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ORIGINAL ARTICLE

Early surgical site infections in adult spinal trauma: A prospective, multicentre study of infection rates and risk factors[☆]

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KEYWORDS

Surgical site
infection;
Spinal infection;
Risk factors;
Prospective study

Summary

Introduction: Spine surgery is known to have a high risk of surgical site infection (SSI). Multiple studies have looked into the risk factors and incidence of SSI during elective surgery, but only two retrospective studies have specifically evaluated SSI during surgery following spine trauma. **Materials and methods:** This work was based on a prospective cohort study that included all the patients operated on for spinal trauma at 13 French hospitals over a three-month period. The main endpoint was the occurrence of a SSI during the three-month period. Patients with multiple trauma or open fractures were excluded from the study.

Results: Of the 169 patients re-examined after a minimum of three months, six had had an acute SSI (3.55%). The following factors were significantly related to a SSI: age, ASA score, diabetes, procedure duration, delay elapsed between accident and procedure, number of levels fused, bleeding and prolonged presence of urinary catheter.

Discussion: Our results were consistent with the published infection rates of 2 to 10%. The risk factors identified have all been described in previous studies on elective spine surgery.

Level of evidence: Level IV, prospective cohort study.

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Introduction

Surgeons dread the possibility of a surgical site infection (SSI). Its nosocomial nature is known by the patient and may engage the responsibility of the surgeon and/or health facility [1]. But since published infection rates vary, it is difficult to specifically outline the potential risk to the patient. For spine surgery, these rates range from 1 to 9% [2–4]. In spinal trauma, the SSI rate is even higher – 10% or more based on some published reports [4,5]. Although many SSI risk factors have been identified for elective spine surgery [6] and general trauma [7–9], little information exists for spinal trauma, other than the studies performed by Blam et al. [4] and Rehtine et al. [5]. But information about these risk factors is essential to preventing and controlling the infection [3,10–12]. The goals of the current study were to precisely define the SSI rate and to determine the specific risk factors in a population of spinal trauma patients in France, through a prospective, multicentre study.

Material and methods

A prospective, multicentre, cohort study involving 13 French hospitals was performed over a three-month period with a minimum of three months of postoperative follow-up. All spinal trauma patients requiring surgery for a vertebral injury (fracture, serious ligament injuries) between C1 to L5 were included. The internal fixation could extend to the cranium or sacrum. Multiple trauma patients and those with open fractures were excluded so the study could more specifically evaluate the other risk factors. To analyse risk factors, the most possible information was collected about the patient, accident, type of fracture, procedure, events during the hospitalisation, and the clinical outcome of the patient after the third month (Table 1). Additional descriptive information and treatment strategies were collected in patients with a SSI.

A univariate analysis was performed to evaluate the relationship between risk factors and the appearance of a SSI. Missing data were not censored because they consisted less than 5% of the series. Non-parametric tests were used because the conditions for parametric testing were not met (sample size too small and variables not normally distributed). Fisher's Exact test was used for categorical variables and the Wilcoxon test was used for continuous variables. The significance threshold was set at $P < 0.05$. A

multivariate analysis was not performed because the small number of positive events (infection) in this study did not meet the guidelines for such an analysis [12]. Statistical analyses were performed with the software R (v 10.13/ R Development Core Team [2011]).

Results

During the recruitment period, only 171 of the 256 eligible patients met the inclusion criteria. Most of these patients were men (70%). The average age was 50 years (± 20.1 years). There were few co-morbidities (ASA 1 in 86% of cases). In one-third of cases, the accident occurred at home. Fewer than 25% of patients presented with a neurological deficit upon admission. A summary of the study data is given in Table 2. Only two of patients were lost to follow up at the last review. Three months after inclusion, six SSIs were observed, which corresponds to an average SSI rate of 3.55% (Fig. 1).

The univariate analysis found many significant risk factors: age, ASA score more than 1, diabetes, more than 72 hours between the accident and procedure, procedure longer than three hours, more than three levels fused, significant bleeding (> 600 cc). Among hospitalisation-related variables, only the presence of a urinary catheter for more

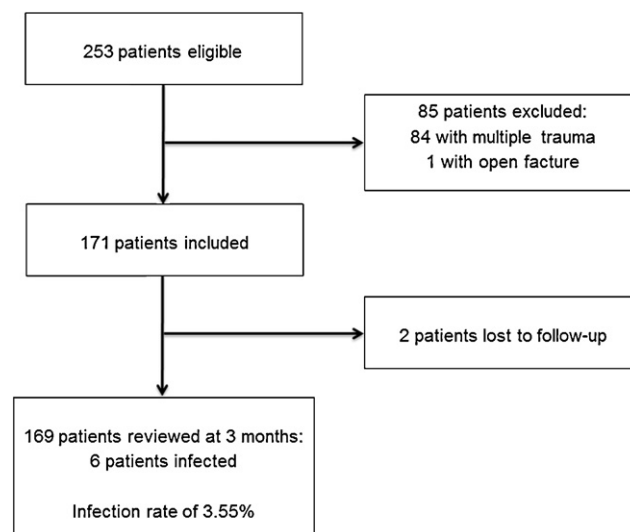


Figure 1 Flow chart for the study.

Table 1 Potential risk factors evaluated in this analysis.

Patient (8)	Fracture (2)	Surgical procedure (7)	Hospitalisation (3)
Age	Site	Duration	Bed rest
Gender	Neurological impairment	Time	Drain
BMI		Approach	Urinary catheter
ASA		Number of instrumented levels	
Diabetes		Delay between accident and procedure	
Smoking		Bleeding	
Alcohol consumption		Intra-operative transfusion	
PAI/AC			

PAI: platelet aggregation inhibitors; AC: anticoagulants; BMI: body mass index.

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