

Review Article

What is new in the diagnosis and prevention of spine surgical site infections

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Abstract

BACKGROUND CONTEXT: Surgical site infection (SSI) after spinal surgery can result in several serious secondary complications, such as pseudoarthrosis, neurological injury, paralysis, sepsis, and death. There is an increasing body of literature on risk factors, diagnosis, and specific intraoperative interventions, including attention to sterility of instrumentation, application of minimally invasive fusion techniques, intraoperative irrigation, and application of topical antibiotics, that hold the most promise for reduction of SSI.

PURPOSE: The purpose of this review is to identify and summarize the recent literature on the incidence, risk factors, diagnosis, prevention, and treatment of SSIs after adult spine surgery.

STUDY DESIGN: The study design included systematic review and literature synthesis.

METHODS: For the systematic reviews, a search was performed in Medline and Scopus using keywords derived from a preliminary review of the literature and Medline MeSH terms. These studies were then manually filtered to meet the study criteria outlined in each section. Studies were excluded via predetermined criteria, and the majority of articles reviewed were excluded.

RESULTS: There are a number of patient- and procedure-specific risk factors for SSI. Surgical site infection appears to have significant implications from the patients' perspective on outcome of care. Diagnosis of SSI appears to rely primarily on clinical factors, while laboratory values such as C-reactive protein are not universally sensitive. Similarly, novel methods of perioperative infection prophylaxis such as local antibiotic administration appear to be modestly effective.

FDA device/drug status: Not applicable.

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The disclosure key can be found on the Table of Contents and at www.TheSpineJournalOnline.com.

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CONCLUSIONS: Surgical site infections are a common multifactorial problem after spine surgery. There is compelling evidence that improved risk stratification, detection, and prevention will reduce SSIs. © 2015 Elsevier Inc. All rights reserved.

Keywords: Spinal infection; Fusion; Topical antibiotics; Surgical wound infection; Spinal instrumentation; Inflammatory markers

Introduction

Surgical site infection (SSI) is a relatively common complication of spinal surgery with the potential of having devastating consequences such as pseudoarthrosis, neurological injury, paralysis, sepsis, and death. Management of SSI requires a multifactorial approach with a primary emphasis placed on prevention including preoperative risk stratification and conduct of the operation. Additionally, recent advances in early diagnosis and effective treatment of spinal SSI will hopefully serve to mitigate some of the potentially severe outcomes of this complication. Nearly all the literature presented in this review has been published within the past 5 years. Furthermore, two systematic reviews were conducted within this literature synthesis to more fully define the recent findings regarding biochemical markers of spinal SSI and intraoperative measures taken to prevent perioperative infection during spine surgery. Although the body of literature pertaining to SSI is quite large, those studies pertaining specifically to spinal surgery are somewhat limited. There is a particular lack of Level I evidence for any intervention. The pool of articles examined for the systematic reviews of laboratory markers to diagnose SSI and for SSI prevention are presented in the [Figure](#), Top and Bottom.

Incidence

The reported incidence of spine SSI ranges from 1% to 14%. In a recent Medicare database subgroup analysis of lumbar fusions, infections were reported in 8.5% of index surgeries and 12% of revision surgeries [1]. However, prospectively collected sources have demonstrated an incidence of SSI as high as 14.9% in some populations [2].

Recent studies have provided benchmark rates of SSI after various types of spine procedures ([Table 1](#)). The overall incidence of infection in the Spine Patient Outcomes Research Trial study of lumbar degenerative conditions was 2% after disc herniation procedures [3], 2.5% after surgery for spinal stenosis [4], and 4% after surgery for degenerative spondylolisthesis [5]. The incidence of SSI after posterior cervical surgery was 2.3% for superficial SSI and 0.7% for deep SSI [6]. Based on a prospectively collected database of 108,419 cases, the overall infection rate for lumbar surgery was 2.1% (superficial=0.8%, deep=1.3%) [7]. These numbers may be useful to describe to patients as the data provides general benchmarks of infection rates.

Other baseline data have been obtained from the investigational device exemption studies on artificial disc prostheses. The results of these studies are summarized in [Table 2](#).

Although the incidence of SSI is relatively low in spine surgery, the effect of SSI is also perceived differently by

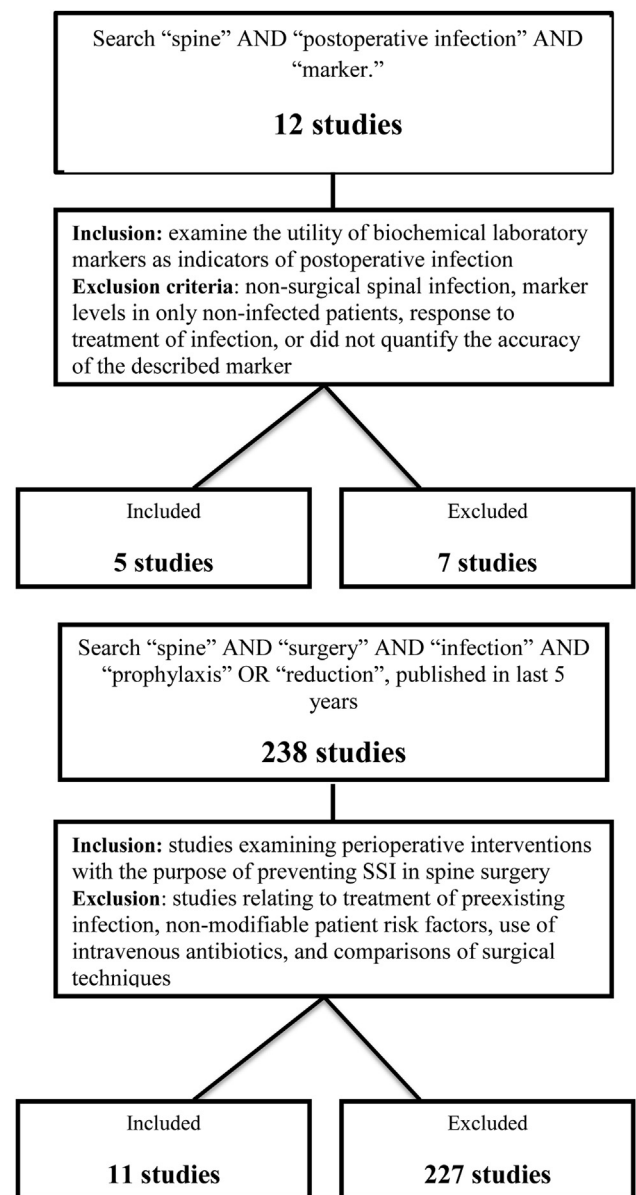


Figure. Flow diagram of articles screened and selected for systematic reviews of (Top) laboratory markers used to diagnose surgical site infection (SSI) and (Bottom) intraoperative SSI prevention.

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