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Clinical Study

Symptomatic spinal epidural hematoma after posterior cervical surgery: incidence and risk factors

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Abstract

BACKGROUND CONTEXT: The true incidence of symptomatic spinal epidural hematoma (SEH) after surgery of the posterior cervical spine and risk factors for its development remain unclear.
PURPOSE: The purpose of this study was to determine the 10-year incidence of symptomatic postoperative SEH and identify risk factors for its development.
STUDY DESIGN/SETTING: This study is a retrospective observational study at a Canadian tertiary care spine center.
PATIENT SAMPLE: The study sample includes adult patients undergoing posterior surgery of the cervical spine.
OUTCOME MEASURES: The outcome measures were the incidence of symptomatic postoperative SEH and risk factors for its development.
METHODS: Surgical procedure codes were used to identify study candidates. Using a standard data collection form, two independent reviewers manually searched paper and electronic medical records to extract patient-, treatment-, and complication-related data. Time to presentation, clinical findings, method of treatment, and intraoperative findings (when relevant) were recorded for patients with an SEH. The overall incidence of symptomatic SEH was calculated, and the categorical and continuous variables were summarized with percentages and means, respectively. Stepwise forward selection logistic regression analysis was performed to identify risk factors for the development of symptomatic SEH.
RESULTS: From January 2002 to December 2011, 529 patients (356 men and 173 women; mean age, 56.7 years) were identified for study inclusion. The mean Charlson Comorbidity Index (CCI) was 0.65 (range, 0–8). Myelopathy was the most common surgical indication (n=293; 55.4%), with the largest subset of patients undergoing decompression with or without instrumented fusion (n=266; 50.3%). Symptomatic postoperative SEH was diagnosed in eight patients for an overall incidence of 1.5%. Postoperative nonsteroidal anti-inflammatory drug (NSAID) use and an increased CCI were identified as significant predictors of the development of a symptomatic SEH in our study cohort (p=.024 and .003, respectively). When all other variables remained constant, a 1-point increase in CCI was associated with 1.6 times higher odds of hematoma development, whereas postoperative NSAID use increased the odds 6.6 times.
CONCLUSIONS: Symptomatic SEH may occur in up to 1.5% of patients undergoing posterior cervical spine surgery. Patients with a higher level of comorbid disease appear to be at increased risk of development of a symptomatic SEH, although avoidance of postoperative NSAIDs may decrease the risk of its development.

Keywords: Spinal epidural hematoma; Cervical spine; Postoperative complications; Incidence; Risk factors; Posterior surgical approach

FDA device/drug status: Not applicable.

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EVIDENCE & METHODS

Context
Spinal epidural hematoma (SEH) of the cervical spine is a postoperative complication that may result in devastating consequences, including paralysis and death. The true incidence of this condition remains unclear, as do risk factors for its development.

Contribution
The authors reviewed 10 years' worth of data regarding posterior cervical spine surgery at their institution. The incidence of SEH was determined to be 1.5%, and comorbidity score and post-operative NSAID use were identified as potent risk factors for the development of this complication.

Implications
The authors maintain that their study is the first to specifically examine the incidence of SEH in the setting of posterior cervical spine surgery. While their determination regarding incidence of this rare complication adds value, their evaluation of risk factors for SEH is not without limitation. When evaluating a dichotomous outcome variable, such as the presence of SEH, at least 10 events are generally needed to rightfully support each predictor variable included in the regression. This critical value was not reached in the current study, yet more than 10 predictor variables were included in the regression model.

—*The Editors*

Introduction

Postoperative spinal epidural hematoma (SEH) is a common radiologic finding identified in 33% to 100% of surgical cases by computed tomography scan or magnetic resonance imaging [1–8]. The majority of these hematomas are clinically silent [9]. However, when an SEH of the cervical spine becomes symptomatic, the consequences may be catastrophic including rapidly progressive quadriplegia, respiratory dysfunction, and even death. Timely diagnosis and surgical treatment is imperative to maximize neurologic recovery [10–13]. Identification of potentially modifiable risk factors or preventive measures is of value to help decrease the risk of hematoma development in this patient population.

Previous reports have consistently estimated the incidence of symptomatic postoperative SEH to be below 1% [14]. Many of these investigations have also identified a wide range of patient- and treatment-related variables as potential risk factors for SEH development. Age more than 60 years [8,15], coagulopathy [16], Rh-positive blood type [15], preoperative nonsteroidal anti-inflammatory drug (NSAID) use [15], elevated preoperative [8] and postoperative international normalized ratio (INR) [15], multilevel laminectomy [8,15,16], and large intraoperative blood loss [15] have all been linked intermittently to this complication.

Although some of these investigations have included posterior surgery of the cervical spine, none has examined both the incidence of, and the risk factors associated with, the development of symptomatic SEH formation after posterior cervical surgery in isolation. As the number of patients undergoing posterior surgical treatment for degenerative conditions of the cervical spine continues to increase [17,18], it is likely that symptomatic postoperative SEH, with its potential for significant negative impact on clinical outcomes, will be encountered more frequently by practicing spine surgeons. Thus, we feel that a focused investigation of patients undergoing posterior cervical surgery is warranted.

The purpose of this study was to determine the 10-year incidence of symptomatic SEH after posterior surgery of the cervical spine at a single Canadian tertiary care spine center and identify patient- and treatment-related risk factors for its development and potential interventions which might serve to decrease its incidence.

Methods

Patient identification

Research ethics board approval was obtained before study commencement. The need for individual consent was waived as patients had previously consented for enrollment in the University of Calgary Spine Program database. No funding was received for completion of this study, and the authors have no conflicts of interest to disclose related to this study.

A list of all patients undergoing surgery of the posterior cervical spine between January 1, 2002, and December 31, 2011, at the Foothills Medical Centre was generated from operating room procedural lists by the Alberta Health Services Department of Data Integration, Measurement and Reporting using the following Canadian Classification of Health Interventions procedure codes: 1SC74 fixation, spinal vertebrae; 1SC75 fusion, spinal vertebrae; 1SC80 repair, spinal vertebrae; 1SC87 excision partial, intervertebral disc; 1SC89 excision total, spinal vertebrae; 1SE89 excision partial, spinal vertebrae; 1SE89 excision total, intervertebral disc; and 1SE53 implantation of internal device. Following generation of the list of potential study subjects, two independent reviewers (CLG and IB) screened paper and electronic patient records to identify patients for study inclusion. Eligible subjects were adults (aged ≥18 years) undergoing posterior surgery of the cervical spine using either an open or a minimally invasive (MIS) technique for pathology of the spinal column. Individuals undergoing surgery for a primary diagnosis of pathology of the central nervous system (eg, Chiari