 14 female patients, the average age was 60.1 years (55-67), the average follow-up period was 52.8 months (24-79), there were 7 cases of spinal stenosis and 13 cases of spondylolisthesis. The CG2 had 7 male and 13 female patients, the average age was 56.6 years (49-65), the average follow-up period was 46.3 months (24-60), there were 8 cases of spinal stenosis and 12 cases of spondylolisthesis.

2. Surgical methods

All surgeries were performed under general anesthesia in the prone position. The surgical procedure for the SG, conventional posterior mid-line approach was used for the symptomatic side which requiring decompressions surgery. Through the Wiltse approach that used the same incisions, pedicle screws were inserted for the opposite side. On the symptomatic side, after the facet joint was removed, posterior decompressions procedure was performed, then the over-the-top technique that decompressed also the opposite side was performed. After checking the disc space, performing discectomy and end plate

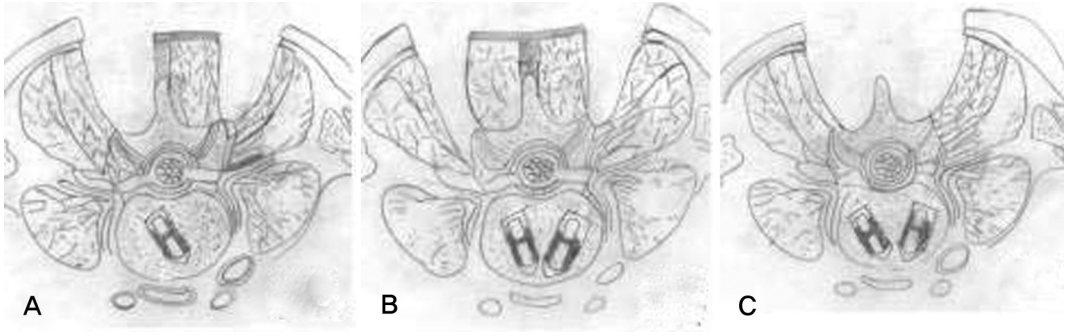

Fig. 1. Schematic illustrations show the three different fusion procedures. **(A)** Unilateral TLIF **(B)** Bilateral TLIF using Wiltse's approach **(C)** Bilateral TLIF using conventional midline approach

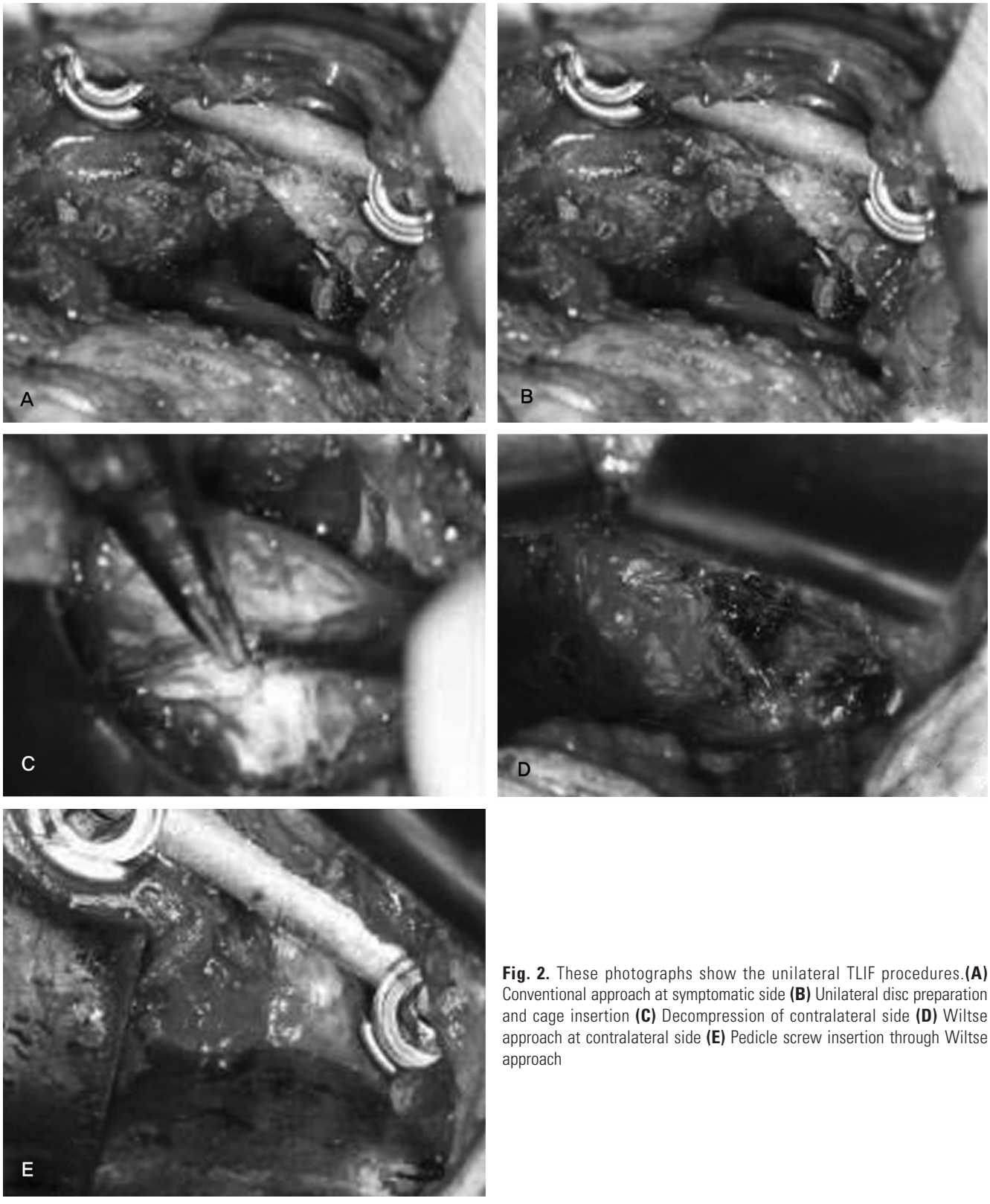

Fig. 2. These photographs show the unilateral TLIF procedures.**(A)** Conventional approach at symptomatic side **(B)** Unilateral disc preparation and cage insertion **(C)** Decompression of contralateral side **(D)** Wiltse approach at contralateral side **(E)** Pedicle screw insertion through Wiltse approach

curettage on symptomatic side, single cage with autogenous local and allogeneic chip bone was inserted in disc space. The cage was inserted in an oblique angle and centered in the disc space. Metal rods were connected with pedicle screws and fixated

under appropriate compressive pressure (Fig. 2).

In the case of bilateral TLIF using the Wiltse approach(CG1), a 3~4cm longitudinal incision was made in the midline and exposed the lumbodorsal fascia. Afterwards, made a fascial incision approximately 2cm lateral to the midline and entered between the multifidus and longissimus muscle. Multifidus muscle was retracted medially and the facet joint was exposed and pedicle screws were inserted. After removing the facet joint, decompressions and interbody fusion were done in both sides. Cages with autogenous local and allogeneic chip bone were inserted in both sides and metal rods were connected and fixated under appropriate compressive pressure.

In the case of bilateral TLIF using the conventional bilateral posterior approach(CG2), screws were inserted in both sides using a typical posterior approach, and afterwards, cages filled with local bones were inserted in both sides.

3. Clinical and Radiographic Analysis

For clinical analysis, the operative time, blood loss during and after surgery, time for ambulation, duration of hospital stay and complications were compared and evaluated for each group. In addition, preoperative and postoperative back pain and radiating pain were measured using the visual analog scale (VAS), and compared with the Control Groups. For clinical assessment of operation results, the Oswestry disability index was used. Radiological analysis was conducted with the images taken every 3 months. The determination criteria for interbody fusion were based on presence of a bony bridge in the anterior part of the cage, or less than 5° movement on lateral flexion and extension views, and less than 2mm radiolucencies around the cage and cage migration. If the fusion was uncertain, computed tomography was used to check the fusion had been completed. Changes in the anterior-posterior disc heights and segmental angle before and after surgery were measured. To compare the disc height with the upper vertebra height, regardless of the enlargement ratio of radiographs, the disc height was measured in percentage, with the height of the upper vertebra being 100%. Anterior and posterior disc heights were measured separately, and postoperative results were indicated in percentage, with 100% being the preoperative level.[7] (Fig. 3). The Cobb method was used to measure changes of the segmental angle of fused vertebral segments.

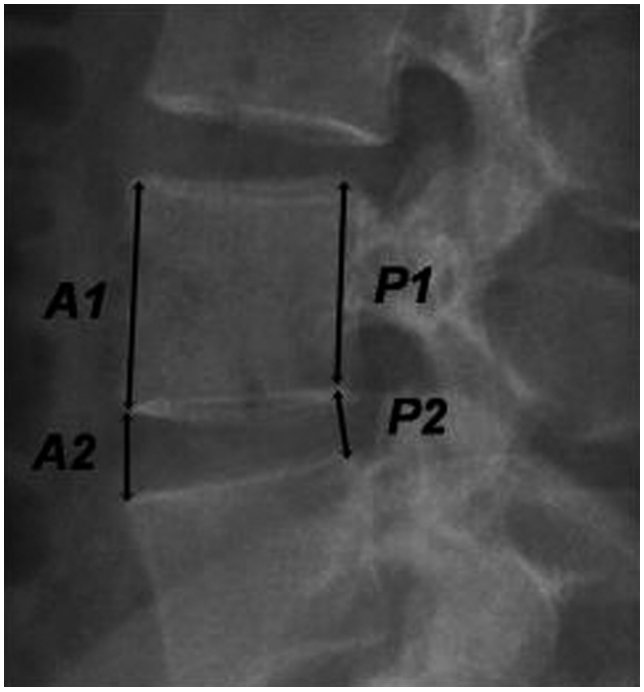

Fig. 3. Radiographic measurement of anterior (A2/A1, original magnification x 100) and posterior disc heights. (P2/P1, original magnification x 100)

4. Statistics

All data were processed using the SPSS statistical program. For discontinuous variables, the $x2$ test was used to calculate statistical significance. ANOVA test was used to analyze the statistical significance among the three groups, and the paired sample t test was used to verify the statistical significance within each group.

RESULTS

1. Clinical Results

The SG showed the shortest operative time with the average operative time of 147 minutes, and the CG1 showed the longest operative time with the average time of 172 minutes, meanwhile the CG2 showed the average operative of 167 minutes. The average blood loss during surgery was 212 ml in the SG, 254ml in the CG1, 486ml in the CG2. SG and CG1 had a significantly less blood loss than the CG2. The average blood loss after surgery were 253 ml in the SG, 315ml in the CG1, 653ml in the CG2. CG2 had a significantly large amount of blood loss than SG and CG1. The average time for ambulation was 3.1 days in SG, 3.4 days in CG1 and 4.7 days in CG2, respectively. In the SG and CG1, which were significantly faster than the CG2. In the SG and CG1, in terms of the average duration of hospital

stay were 5.1 days and 6.5 days, respectively. These results were much shorter than the 7.9 days in the CG2 and earlier discharges were possible (Table 1). The average VAS for the postoperative pain after the third day of the surgery were 3.1 and 3.3 for the SG and the CG1, respectively and these were significantly lower than the CG2's 6.1. However, the differences gradually decreased and there were no differences at final follow-up. The postoperative radiating pain showed no difference among the three groups and there was no difference in Oswestry disability index among the three groups (Table 2).

2. Radiographic Results

Bone fusion was confirmed by radiographs at the two-year follow-up. There was 1 case in the SG that was suspected of incomplete fusion, and CT scan was conducted to confirm and even the CT showed some signs of incomplete fusion, however there was not any particular symptom so the case is being observed. Other than this case, there were no cases of incomplete fusion in any of the 3 groups (Fig. 4). There was no statistical difference among the 3 groups in terms of the anterior and posterior disc height (Table 3). There was no difference among

Fig. 4. These radiographs are taken from the patient who underwent unilateral TLIF at 2 years follow up. Suspicious nonunion is observed in these radiographs. **(A, B)** X-ray shows radiolucent area around the cage. **(C, D)** CT scan shows discontinuity of bridging bone in interbody space.

Table 1. Operative and Perioperative Data

	Unilateral TLIF	Bilateral TLIF(Wiltse)	Conventional TLIF
Operating time	147.4 +/- 24.2	172.3 +/- 31.6	167.4 +/- 28.4
Blood Loss*	212 + 253	254 + 315	486 + 653
(intra+post)	= 465.7 +/-59.9	= 569.3 +/- 45.8	1139.5 +/- 52.7
Admission day*	5.1 +/- 1.2	6.5 +/- 1.6	7.9 +/- 2.1
Walking time*	3.1 +/- 0.9	3.4 +/- 1.1	4.7 +/- 1.4
Back pain at PO 3D*	3.1 +/- 0.6	3.3 +/- 0.8	6.1 +/- 1.3

According to ANOVA, there were significant differences in blood loss, admission day, walking time, back pain at PO 3D(*)
TLIF: transforaminal lumbar interbody fusion, intra: intraoperative, post: postoperative
PO 3D: postoperative 3 days

Table 2. Pain and Disability Scores at Follow-up

	Unilateral TLIF	Bilateral TLIF(Wiltse)	Conventional TLIF	P*
Back Pain				
Preoperative	7.98 +/- 1.21	7.32 +/- 1.87	7.55 +/- 1.19	0.987
F/U at 6 months	1.21 +/- 1.09	1.83 +/- 0.97	2.73 +/- 1.03	0.132
F/U at 2 years	2.69 +/- 0.98	2.97 +/- 0.89	3.51 +/-0.84	0.821
Leg Pain				
Preoperative	8.01 +/- 1.56	7.78 +/- 1.57	7.88 +/- 1.81	0.891
F/U at 6 months	1.34 +/- 1.29	1.89 +/- 1.21	2.02 +/- 1.20	0.071
F/U at 2 years	1.02 +/- 0.83	1.23 +/- 0.74	1.78 +/- 0.79	0.311
Oswestry Low Back Questionnaire				
Preoperative	57.8 +/- 8.3	58.9 +/- 7.9	56.3 +/- 10.3	0.921
F/U at 6 months	21.5 +/- 9.8	21.9 +/- 10.9	23.1 +/- 10.1	0.085
F/U at 2 years	23.8 +/- 9.3	22.5 +/- 9.1	23.9 +/- 9.9	0.219

Pain was measured on a 10-point VAS, and functional disability was assessed with the Oswestry Low Back Pain Questionnaire. The VAS score ranged from 0 to 10 (maximum pain), and Oswestry, from 0 to 100 (maximum severity). The paired-sample t test was used to calculate the differences within each group during the follow-up. No significant differences between preoperative and postoperative scores were found within each group (P <0.001).
*ANOVA was used to calculate the differences among the groups. No significant differences were found among the groups.
F/U: follow up

the 3 groups in terms of the segment angle (Table 4).

3. Complications

Although in 2 cases from the SG showed paresthesia in the lower limb on the opposite side but the symptoms were disappeared in 3 months after the operation. 1 case from the CG1 showed superficial seroma, but this was eliminated with a conservative treatment. 1 case from the CG2 showed some symptoms of local infections, but the symptoms improved after 2 weeks of intravenous antibiotics.

DISCUSSION

As the effect of interbody fusion as compared to posterior or posterolateral fusion is recognized, the current trend indicates that opting for the interbody fusion is prevalent when it is possible. Interbody fusion is largely classified into anterior and posterior methods depending on the approach. Typical posterior fusion procedures are PLIF and TLIF. TLIF inserts a cage through a space made available after removing the facet joint, and compared to conventional PLIF, does not require excessive retraction of dura, which helps reduce neurologic complications. This is widely known and various forms of TLIF procedures have been reported due to this advantage. The unilateral TLIF published by Harms and Jeszenszky[5] of Germany in 1998 was a conventional midline approach. This approach exposed both sides of the facet joint completely and performed unilateral facetectomy and inserted on one side 2 cages and posterior fusion

Table 3. Change of Disc Height

Unilateral TLIF	postoperative	F/U at 6 months	F/U at 2 years	p*
ADH	178.7 +/- 57.2	148.7 +/- 45.3	142.1 +/- 67.3	<0.001
PDH	150.4 +/-45.2	139.5 +/- 63.4	130.5 +/- 48.4	<0.001
Bilat TLIF(Wiltse)	postoperative	F/U at 6 months	F/U at 2 years	p*
ADH	183.5 +/- 55.7	161.1 +/- 43.9	153.6 +/- 57.9	<0.001
PDH	168.7 +/- 45.5	145.6 +/- 55.8	141.3 +/- 45.2	<0.001
Conventional TLIF	postoperative	F/U at 6 months	F/U at 2 years	p*
ADH	186.7 +/- 60.9	168.3 +/- 56.2	157.3 +/- 54.8	<0.001
PDH	163.3 +/- 58.0	148.2 +/- 45.8	139.1 +/- 41.2	<0.001

Values are expressed as percentages.
*The paired-sample t test was used to calculate significance in each group.
There were no significant differences in the disc height among the groups. ANOVA was used.
ADH: anterior disc height, PDH: posterior disc height

Table 4. Change of Mean Segmental Lordosis

	Preoperative	F/U at 6 months	F/U at 2 years	p*
Unilateral TLIF	11.7 +/- 5.8	16.4 +/- 6.1	13.8 +/- 5.2	<0.05
Bilateral TLIF(Wiltse)	12.1 +/- 10.1	16.8 +/- 8.5	14.2 +/- 8.9	<0.05
Conventional TLIF	13.8 +/- 7.8	17.1 +/- 7.1	14.6 +/- 6.7	<0.05

Values are expressed in degrees.
*The paired-sample t test was used to calculate significance in each group.
There were no significant differences of the lumbar angle among the groups. ANOVA was used.
F/U: follow up

was performed on the other side. The reports published after this by Humphreys[8] and Lowe and Tahernia,[9] their methods also were using conventional posterior mid-line approach. In 2003, Kim et al[6] and Foley et al[2] reported on a bilateral TLIF that combined minimally invasive approach that used tubular retractors. Recently, interest in minimally invasive spinal surgery gradually increased and there have been numerous reports on minimally invasive TLIFs. It was highlight that the postoperative back pain was reported to be lower since there was less damage to the soft tissues and this facilitated faster recovery in minimally invasive TLIF and it showed similar clinical outcomes comparing to the conventional midline approach.[10-14] On the other hand disadvantages such as lengthy learning curve, longer operative time, high risk of complications and longer exposure to radiation also reported. In addition specially designed instruments and implants are required to perform minimally invasive TLIFs. The authors used to perform minimal invasive TLIF using tubular retractor system in the past but encountered potential problems such as incomplete decompression, insufficient compression through percutaneous pedicle screws after the cage insertion, inconvenience to deal with problems such as dural tear during the operation. For these reasons, the TLIF via Wiltse approach were performed and the clinically results indicating that there were no differences in terms of postoperative pains and recovery time compared to minimally invasive TLIFs were obtained. However it was possible to know that TLIFs using the Wiltse approach had shortcomings of limited surgical field of vision due to the existence of multifidus muscle medially which causes insufficient decompression and longer operative times. For these reasons, currently the side with symptoms is treated with decompression and interbody fusion using conventional posterior mid-line approach, and the opposite side with no symptoms is treated with a variation of unilateral TLIF using the Wiltse approach and insertion of pedicle screws. The authors' method enabled to reduce soft tissue damage, operative time and the blood loss by using conventional midline approach at only one side and Wiltse approach to the other side. Additionally, it was possible to ensure sufficient decompression and to perform direct compression with pedicle screw after the insertion of cages because the method facilitated to secure relatively wider visualization. Also it was possible reduce the additionally required skin incision and radiation exposure during percutaneous pedicle

screw insertion. It was also possible to decompress the other side by approaching the affected side only when the over-the-top technique was performed with tilting of the patient and it was thought that postoperative neurological complications due to unnecessary neural irritation was avoidable. The possibility of occurrence of radiculopathy on the opposite side have been reported. We think that if the intervertebral foraminal space can be increased through insertion of relatively large height cage, the possibility of symptoms on the opposite side can be reduced. But it will be necessary to minimize the compressive pressure between pedicle screws on the unaffected side. Although there was no statistical difference in the operative times among the 3 groups, but the groups that underwent Wiltse approach were statistically lower in terms of the blood loss and postoperative pains indicated that there was less soft tissue damage. Since after 6 months and 2 years there were no differences in the back pain and radiating pain, the Wiltse approach has advantages in the short term right after an operation, and these advantages can be considered as results that there would be no long-term follow-up issues. Radiological results showed 1 case of incomplete fusion from the SG and we think that more thorough removal of soft tissues in the disc space when unilaterally inserting a cage.

CONCLUSION

The blood loss and postoperative pain was significantly lower in unilateral TLIF and bilateral TLIF comparing to the conventional TLIF and this facilitated the early ambulation and the early discharge. Unilateral TLIF showed similar clinical and radiological results with bilateral TLIF in patients with unilateral leg pains. Unilateral TLIF seems to be relatively easily accepted by the spine surgeons who are experienced in the conventional TLIF. Unilateral TLIF can be considered one of the various TLIF procedures that can be applied relatively easily.

REFERENCES

1. Sihvonen T, Herno A, Paljarva L, Airaksinen O, Partanen J, Tapaninaho A. Local denervation atrophy of paraspinal muscles in postoperative failed back syndrome. Spine (Phila Pa 1976). 1993;18:575-81.
2. Foley KT, Holly LT, Schwender JD. Minimally invasive lumbar fusion. Spine (Phila Pa 1976). 2003;28(15 Suppl):S26-35.
3. Holly LT, Schwender JD, Rouben DP, Foley KT. Minimally invasive transforaminal lumar inerbody fusion: indications, technique, and complications. Neurosurg Focus. 2006;20:E6.
4. Shunwu F, Xing Z, Fengdong Z, Xiangqian F. Minimally invasive transforaminal lumbar interbody fusion for the treatment of degenerative lumbar diseases. Spine (Phila Pa 1976). 2010;35:1615-20.
5. Harms JG, Jeszenszky D. [In Process Citation]. Oper Orthop Traumatol. 1998;10:90-102.
6. Kim KT, Suk KS, Lee YH, Kim YW, Lee SH. The Posterior Decompression and Posterior Lumbar Interbody Fusion Using a Mini-open Technique - New Suggestion of Minimally Invasive Technique - A Prelimainary Report. J Korean Orthop Assoc. 2003;38:492-7.
7. Kim KT, Lee SH, Lee YH, Bae SC, Suk KS. Clinical outcomes of 3 fusion methods through the posterior approach in the lumbar spine. Spine (Phila Pa 1976). 2006;31:1351-7.
8. Humphreys SC, Hodges SD, Patwardhan AG, Eck JC, Murphy RB, Covington LA. Comparison of posterior and transforaminal approaches to lumbar interbody fusion. Spine (Phila Pa 1976). 2001;26:567-71.
9. Lowe TG, Tahernia AD. Unilateral transforaminal posterior lumbar interbody fusion. Clin Orthop Relat Res. 2002;394:64-72.
10. Isaacs RE, Podichetty VK, Santiago P, et al. Minimally invasive microendoscopy-assisted transforaminal lumbar interbody fusion wit instrumentation. J Neurosurg Spine. 2005;3:98-105.
11. Jang JS, Lee SH. Minimally invasive transforaminal lumbar interbody fusion with ipsilateral pedicle screw and contralateral facet screw fixation. J Neurosurg Spine. 2005;3:218-23.
12. Mummaneni PV, Rodts GE Jr. The mini-open transforaminal lumbar interbody fusion. Neurosurgery. 2005;57(4 Suppl):256-61.
13. Ozgur BM, Yoo K, Rodriguez G, Taylor WR. Minimally-invasive technique for transforaminal lumbar interbody fusion (TLIF). Eur Spine J. 2005;14:887-94.
14. Schwender JD, Holly LT, Rouben DP, Foley KT. Minimally invasive transforaminal limbar interbody fusion (TLIF): technical feasibility and initial results. J Spinal Disord Tech. 2005;(18 Suppl):S1-6.

일측성 경추간공 요추 추체간 유합술과 Wiltse 접근법을 통한 양측성 경추간공 요추 추체간 유합술 및 고식적 접근법을 통한 양측성 경추간공 요추 추체간 유합술의 임상적 결과 비교

김기택 • 석경수 • 이상훈 • 이정희 • 박경준 • 손은석* • 곽윤호 • 홍세혁
경희대학교 정형외과학 교실, 경희대학교 대학원 의학과*

연구 계획: 비교 연구
목적: 일측성 경추간공 요추 추체간 유합술과 Wiltse 접근법을 통한 양측성 경추간공 요추 추체간 유합술 및 고식적 후방 접근법을 통한 양측성 경추간공 요추 추체간 유합술의 결과를 비교하였다.
선행문헌의 요약: 일측성 경추간공 요추 추체간 유합술의 결과에 대한 많은 보고가 있으나 서로 다른 세가지 유합 방법에 따른 비교 연구는 많지 않다.
대상 및 방법: 60명의 환자를 대상으로 하였다. Wiltse 접근법을 통한 일측성 경추간공 요추 추체간 유합술을 시행 받은 20명의 환자를 연구군, Wiltse 접근법을 통한 양측성 경추간공 요추 추체간 유합술을 받은 20명의 환자를 대조군 1, 고식적 후방 접근법을 통한 양측성 경추간공 요추 추체간 유합술을 시행 받은 20명의 환자를 대조군 2로 분류하였다. 임상적 결과로 수술 시간, 수술 중 및 수술 후 실혈량, 보행 시까지의 기간, VAS를 통한 요부 통증의 정도, 입원기간 및 Oswestry 장애 지수를 조사하였다. 방사선 조사로는 수술 전후 추간판의 전후방 높이 변화와 수술 분절의 전만각 변화를 측정하였다.
결과: 평균 수술 시간은 연구군이 147분, 대조군 1이 172분, 대조군 2이 167분 이었다. 평균 전체 출혈량은 연구군이 466ml, 대조군 1이 569ml, 대조군 2가 1140ml 였다. 수술 후 3일째 측정한 요부 통증에 대한 VAS는 연구군과 대조군 1이 대조군 2에 비해 유의하게 낮았다. Oswestry 장애 지수, 추간판의 높이 변화와 수술 분절의 전만각에는 세 군간에 유의한 차이를 보이지 않았다.
결론: 수술 중 및 수술 후 출혈량과 수술 후 3일째 요부 통증, 재원 기간, 보행시기에서 Wiltse 접근법을 통한 수술법이 고식적 후방 접근법에 비해 우수한 결과를 보였다. 일측성 경추간공 요추 추체간 유합술은 양측성 경추간공 요추 추체간 유합술과 비슷한 임상적, 방사선학적 결과를 보였다.

색인 단어: 최소 침습 수술, Wiltse, 경추간공 요추 추체간 유합술
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