

# 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, 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 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 drainage

## Introduction

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 orthopaedic surgeries for wound healing and decreasing infection rates. However closed suction drainage can cause anxiety, and discomfort. Moreover, this closed suction drainage is 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.

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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.

## Materials and 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 multi-segment 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 hours course of prophylactic antibiotics were 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 (TLSO) after 48 hours post-surgery.

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

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.

## 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 Mann-Whitney U test or the Student t-test. P-value < 0.001 was considered as significant.

## 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.

Variable		Number (%)
Gender	Female	40 (60.6%)
	Male	26 (39.4%)
Type of scoliosis	L <sub>1</sub>	37 (56.1%)
	L <sub>2</sub>	8 (12.1%)
	L <sub>3</sub>	11 (16.7%)
	L <sub>5</sub>	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 1.** Demographic characteristics of the patients.

Pre and post operation data of the patients are shown in Tables 2 and 3. 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.

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 2.** Post operation data of the patients.

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

**Table 3.** Post operation complications.

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 4-6).

Variable	Mean (SD)	P-value
Hb before surgery	13.3 (0.56)	<.001
Hb after surgery	10.6 (0.57)	

**Table 4.** Difference between hemoglobin before and after surgery.

Variable	Mean (SD)	P-value
Hb before surgery	13.3 (0.56)	<.001
Hb after discharge	10.3 (0.57)	

**Table 5.** Difference between hemoglobin before surgery and during discharge.

Variable	Mean (SD)	P-value
Hb after surgery	10.6 (0.57)	<.06
Hb after discharge	10.3 (0.57)	

**Table 6.** Difference between hemoglobin after surgery and during discharge.

**Moreover, none of the patients needed blood transfusion postoperatively**

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 patients had skin dehiscence after surgery that half of them were located at the distal part of the incision and the other half were at the proximal part and all of the patients were healed after 10 days by using wound dressing. In contrast, none the patients were found to have deep infections or hematoma after surgery and follow-up.

**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, but, 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, and also most studies have reported that the use of drain does not prevent infection and may increase the rate of complications after surgery [10,11].

Feras Waly, et al. in a review study reported that spine surgeons not routinely used closed suction drains in lumbar spine surgery [12].

Some study determined increase in frequency of wound infection in patients with idiopathic scoliosis who underwent posterior spinal fusion without use of suction drains.

In our study, there was 4 (6%) cases of infection (superficial) which was very low compared to the results of studies performed in patients underwent posterior spinal fusion PSF for idiopathic scoliosis with and without suction drains (16%). 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 led to complications [13,14].

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 [15]. In our opinion, subcutaneous suction drains is 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 strengthening the fusion.

Several studies have reported significant increase of blood loss, Hemoglobin level reduction, and blood transfusion in patients underwent PSF for idiopathic scoliosis with suction drains [16-18].

Abdulmonem Alsiddiky, et al. in a study of patients underwent PSF for idiopathic scoliosis without suction drains, reported no hemoglobin level reduction, blood transfusion, and significant infections [19].

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

In most studies the length of hospital stay are longer 6 (6-7) in patients underwent PSF for idiopathic scoliosis with suction drains. Length of hospital stay in our study was 3 days [20].

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.

There were 4 (6%) cases of wound dehiscence in our study treated in 2 weeks only with dressing.

## 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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## References

- Alauddin Kochai, Unal Erkorkmaz. "The role of drains in adolescent idiopathic scoliosis surgery. Is it necessary?" *Medicine (Baltimore)* 98 (2019): 18061.
- Parker, Martyn J, Vicki Livingstone, Rupert Clifton, and Andrew McKee, et al. "Closed suction surgical wound drainage after orthopaedic surgery." *Cochrane Database Syst Rev* 3 (2007): 1-12.
- Fichman, Simcha G, Tatu J Makinen, Benjamin Lozano, and Wael A Rahman, et al. "Closed suction drainage has no benefits in revision total hip arthroplasty: A randomized controlled trial." *Int Orthop* 40 (2016): 453-457.
- Zhou, Xin-die, Jin Li, Yan Xiong, and Li-feng Jiang, et al. "Do we really need closed-suction drainage in total hip arthroplasty? A meta-analysis." *Int Orthop* 37 (2013): 2109-2118.
- Zhang, Qidong, Qian Zhang, Wanshou Guo, and Zhaohui Liu, et al. "No need for use of drainage after minimally invasive unicompartmental knee arthroplasty: a prospective randomized, controlled trial." *Arch Orthop Trauma Surg* 135 (2015): 709-713.
- Walid, Mohammad Sami, Moataz Abbara, Abdullah Tolaymat, and James R Davis, et al. "The role of drains in lumbar spine fusion." *World Neurosurg* 77 (2012): 564-568.
- Ovadia, Dror, Michael Drexler, Moti Kramer, and Amir Herman, et al. "Closed wound subfascial suction drainage in posterior fusion surgery for adolescent idiopathic scoliosis: A prospective randomized control study." *Spine* 44 (2019): 377-383.
- Murphy, Robert F, and James F Mooney. "Complications following spine fusion for adolescent idiopathic scoliosis." *Curr Rev Musculoskelet Med* 9 (2016): 462-469.
- O'Toole, John E, Kurt M Eichholz, and Richard G Fessler. "Surgical site infection rates after minimally invasive spinal surgery." *J Neurosurg Spine* 11 (2009): 471-476.
- Alsiddiky, Abdulmonem, Kaleem Ahmed Nisar, Fahad Alhuzaimi, and Waleed Albishi, et al. "Wound healing without drains in posterior spinal fusion in idiopathic scoliosis." *J Coll Physicians Surg Pak* 23 (2013): 558-561.
- Lwin, Sein, Shiong Wen Low, D Choy, and Tseng Tsai Yeo, et al. "External ventricular drain infections: Successful implementation of strategies to reduce infection rate." *Singapore Med J* 53 (2012): 255.
- Waly, Feras, Mohammad M Alzahrani, Fahad H Abduljabbar, and Tara Landry, et al. "The outcome of using closed suction wound drains in patients undergoing lumbar spine surgery: A systematic review." *Global Spine J* 5 (2015): 479-485.
- Patel, Salil B, William Griiths-Jones, Conor S Jones, and Dino Samartzis, et al. "The current state of the evidence for the use of drains in spinal surgery: systematic review." *Eur Spine J* 26 (2017): 2729-2738.
- Blank, John, John M Flynn, William Bronson, and Peter Ellman, et al. "The use of postoperative subcutaneous closed suction drainage after posterior spinal fusion in adolescents with idiopathic scoliosis." *J Spinal Disord Tech* 16 (2003): 508-512.
- Diab, Mohammad, Mia Smucny, John P Dormans, and Mark A Erickson, et al. "Use and outcomes of wound drain in spinal fusion for adolescent idiopathic scoliosis." *Spine* 37 (2012): 966-973.
- Ovadia, Dror, Michael Drexler, Moti Kramer and Amir Herman, et al. "Closed wound subfascial suction drainage in posterior fusion surgery for adolescent idiopathic scoliosis: A prospective randomized control study." *Spine (Phila Pa 1976)* 44 (2019): 377-383.
- Waly, Feras, Mohammad M Alzahrani, Fahad H Abduljabbar, and Tara Landry, et al. "The outcome of using closed suction wound drains in patients undergoing lumbar spine surgery: A systematic review." *Global Spine J* 5 (2015): 479-485.
- Alsiddiky, Abdulmonem, Kaleem Ahmed Nisar, Fahad Alhuzaimi, and Waleed Albishi, et al. "Wound healing without drains in posterior spinal fusion in idiopathic scoliosis." *J Coll Physicians Surg Pak* 23 (2013): 558-561.
- Blank, John, John M Flynn, William Bronson, and Peter Ellman, et al. "The use of postoperative subcutaneous closed suction drainage after posterior spinal fusion in adolescents with idiopathic scoliosis." *J Spinal Disord Tech* 16 (2003): 508-512.
- Liang, Jinqian, Guixing Qiu, Sooyong Chua, and Jianxiong Shen, et al. "Comparison between subcutaneous closed-suction drainage and conventional closed-suction drainage in adolescent's idiopathic scoliosis patients undergoing posterior instrumented spinal fusion: A randomized control trial." *J Spinal Disord Tech* 26 (2013): 256-259.

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