

The Outcome of Posterior Spinal Fusion and Instrumentation of Adolescent Idiopathic Scoliosis without Wound Suction Drainage

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Abstract

Background: In spine surgery postoperative closed suction drainage is used to decrease the potential risks of wound hematoma formation, and reduces the risk of infection, cord compression and neurologic deficit. However, the efficacy of drains used for this purpose in adolescent idiopathic scoliosis is controversial. The purpose of this study is to evaluate outcomes of patients after posterior spinal fusion with instrumentation for adolescent idiopathic scoliosis without wound suction drainage. **Methods:** A total of 66 Patients who underwent posterior spinal fusion and instrumentation for the correction of Adolescent idiopathic scoliosis without the use of drain from January 2012 to January 2021 were included. Wound dehiscence, wound hematoma, infection, preoperative and postoperative hemoglobin levels and need for transfusion were described as frequency and mean values. **Results:** The average age was 15.06 years. Hospital stay was 2.2 days. Patients were followed-up over 50.21 months. There was no deep infection, wound hematoma. The difference between just postoperative and three days after operation hemoglobin levels was not significant and no need for transfusion. Only 3 (4.5%) cases with superficial skin infection and 4 (6%) cases with skin and Wound dehiscence were treated with dressing and antibiotics with full recovery. **Conclusion:** Without using drain for patients with idiopathic scoliosis who underwent posterior spinal fusion and instrumentation, no increase in blood loss, transfusion requirements, wound infection, skin dehiscence, and wound hematoma was observed.

Keywords

Posterior Spinal Fusion, Adolescent Idiopathic Scoliosis, Wound Suction

1. Background

Closed suction drainage is widely used in spine surgery to prevent hematoma and wound complications. Hematoma may result in neural compression and cause cauda equina syndrome and neurologic deficits, which were reported to be prevented by using closed suction drainage. However, the use of closed suction drainage in posterior spinal fusion with instrumentation for adolescent idiopathic scoliosis surgery is controversial [1] [2].

Many articles have reported the benefit of closed suction drainage in orthopedic surgeries for wound healing and decreasing infection rates. However closed suction drainage can cause anxiety and discomfort. Moreover, these closed suction drainages are considered foreign bodies, which could cause surgical site infections and inflammation post-surgery [3].

Many studies have reported that closed suction drainage does not decrease the incidence of wound complications, but patients with closed suction drainage have more blood loss with anemia and increased postoperative blood transfusion rate compared with non-suction drainage patients [4] [5].

In a study by Walid *et al.*, they found an increased prevalence of postoperative fever with suction drainage use, likely due to the nature of the drain as a foreign body [6].

Recently some articles do not recommend using suction drainage routinely, and they report that drains do not reduce postoperative complications [7] [8].

A recent study showed that sub fascial suction drainage has no benefit over any drainage for patients with spine surgery in adolescent idiopathic scoliosis [7].

Unfortunately, the study of the use of closed suction drainage in posterior spinal fusion with instrumentation for adolescent idiopathic scoliosis surgery is low and especially in the case of no suction drainage the study is much less.

The purpose of this study is to evaluate outcomes of patients after posterior spinal fusion with instrumentation for adolescent idiopathic scoliosis without wound suction drainage.

2. Methods

In our study all of the 66 patients with Adolescent idiopathic scoliosis underwent standard posterior spine exposure technique, posterior spinal fusion and instrumentation (universal clamp or multisegment screw fixation systems) without use of drain to correct scoliosis from 2012 to 2021 at Imam Reza university hospital and Sina hospital.

Patients' deformities were categorized based on the Lenke Classification System for Scoliosis.

After surgery, a 48-hour course of prophylactic antibiotics was administered to all of the patients. Also, all of them were encouraged to start ankle and knee

range of motion (ROM) exercises as soon as possible, mobilize within the first 24 hours, and walk with Thoracolumbar Spinal Orthosis (T.L.S.O) after 48-hour post-surgery.

After discharge, all of the patients were followed up monthly to assess complications such as wound dehiscence, wound hematoma, and infection, and all were recorded. Moreover, pre and postoperative hemoglobin levels, need for blood transfusion and length of hospital stay were recorded.

The data related to before and after the operation, as well as the data of post-operative complications, were collected from the information recorded in the department and clinic of the university and private hospitals.

Patients with Anterior spinal fusion (ASF), postoperative neurological deficit, requiring postoperative intensive care unit admission, inadequate follow-up, insufficient hospital data, younger than 11 years old or older than 20 years old, and underlying disease were excluded from this study.

3. Statistical Analysis

Data analysis was performed using SPSS. Differences in categorical variables were tested by fisher exact test. According to data distribution, continuous and ordinal variables were calculated using Manne-Whitney U test or the Student t-test. P-value < 0.001 was considered as significant.

4. Results

Demographic characteristics of the patients are shown in **Table 1**. From 66 patients, 26 (39.4%) were male and 40 (60.6%) were female. The mean age of the patients was 15.06 (± 2.0) years. Based on Lenke classification, 37 patients had Lenke Type 1, nine had Lenke Type 2, 11 had Lenke Type 3, and 10 Lenke Type 5.

Pre and post-operation data of the patients are shown in **Table 2**. The mean follow-up was 50.21 (± 16.9) months. The mean hemoglobin level before surgery decreased from 13.3 (± 0.56) to 10.6 (± 0.57) after surgery and to 10.3 (± 0.57) at the time of discharge. Based on our results, the difference between pre and post-operative hemoglobin level was significant (<0.001). Also, the difference between preoperative and during discharge hemoglobin levels was significant as well (<0.001). The difference between postoperative and during discharge hemoglobin levels was not significant (<0.06) (**Tables 3-5**). Moreover, none of the patients needed blood transfusion postoperatively.

Post operative complications are shown in Table 6. The median postoperative hospital stay was 2.2 (± 0.35) days. During follow-up after surgery, three patients (4.5% of patients) were found to have superficial surgical site infections, that healed by using wound dressing and oral antibiotics after 2 weeks. Also, four (**6% of patients**) patients had skin dehiscence after surgery that half of them were located at the distal part of the incision (**3%**) and the other half were at the proximal part (**3%**) and all of the patients were healed after 10 days by using wound dressing. In contrast, none of the patients were found to have deep infections or hematoma after surgery and follow-up.

Table 1. Demographic characteristics of the patients.

Variable		Number (%)
Gender	Female	40 (60.6%)
	Male	26 (39.4%)
Type of scoliosis	L1	37 (56.1%)
	L2	8 (12.1%)
	L3	11(16.7%)
	L5	10 (15.2%)
System	U.Clamp	36 (54.5%)
	Multi Seg.	30 (45.5%)
Age, Mean (SD)		15.06 (2.0)
Hb before surgery, Mean (SD)		13.3 (0.56)

Table 2. Post-operation data of the patients.

Variable	Number (%)
Follow-up (month), Mean (SD)	50.21 (16.9)
Duration of Surgery (hours), Mean (SD)	3.2 (0.12)
Hospital stay (days), Mean (SD)	2.2 (0.35)
Hb before surgery, Mean (SD)	13.3 (0.56)
Hb after surgery, Mean (SD)	10.6 (0.57)
Hb after discharge, Mean (SD)	10.3 (0.57)

Table 3. Difference between hemoglobin before and after surgery.

Variable	Mean (SD)	P-value
Hb before surgery	13.3 (0.56)	<0.001
Hb after surgery	10.6 (0.57)	

Table 4. Difference between hemoglobin before surgery and during discharge.

Variable	Mean (SD)	P-value
Hb before surgery	13.3 (0.56)	<0.001
Hb after discharge	10.3 (0.57)	

Table 5. Difference between hemoglobin after surgery and during discharge.

Variable	Mean (SD)	P-value
Hb after surgery	10.6 (0.57)	<0.06
Hb after discharge	10.3 (0.57)	

Table 6. Post-operation complications.

Variable		Number (%)
Hematoma		0 (0%)
Superficial Infection		3 (4.5%)
Skin dehiscence	Distal	2 (3%)
	Proximal	2 (3%)

5. Discussion

Postoperative surgical site infections in spine surgery (0.7% to 16%) and hematoma of the surgical field may occur in posterior spinal fusions and instrumentation. Suction drains are used by spine surgeons to aspirate collections to prevent hematoma formation, subsequently preventing the development of surgical site infections [9]. Although the presence of a postoperative suction drain theoretically reduces the risk of hematoma and infection, the efficacy of drains used for this purpose is controversial. Suction drain also can both transmit bacteria from the outside into the wound and as a foreign body, stimulate infection. There are several studies about the use of drains and infection rate in orthopedic surgeries [10] and also most studies have reported that the use of drain does not prevent infection and may increase the rate of complications after surgery [11].

Feras Waly, *et al.* in a review study reported that spine surgeons not routinely used closed suction drains in lumbar spine surgery.

Some studies determined increase in frequency of wound infection in patients with idiopathic scoliosis who underwent posterior spinal fusion without use of suction drains [10]. **But studies that show this result are rare.**

In our study, there were 4 (6%) cases of infection (superficial) which was very low compared to the results of studies performed in patients who underwent posterior spinal fusion PSF for idiopathic scoliosis with and without suction drains (16%) [1]. **All of the patients were healed after 10 days by wound dressing.** There was not any deep infection and massive hematoma in our patients.

In a systematic review about the use of drains in spinal surgery reported that drains do not reduce the incidence of complications and also the use of drains may lead to complications [12].

There are some studies about used of subcutaneous suction drain for posterior spinal fusion (PSF) in adolescent idiopathic scoliosis (AIS). They claim that subcutaneous suction drains can improve postoperative wound healing without significantly increasing blood loss, transfusion requirements and infection [13]. In our opinion, subcutaneous suction drains are not needed if the muscles and fascia are carefully sutured, on the other hand, not emptying the hematoma and creating the clot helps to accelerate and strengthen the fusion.

Several studies have reported significant increase of blood loss, Hemoglobin level reduction, and blood transfusion in patients who underwent PSF for idiopathic scoliosis with suction drains [1] [14] [15] [16].

Abdulmonem Alsiddiky *et al.*, in a study of patients who underwent PSF for idiopathic scoliosis without suction **drainage**, reported no hemoglobin level reduction, blood transfusion, and significant infections [17].

In our patients, there is no case of Hemoglobin level reduction, significant blood loss, and blood transfusion in the postoperative three days.

In most studies, the length of hospital stay is longer 6 (6 - 7) in patients who underwent PSF for idiopathic scoliosis with suction drainage [1] [13]. **Length of hospital stay in our study was 3 days. The length of hospital stay does not seem to be related to the presence or absence of suction drainage.**

Alauddin Kochai, MD *et al.* in their study reported 6 (21.4%) and 3 (12.5%) cases of Wound dehiscence in patients who underwent spinal fusion for AIS with and without suction drains respectively [1] [14] [15] [18]. **Wound dehiscence in our study was less** and there were 4 (6%) cases of Wound dehiscence in our study treated in 2 weeks only with dressing.

6. Limitations

This study involved a small number of patients and was a retrospective study. Sufficient sample sizes and appropriate methodology protocols are needed to assess the efficacy of suction drainage on spinal fusion for AIS.

7. Conclusion

Without using drain for patients with idiopathic scoliosis who underwent posterior spinal fusion and instrumentation, no increase in blood loss, transfusion requirements, wound infection, skin dehiscence, and wound hematoma was observed.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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