

Clinical Decision Making in Early Wound Drainage Following Posterior Spine Surgery in Pediatric Patients

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Abstract

Study Design: Retrospective.

Objectives: To identify the clinical factors suggestive of infected and non-infected drainage to help clinical decision making.

Summary of Background Data: Differentiating between drainage caused by a benign seroma and deep spinal infection may be difficult in the early postoperative period.

Methods: Institutional spine surgery database was searched to identify the cases that were taken back to the operating room for drainage from the surgical wound in the early postoperative period between 2000 and 2012.

Results: A total of 38 cases of early wound drainage (within 6 weeks postoperatively) were identified that were treated with opening all layers, irrigation, and debridement. Intraoperative cultures were sent in all cases. Twenty-five patients proved to have non-infected drainage and did not require further treatment. In 13 patients, infection was confirmed with intra-operative findings and cultures; these patients were treated with serial debridements. In 4 cases, implants had to be removed after multiple debridements (after a quiescent period). The group with non-infected drainage differed from the infection group in that most patients (21 of 25) had non-neuromuscular deformities, whereas 77% of the infected group had neuromuscular etiology (10 of 13) ($p = .0004$). Average number of days to revision was 8.5 (range, 5–14 days) for the non-infected group. Of the 25 patients, 23 presented in the first 10 days. In the infected group, average number of days to revision was 19. Ten of the 13 patients presented on postoperative day 14 or later. Logistic regression analysis showed a significant association between increased likelihood of infection and increased time from the index procedure ($p = .0085$).

Conclusions: The findings suggest that early presenting drainage in pediatric idiopathic spine deformity is often not infected. Drainage, especially presenting after the second postoperative week in neuromuscular patients, proved to be mostly deep spinal wound infections. © 2014 Scoliosis Research Society.

Keywords: Wound drainage; Infection; Spine; Scoliosis; Pediatric deformity

Introduction

In the early postoperative period, wound drainage from an instrumented posterior spinal fusion may indicate an underlying infection. If early infection is promptly diagnosed, debrided, and treated with antibiotics, cure is often achieved without removing the implant [1-3]. Therefore early wound

drainage usually provokes the surgeon to consider returning the patient to the operating room for exploration. However, early wound drainage is not always from an infection. It may be the result of a benign subcutaneous seroma that does not require the expense and aggravation that a return to the operating room causes the patient. Differentiating infection from benign drainage can be difficult because in the early postoperative period, especially the first 2 weeks, all infectious markers including C-reactive protein (CRP) may be high, either as a result of the surgery or because of other complications [4-6]. The aims of this study were to evaluate the characteristics of early-onset postoperative wound drainage and to compare the findings between infected cases with those that had benign seromas.

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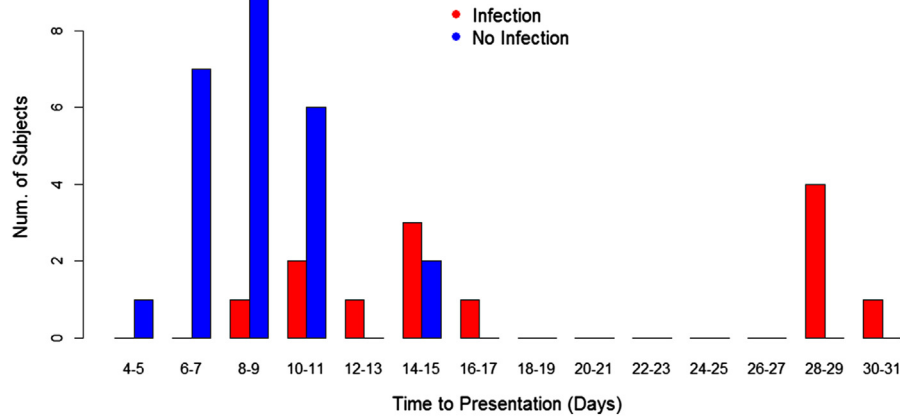


Fig. 1. Time to presentation with wound drainage after posterior spinal instrumentation, and the number of infected and not-infected cases.

Materials and Methods

After the authors obtained approval by the institutional review board, they searched their spine surgery database for patients who were treated by surgical debridement for early wound drainage (within 6 weeks after the initial posterior instrumentation). Other inclusion criteria were the availability of complete imaging and chart data and a minimum of 2 months of follow-up. After surgical debridement for early wound drainage, all patients received empiric antibiotic treatment until the intraoperative culture results were received. Data collected included age, sex, type of instrumentation, length of fusion, etiology of spine deformity, use of surgical drains, use of a vacuum-assisted

closure (VAC) system, time to irrigation and debridement surgery, number of debridement surgeries, intra-operative culture results, and laboratory markers.

Between the years 2000 and 2012, 905 patients had a posterior instrumented fusion. The most frequent indications for surgery included adolescent idiopathic scoliosis (AIS), Scheuermann disease, neuromuscular scoliosis, congenital spinal deformity, and spondylolisthesis. Of this cohort, a total of 42 patients (4.6%) were taken back to the operating room in the first 6 weeks for spinal wound drainage. All patients were taken to the operating room for debridement and irrigation within 24 hours of when they presented with drainage. Therefore, in this article, time to

Table 1
Infected group.

Patient	Sex	Etiology	Construct	Days to revision	Drain	Implant Removal	Pathogen	CRP	ESR	WBC (x10 ³ /mm ³)	T (°C)
1	M	Asperger	PS	14	–		MRSA, <i>Klebsiella</i>	0.66	38	11.6	36.6
2	F	CP	PS	17	–		<i>Escherichia coli</i> , <i>Klebsiella</i> , Gr B <i>Streptococcus</i>	3.21	N/A	10.9	36.7
3	F	CP	Hybrid	13	+		<i>Serratia</i> , <i>Enterococcus</i>	N/A	N/A	12.5	N/A
4	F	Developmental delay	Hybrid	28	–		MSSA	N/A	N/A	N/A	36.5
5	M	CP	Hybrid	28	+		MSSA	28.74	66	15.9	N/A
6	F	Developmental delay/epilepsy	PS	14	+		<i>Escherichia coli</i> , <i>Enterococcus</i> , MSSA, <i>Bacteroides</i> spp	N/A	N/A	N/A	35.1
7	M	CP	SW	9	+	13 months	<i>Escherichia coli</i>	23.8	56	24.9	39.5
8	F	CP	PS	10	–		MRSA	N/A	N/A	15	38.1
9	F	AIS	PS	28	–	15 months	<i>Propionibacterium acnes</i> and mixed flora	0.6	26	5.3	36.7
10	M	CP	Hybrid	15	+		Coagulase-negative <i>Staphylococcus</i> , <i>Pseudomonas aeruginosa</i> , <i>Proteus mirabilis</i> , <i>Acinetobacter</i> , <i>Candida albicans</i>	N/A	N/A	12.2	37.5
11	M	CP	Hybrid	28	+	12 months	MSSA	N/A	N/A	N/A	37
12	F	AIS	Hybrid	11	–		<i>Pseudomonas aeruginosa</i>	N/A	N/A	N/A	37.9
13	F	CP	All hooks	30	+	5 months	<i>Enterococcus</i>	N/A	52	12.4	N/A
Mean				18.8				11.4	47.6	13.4	37.2

CP = cerebral palsy; AIS = adolescent idiopathic scoliosis; PS = pedicle screws; SW = sublaminar wires; MRSA = methicillin-resistant *Staphylococcus aureus*; MSSA = methicillin-sensitive *Staphylococcus aureus*; CRP = C-reactive protein (milligrams per deciliter; normal range, 0.06–0.76); ESR = erythrocyte sedimentation rate (millimeters per hour; normal range, 0–20); WBC = white blood cells; T = temperature; N/A = not available.

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