

# One- or Two-Level Transforaminal Lumbar Interbody Fusion without Closed-Suction Wound Drainage

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## ABSTRACT

**Background Data:** Although many surgeons stopped using closed-suction drainage following simple spine decompression surgery, there is still debate regarding the necessity of wound drainage in more extensive lumbar spine surgical procedures.

**Purpose:** To estimate the advantages and disadvantages of performing one- or two-level transforaminal lumbar interbody fusion (TLIF) without closed-suction drainage.

**Study Design:** Retrospective clinical cohort study.

**Patients and Methods:** The Fast-Track technique was performed in 36 consecutive TLIF surgeries between January and September 2016 without using wound drainage. Twenty-eight patients were females and 8 were males. Thirty patients had single-level TLIF and 6 double-level TLIF. The results of these patient series were retrospectively analyzed. The variables that were reviewed included blood transfusion, postoperative temperature, postoperative pain and the use of opiates during hospital stay, duration of surgery, duration of hospital stay, and incidence of postoperative complications such as neurological deficit, hematoma, postoperative wound infection, and revision surgery.

**Results:** There was no postoperative allogenic blood transfusion; the patients did not develop postoperative neurological deficit; there were no cases of surgical revision as a result of significant postoperative hematoma or infection. There were two cases (5.5%) of revision surgery due to persistent CSF leakage from the wound. Four patients (11.1%) developed serous discharge from the wound, which was treated conservatively with frequent dressing and antibiotics. Four patients (11.1%) developed transient postoperative fever. The mean pain score in the first 2 days after surgery assessed by the Visual Analogue Score (VAS) was 6.1 points, and additional opiate in the first 2 postoperative days was mandatory in 30 patients (83.3%).

**Conclusion:** Performing one- or two-level lumbar decompression and fusion without closed-suction wound drainage did not increase the rate postoperative infection or hematoma formation. Additionally, none of our patients required postoperative blood transfusion. (2019ESJ168)

**Keywords:** Transforaminal lumbar interbody fusion (TLIF), closed-suction drainage, fast-track technique, postoperative complications, lumbar decompression and fixation

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## INTRODUCTION

There is a paucity of evidence regarding the effectiveness of closed-suction drainage in spinal surgery.<sup>8</sup> Drainage is used to reduce the incidence of complications especially neurologic impairment as a result of hematoma formation or accumulation of exudative fluid and hence wound healing complication.<sup>2</sup> An additional benefit of drainage use in spine surgery may be the prevention of postoperative fibrosis and hence adhesions that may complicate decompression surgery and usually cause treatment failure.<sup>5,6</sup> However, drainage may have some complications like iatrogenic trauma due to drain misplacement or displacement, infection, and difficulties removing the drain, which can require a reoperation.<sup>4</sup> One study<sup>12</sup> reported the use of wound drainage in cases of spinal fusion and has shown lower rates of post-haemorrhagic anaemia, blood transfusion, and postoperative fever in patients operated on without using a drain. With regard to lumbar spine surgery, many surgeons stopped using drains following single-level decompression procedures; however, there is still controversy regarding using drains after extensive decompression and fusion surgery.<sup>8</sup> One parameter that is not studied yet is the impact of wound drainage on postoperative pain and duration of hospital stay.

The aim of our study is to estimate the advantages and disadvantages of performing one- or two-level transforaminal lumbar interbody fusion (TLIF) without closed-suction wound drainage.

## PATIENTS AND METHODS

At our institute (Barmherzige Brüder Hospital Trier, Trier, Germany), we routinely used closed-suction wound drainage in cases of single- and multiple-level transforaminal lumbar interbody fusion (TLIF) surgery. Recently, we applied the Fast-Track technique in which wound drainage was avoided and urinary catheter was removed immediately postoperatively aiming at rapid mobilisation of the patients. The Fast-Track

technique was performed in 36 consecutive cases of one- or two-level TLIF in a period of 9 months (from January 2016 to September 2016) and the perioperative data were collected retrospectively. There was no change in our routine standard perioperative and operative measures. An antibiotic (Cefazolin 2gm) was administered with the induction of anaesthesia and an additional dose was given if surgery lasted longer than 4 hours. There was no routine use of postoperative antibiotics. The operative technique involves navigation-based transpedicular screws placement, followed by decompression and insertion of TLIF cage. The variables that were reviewed included blood transfusion (intraoperative and postoperative), postoperative temperature, postoperative pain assessed by Visual Analogue Score (VAS) and the use of opiates during hospital stay, duration of surgery, duration of hospital stay, and incidence of postoperative complications as neurological deficit, hematoma, wound infection, and revision of surgery. The study was approved by the ethics committee of our institute and written consent of participation was signed by all patients.

## RESULTS

A total of 36 consecutive patients (28 females and 8 males) with mean age of  $62.0 \pm 12.3$  years (range 27.9–74.6) were reported in this study. Thirty patients were operated on for single-level TLIF and 6 for double-level TLIF. Table 1 shows patients' demographics and the perioperative details. The mean operative time was  $181 \pm 44.2$  (range 139–290) minutes. Intraoperative bleeding was found to be lower in cases of single-level fusion compared to double-level cases. Cell-saver blood was transfused in 6 patients (16.7%); intraoperative blood loss in those 6 patients was more than 1 liter; 4 of them were double-level fusion cases and the other 2 were single-level fusion cases. There was no postoperative allogenic blood transfusion in any patient. No patients developed postoperative neurological deficit, and there were no cases of surgical revision because of significant

postoperative hematoma. Four patients (11.1%) developed serous discharge from the wound, which was treated conservatively with antibiotic and frequent dressing of the wound. Four patients (11.1%) developed postoperative fever with maximum temperature of 37.8; however, no patients developed deep wound infection. There were two cases of revision surgery due to

CSF leakage that failed to heal with conservative measures. The mean duration of hospital stay was  $8.4 \pm 1.9$  days (range 6–12 days). The mean pain score in the first 2 days after surgery assessed by the VAS was  $6.1 \pm 1.9$ . Additional opiate in the first 2 postoperative days was mandatory in 30 patients (83.3%).

**Table 1.** Patients demographics and perioperative data.

Parameters	Results
Number of patients	36
Age/years	$62.0 \pm 12.3$ (27.9-74.6)
Sex: males/females	8/28
Operated levels	
Single-level	30; 83.3
Double-level	6; 16.7
Preoperative HB (g/dl)	$14.1 \pm 1.6$ (11.1-17.8)
Operative time/minutes	$181.1 \pm 44.2$ (139-290)
Intraoperative blood loss/ml	
All series/ml	$495 \pm 505$ (100-1900)
Single-level/ml	$335 \pm 263$ (100-1075)
Double-level/ml	$1300 \pm 721$ (500-1900)
Cell-saver transfusion	6 (16.7%)
Postoperative blood transfusion	0
Postoperative fever	4 (11.1%)
Hospital stay/days	$8.4 \pm 1.9$ (6-12)
Additional opiate in the first 2 days	30 (83.3%)

## DISCUSSION

Although it is agreed that the use of drains should decrease the incidence of postoperative hematoma formation and hence the incidence of infection, systematic reviews have shown a paucity of level I or II evidence suggesting benefits from the employment of drains in orthopedic<sup>7</sup> and in spinal surgery.<sup>8</sup>

A prospective randomized study compared the results following single-level laminectomy with and without drain reaching the conclusion

that the usage of drain did not affect the rate of complication<sup>9</sup>. The same conclusion was reported by an additional prospective randomized study performed on use of drain following extensive lumbar spine surgical procedures. The procedures in this study included multilevel decompressions, revision decompressions, decompression combined with instrumented fusion, and decompression combined with un-instrumented fusion.<sup>1</sup> Another prospective study has shown the benefit of drainage in reducing the incidence of postoperative epidural hematoma detected by MRI in the first postoperative day following

lumbar discectomy operations. However, the authors did not report the complications resulting from hematoma formation in their study.<sup>6</sup>

Our results have shown that performing one- or two-level TLIF surgeries without using wound drainage did not increase the reported rate of complication. No patients in our series returned to the operating theater due to postoperative neurological deficit because of hematoma formation. 11.1% of our patients developed serous discharge from the wound and it was treated conservatively with repeated dressing of the wound. Nevertheless, the mean duration of hospital stay in this series was less than the average duration in our previous TLIF series, where drains were routinely used (8.4 versus 10.1 days) (nonpublished data).

In their retrospective comparison between two groups of patients who underwent lumbar decompression and fusion surgery with and without drain, Walid et al.<sup>12</sup> concluded that the use of drain did not reduce the incidence of complications. Nevertheless, the results of their study have shown that the use of drain was associated with higher incidence of post-haemorrhagic anaemia (23.5 versus 7.7%) and higher incidence of blood transfusion (23.9 versus 6.8%). Another study<sup>3</sup> performed on spinal fusion in adolescent scoliosis found that more drained patients received postoperative blood transfusions compared with those without a drain (43% versus 22%). In our series of patients without drain, no postoperative allogenic blood transfusion was performed, while, in our previous TLIF series with drain, the rate of allogenic blood transfusion was 4.2% (nonpublished data).

Development of postoperative fever could be related to the nature of drains as a foreign body. Walid et al.<sup>12</sup> found a significantly increased prevalence of postoperative fever associated with drain use in lumbar spine fusion surgeries (63.2% in the drain group versus 52.6% in the non-drain group). Nevertheless, the authors reported postoperative infection in 3.5% of patients with drain compared to 2.6% of patients without drain with no significant difference between the two groups. In a study performed on a series of 80

patients of single-level decompression and fusion without using a drain, Scuderi et al.<sup>11</sup> reported three complications: 2 cases of infection (2.5%) and one case (1.25%) of postoperative hematoma requiring surgical decompression. In a bacteriological study, Raves et al.<sup>10</sup> have documented that there is 20% greater risk of contamination in the closed-suction drainage systems compared to no drain use. In our series of patients operated on without drain, no significant wound infection was detected, and no revision surgery was performed because of infection. The only reported revision surgery in our series was due to persistent CSF leakage from the wound. Additionally, the reported rate of postoperative fever was 11.1% and the maximum temperature was 37.8. On the contrary, the rate of revision surgery because of infection and the rate of postoperative fever were 3.7% and 19%, respectively, in our previous TLIF cases with wound drainage. Interestingly, the temperature was normalized after removal of the drain in 75% of the patients (27 out of 36) with fever (nonpublished data).

Accumulation of blood in the operative bed may result in pain in the early postoperative period; therefore, operating without drain may lead to more pain in the early days after surgery until the resorption of the accumulated blood or exudation. Our study focused on the analysis of postoperative pain and the usage of opiate in the postoperative period. We found that, in the first 2 postoperative days, the mean postoperative pain score and the rate of additional opiate use were higher in our series of patients without drain than those in the previous cases with drain (nonpublished data).

The limitation of our study was related to the retrospective nature of the analysis, in addition to the small number of patients reported. Therefore, a large sample series and prospective randomized control study are highly recommended.

## CONCLUSION

Performing one- or two-level lumbar decompression and fusion without closed-suction wound drainage did not increase the rate of

postoperative infection or hematoma formation. Additionally, none of our patients required postoperative blood transfusion.

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## الملخص العربي

### جراحة تثبيت الفقرات القطنية في مستوى واحد أو مستويين بدون تصريف للجرح

**البيانات الخلفية:** على الرغم من أن العديد من الجراحين توقفوا عن استخدام تصريف للجرح بعد جراحات العمود الفقري البسيطة، لا يزال هناك جدل بشأن ضرورة التصريف في عمليات العمود الفقري الأكثر توسعاً.  
**الغرض:** تقدير مزايا وعيوب إجراء جراحة تثبيت الفقرات القطنية في مستوى واحد أو اثنين بدون تصريف للجرح.

### تصميم الدراسة: دراسة سريرية استعادية

**المرضى والطرق:** دراسة مرجعية للملفات الطبية الخاصة بـ 36 مريض، تم إجراء 36 عملية متعاقبة من جراحات تثبيت الفقرات القطنية في مستوى واحد أو اثنين في الفترة بين يناير وسبتمبر 2016 دون استخدام تصريف للجرح، ثم تم تحليل نتائج هذه الحالات ودراساتها.

**النتائج:** لم يتم نقل دم بعد الجراحة لأي من المرضى، 19% من المرضى حدث لهم حمى ما بعد الجراحة، لم يتم إجراء مراجعات جراحية لأي من المرضى سواء بسبب عدوى الجرح أو التجمع الدموي. متوسط الألم بعد الجراحة كان مرتفع (1.6) خلال أول يومين، كذلك كان معدل استخدام مسكنات الألم الافيونية في أول يومين بعد الجراحة مرتفعاً.

**الاستنتاج:** إجراء جراحة تثبيت الفقرات القطنية في مستوى واحد أو اثنين بدون تصريف للجرح لا يزيد من نسبة المضاعفات، في حين أن تجنب استخدام تصريف للجرح قد يصاحبه معدل أقل لنقل الدم للمرضى بعد الجراحة وأيضاً معدل أقل لحمى بعد الجراحة، ويقلل من معدل عدوى الجرح الميكروبية.