

# Wound Healing Without Drains in Posterior Spinal Fusion in Idiopathic Scoliosis

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## ABSTRACT

**Objective:** To determine the frequency of wound infection and neurological injuries in patients with idiopathic scoliosis who underwent posterior spinal fusion without use of drains.

**Study Design:** Case series.

**Place and Duration of Study:** Department of Orthopaedics, College of Medicine, King Saud University, Riyadh, Kingdom of Saudi Arabia, from February 2007 to June 2010.

**Methodology:** Patients who underwent similar technique of posterior spinal fusion instrumentation for the correction of scoliosis without use of drain were included. Wound Demographics, wound healing, complications and duration of hospital stay were considered and described as frequency and mean values.

**Results:** The average age at the time of surgery was  $12.80 \pm 1.30$  years, duration of surgery was  $3.80 \pm 0.86$  hours, hospital stay was  $3.84 \pm 0.78$  days and patients were followed-up over the last 30 months. There was no incidence of any neurological complication and deep infection. However, only 2 (4.16%) cases with superficial skin infection were treated with dressing and antibiotics with full recovery.

**Conclusion:** The wound healing is adequate without using drain for patients with idiopathic scoliosis who underwent posterior spinal fusion and instrumentation when good wash, watertight closure technique and appropriate antibiotics coverage is provided.

**Key Words:** Wound drainage. Spinal fusion. Idiopathic scoliosis. Wound healing.

## INTRODUCTION

The use of surgical drains is common in postoperative management of surgical patients. Postoperative care and recovery strategies, from post-anaesthesia to hospital discharge, can avoid many complications, promote healing, and achieve a positive outcome. The increasing number of surgical cases requires instrumentation that increases the likelihood of infection resulting from the presence of drains. The use of prophylactic drains in orthopaedics procedures is also well documented; however, the efficacy of drains used for this purpose is controversial. It has also been suggested that the use of drain is not effective in preventing the infection and may actually increase the rate of post-surgical complications.<sup>1-3</sup> The presence of a postoperative drain theoretically reduces the risk of infection. They are also associated with complications including haemorrhage, tissue inflammation, retrograde

bacterial migration, drain entrapment or loss, pain and fluid, electrolyte and protein loss. Several randomized studies suggest that the use of drains is not effective at preventing infection and may actually increase the rate of complication after surgery.<sup>4,5</sup>

There is very little evidence in the medical literature to support or contest the use of drains to prevent epidural haematoma, which may result in compression of the cauda equina with neurologic injury following lumbar spine surgery. Keeping in view the little information regarding the use of drains in various surgical procedures, the aim of this study was to determine the frequency of wound infection and neurological injuries in patients with idiopathic scoliosis who underwent posterior spinal fusion without use of drains.

## METHODOLOGY

This case series study was conducted in the Department of Orthopaedics, Research Chair of Spinal Deformities, College of Medicine, King Saud University, Riyadh, Saudi Arabia, during the period February 2007 to June 2010.

Patients who underwent posterior spinal fusion instrumentation technique for the correction of scoliosis without the use of drain were inducted. Patients who suffered from gross anaemia, bleeding or clotting disorders and those who suffered from chronic debilitating disease such as diabetes mellitus were

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excluded from the study. All the patients underwent a similar operative technique, a standard posterior subperiosteal exposure of the spine and closure using watertight technique that include 3 layers of suturing included muscle, sub-cutaneous tissue and skin and the dressing was applied with steri-strips. Blood transfusion was given as indicated by the anaesthesiologist. All patients received cefuroxime antibiotics 30 – 60 minutes pre-operatively and for 24 hours post-operatively, the antibiotic was continued for further longer period as per clinical and wound situation of the patient.

Postoperatively, patients were advised for lying supine on the first day postoperative without using the pillow, haemoglobin/haematocrit levels were measured daily, with coagulation profile at first day, postoperative, anticoagulation was given on the second day, post-operatively. Dressings were changed every other day. Patients were encouraged to stand and walk on the third day and were usually discharged on the 3rd day post-operatively. Patients were evaluated in the clinic at 2, 6 weeks, and 3, 6, 12, 18 and 30 months for regular follow-up. Patients were instructed to avoid sitting on the ground, bending or bowing, and gradually returned to work, and full mobilization was restored after 3 months.

The data was coded, entered into computer and analyzed by using Gold Stat Pac software version 3.2. Quantitative data was presented in the mean  $\pm$  SD. The incidence of infection was analyzed by total number of patients and number of patients who developed infection based on the presence (yes) and absence (no) findings. The finding was expressed as percentage and frequencies.

## RESULTS

There were 48 patients with 6 (12.5%) males and 42 (87.5%) females with diagnosis of idiopathic scoliosis who underwent posterior spinal fusion after the correction of the deformity without the use of the drain (Table I). The average age at the time of surgery ranged from 9-16 years mean being  $12.80 \pm 1.30$  years, duration of the surgery was 4 – 5 hours, blood loss was 800-1200 ml, hospital stay was 3 – 5 days, haemoglobin ranged from 12 – 15 gm / dl and Cobb's angle ranged from 41 – 100 degrees.

There was no incidence of deep infection (0%) that needed to open the wound and irrigation and debridement. There was also no incidence of neurologic injury or compression of the cauda equine (0%) as a result of dense epidural adhesion caused by the haematoma. There were only 2 cases (4.16%) with superficial skin infection, which were treated with antibiotics and with full recovery. The better results without using drains with respect to superficial, deep infection and neurological injury.

**Table I:** Distribution of anthropometric parameters and incidence of infections and neurological injury in patients with idiopathic scoliosis (n = 48).

Parameters	Number of cases, infections and their percentage (%)
Gender	
Male	6 (12.5%)
Female	42 (87.5%)
Age at the time of surgery (Mean $\pm$ SD)	(12.80 $\pm$ 1.30) years
Duration of surgery (Mean $\pm$ SD)	(3.80 $\pm$ 0.86) hours
Hospital stay (Mean $\pm$ SD)	(3.84 $\pm$ 0.78) days
Haemoglobin g/dL (Mean $\pm$ SD)	(13.80 $\pm$ 1.28)
Superficial skin infection	
Yes	2 (4.16%)
No	46 (95.84%)
Deep infection	
Yes	0 (0%)
No	48 (100%)
Neurological injury	
Yes	0 (0%)
No	48 (100%)

## DISCUSSION

Postoperative wound infections in most of the surgical procedures especially in the spinal surgery are a significant problem for the patient as well as the treating physicians and surgeons. The literature acknowledged that the rate of postoperative spine infections ranged from 1.9 – 20%.<sup>6,7</sup> It has also been reported that postoperative wound infections after instrumented arthodesis can be managed by a protocol of aggressive debridement and irrigation, primary or delayed closure, and appropriate antibiotic therapy without removal of internal fixation.<sup>8-10</sup> However, the number of surgical debridement and irrigations in the operating room prior to wound closure varies among patients. Surgical drain system may either be open drains or closed suction drains.

The frequent procedures in which drains are commonly used are joint replacement surgery for shoulder, hip, knee replacement, fracture fixation and spinal surgery. The main concept regarding the using of drain is to reduce the formation of haematoma and infection of the wound.<sup>11</sup> A potential adverse effect of surgical drains is that they may become contaminated and act as a conduit for infection into the depths of the wound.<sup>12</sup> In addition, some times the drain may be difficult to remove postoperatively and can even require additional surgery to remove if they have been inadvertently misplaced or sutured with surrounding tissues. Conversely, drains may be displaced or removed pre-maturely by the patients pulling on them. Using drains may add additional cost to the procedure but may reduce the number of wound dressings needed. In the present study, the patients with idiopathic scoliosis underwent posterior spinal fusion after the correction of the deformity without the use of the drains. There was no

incidence of deep infection, neurologic injury or compression of the cauda equine as a result of dense epidural adhesion caused by the haematoma. However, we found only 2 cases (4.16%) with superficial skin infection.

Parker *et al.*,<sup>11</sup> demonstrated the results based on the various types of surgeries such as hip and knee replacement, shoulder surgery, hip fracture surgery, spinal surgery, cruciate ligament re-construction, open meniscectomy and fracture fixation surgery. They did not find statistically significant difference in the incidence of wound infection, haematoma, dehiscence or re-operations between those allocated to drains and the un-drained wounds. They also showed that blood transfusion was required more frequently in those who received drains. However, the need for re-inforcement of wound dressings and the occurrence of bruising were more common in the group without drains. In the present study, there was no incidence of deep infection, neurologic injury or compression of the cauda equine as a result of dense epidural adhesion caused by the haematoma.

Ho *et al.*,<sup>13</sup> reported that patients with clinical history of infection, more distal fusion, not using postoperative drains, use of a blood transfusion with increasing units of transfusion are associated with the infection. However, in the present study, there was no incidence of deep infection hence we believe that there is no need to use the drain for the patients with idiopathic scoliosis who underwent posterior spinal fusion and instrumentation when good wash, watertight closure technique and appropriate antibiotics coverage is provided.

Hasan *et al.*,<sup>14</sup> demonstrated that the occurrence of extensive scar adhesions to the dura mater and adjacent nerve roots in the laminectomy site can be seen as a consequence of lumbar disc surgery. Histological studies have shown three main factors responsible for the formation of dense epidural scar adhesions: the destruction of epidural fat, epidural haematoma, and muscle fibre invasion from spine erector muscles into the laminectomy defect. The destruction of epidural fat results in a cavity that is favourable to the development of haematoma and causes the dura mater to become directly exposed to it. Formation of extensive haematoma can consequently induce the invasion of fibrous tissue elements from the erector spine muscle mass to the dura, producing dense and thick scar adhesions.<sup>15</sup> Thus, avoidance of haemorrhage may be the initial step for decreasing the scar tissue forming from dense epidural adhesions. In an experimental study, a highly statistically significant increase has been reported in adhesion load when active intraoperative epidural bleeding was encountered.<sup>16</sup> Insertion of a drain decreases both the incidence and the size of haematoma on the first postoperative day. This may

have practical implications for the prevention of significant postoperative fibrosis and obtaining better surgical outcome.<sup>14</sup> In the present study, 48 patients with idiopathic scoliosis underwent posterior spinal fusion after the correction of the deformity without the use of the drain. There was no incidence of deep infection that needed to open the wound and irrigation and debridement, and there was also no incidence of neurologic injury or compression of the cauda equine as a result of dense epidural adhesion caused by the haematoma. There were only 2 cases (4.16%) with superficial skin infection, which were treated with antibiotics and were fully recovered.

There were some limitations for generalization of the results to this study. First, the study sample size was small with female predominance. A larger future study was required that should take into account the sample size, i.e. recruits more patients. Second, the institutions differ from each other in terms of their practice and protocols. Therefore, the present experience may not be applicable to all institutions.

## CONCLUSION

There was no incidence of any neurological complication and deep infection. It is suggested that there is no need to use the drain for the patients with idiopathic scoliosis who undergo posterior spinal fusion and instrumentation when good wash, watertight closure technique and appropriate antibiotics coverage is provided.

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