



ELSEVIER

The Spine Journal 5 (2005) 508–514

THE  
SPINE  
JOURNAL

## Iatrogenic vertebral artery injury during anterior cervical spine surgery

James P. Burke, MD, PhD, Peter C. Gerszten, MD, MPH, William C. Welch, MD, FACS\*

Department of Neurological Surgery, University of Pittsburgh, 200 Lothrop Street, Suite B-400, Pittsburgh, PA 15213, USA

Received 3 March 2004; accepted 23 November 2004

### Abstract

**BACKGROUND CONTEXT:** Iatrogenic injury to the vertebral artery during an anterior cervical decompression is a rarely mentioned but potentially catastrophic complication.

**PURPOSE:** This study was designed to examine the incidence and management of iatrogenic vertebral artery injury (IVAI) in a large database.

**STUDY DESIGN/SETTING:** This was a retrospective study performed at a large teaching institution over a 7-year period (1994–2001).

**PATIENT SAMPLE:** All anterior cervical spinal procedures performed for herniated or degenerative disc disease, or cervical spondylosis were identified, as were incidences of IVAI. Anterior cervical procedures performed for trauma, neoplasia, or infection were excluded from this study.

**OUTCOME MEASURES:** Neurological and associated morbidity as well as mortality were recorded.

**METHODS:** Data were accessed through an institution-wide electronic medical record search through the operative reports of 10 spine surgeons. Hospital and clinical charts of IVAI cases were subsequently reviewed. Demographic data and intraoperative strategies for repair were recorded.

**RESULTS:** A total of 1,976 patients underwent anterior cervical spinal procedures in the review period. Six cases of IVAI were identified. In three of the six patients, arterial bleeding was controlled with hemostatic agents. Of these three, two suffered complications. The initial management of controlling arterial bleeding is by hemostatic agents; however, one must also consider repair or ligation. The remaining three patients were treated with primary repair or ligation, and no complications were noted.

**CONCLUSIONS:** IVAI is a rare complication (0.3%) of anterior cervical procedures. The arterial bleeding can usually be controlled with topical hemostatic agents, but mortality may occur in instances where it cannot be adequately addressed in a timely fashion. © 2005 Elsevier Inc. All rights reserved.

### Keywords:

Vertebral artery; Anterior cervical spine; Cervical corpectomy; Anterior cervical discectomy and fusion (ACDF); Iatrogenic

### Introduction

The anterior approach for decompression of the cervical spinal cord and nerve roots is widely used for herniated intervertebral disc, spondylosis, trauma, tumor, and infection. Although anterior approaches to the cervical spine are associated with a lower incidence of neurologic complications [1,2], injury to the many vital structures encountered in

the anterior approach remains a risk. Potential complications include vocal cord paralysis, dysphagia, carotid artery injury, Horner's syndrome, esophageal perforation, and respiratory obstruction resulting from acute retropharyngeal edema or hematoma [1–7]. Despite these potential complications, anterior procedures have been successful and are popular. Additionally, most of the complications of the anterior approach do not detract from the excellent long-term clinical results [8–12].

In contrast to this, iatrogenic injury to the vertebral artery during an anterior cervical decompression can be catastrophic [13–15]. Such injuries have been acknowledged in the literature, but their incidence is rarely mentioned, except to state that it is an unusual complication [3,8,15–22]. Vertebral artery laceration is particularly grave because of the

FDA device/drug status: not applicable.

Nothing of value received from a commercial entity related to this research.

\* Corresponding author. Department of Neurological Surgery, University of Pittsburgh, 200 Lothrop Street, Suite B-400, Pittsburgh, PA 15213. Tel.: (412) 647-0958; fax: (412) 647-0989.

E-mail address: [welchwc@upmc.edu](mailto:welchwc@upmc.edu) (W.C. Welch)

difficulty of controlling hemorrhage, and the uncertain neurological consequences, often resulting in significant neurological injuries [13,15,23,24].

Although vertebral artery trauma is uncommon, penetrating injuries to the neck can result in life-threatening hemorrhage. In the general surgery literature, there are good accounts of the surgical exposure of the artery and of the control of bleeding caused by penetrating neck injuries [25–29]. However, little has been published to guide the spinal surgeon in the avoidance or intraoperative management of such an injury. While prevention of the problem is the best treatment, spine surgeons who perform anterior cervical decompressions should be prepared to manage an inadvertent laceration of the vertebral artery during the lateral extent of the decompression. The present study reviews the experience at a single institution with anterior cervical spine procedures complicated by vertebral artery injuries in terms of incidence, intraoperative strategies for repair, and postoperative outcome.

## Methods

We present a retrospective review of six adult patients in whom an anterior cervical spinal procedure was complicated by iatrogenic vertebral artery injury (University of Pittsburgh IRB #000565). An institution-wide electronic medical record search through the operative reports of 10 spine surgeons (seven neurosurgeons, three orthopedic surgeons) over the past 7 years (1994–2001) was conducted. All procedures were performed for herniated or degenerative disc disease, or spondylosis; procedures for trauma, neoplasia, or infection were excluded from this study. Hospital and clinical charts subsequently were reviewed. Demographic data, intraoperative strategies for repair, and postoperative outcome were recorded.

## Results

Using an electronic search of medical records at our institution over the past 7 years, six adult patients were identified who suffered iatrogenic vertebral artery injury during anterior cervical spine procedures for herniated or degenerative disc disease or spondylosis. A total of 1,976 anterior cervical spine procedures were performed for these indications during this time (incidence of 0.3%); procedures for traumatic, neoplastic, and infectious processes were excluded from entry into this study. Of these six patients, one single-level and one three-level anterior cervical discectomy and fusion, and one reexploration and three primary cervical corpectomies and fusions were performed. Median patient age was 60 years; female to male ratio was 2:1. In five of six cases presented, an operating microscope was used. In all six patients with vertebral artery injury, the operation was performed from the patient's right side (Table 1).

In five cases, bright arterial bleeding was encountered: two were repaired primarily; one was treated with arterial

ligation; one was tamponaded with thrombin-soaked Gelfoam (Pfizer, New York, NY). In each of these cases, no neurological sequelae were noted postoperatively. The duration of postoperative follow-up was approximately 3 months. Only one postoperative cerebral angiogram was performed; this demonstrated a mild defect in the arterial wall consistent with the intraoperative packing of the vertebral artery. In the final case in which bright arterial bleeding was encountered, hemodynamic instability from hypovolemia resulted in intraoperative death.

In the sixth case of vertebral artery injury, no arterial or excessive bleeding was encountered; however, thrombin-soaked Gelfoam was placed laterally to tamponade epidural oozing. Postoperatively, the patient awoke with a lateral medullary infarct, and cerebral angiography demonstrated a vertebral artery dissection with posterior inferior cerebellar artery occlusion (Fig. 1). Anticoagulation with heparin was started immediately after the diagnosis of vertebral artery dissection was made.

## Discussion

Vertebral artery injury is a serious complication of anterior spinal surgery. The possibility of severe hypotension and cardiac arrest is present. If control of blood loss is not obtained carefully, the spinal cord and nerved roots may be injured. Control of the hemorrhage may be adequate initially. However, recurrent hemorrhage or the chronic problems of arterial injury (eg, arteriovenous fistula, pseudoaneurysm, arterial thrombosis, and cerebrovascular emboli), are real possibilities [15,19,20,30].

The true incidence of iatrogenic injury to the vertebral artery during anterior decompressive surgery in the subaxial spine is unknown. In a questionnaire survey of 82,114 patients, Flynn [31] did not mention iatrogenic vertebral artery injury. Isolated reports include one by Cloward [17], in which he described a case of Wallenberg's syndrome, resulting from thrombosis of the vertebral artery after the use of a vertebral spreader. Additionally, Cloward reported personal communications from three surgeons, each with a case of vertebral artery injury that required only tamponade [3]. Weinberg and Flom [30] reported injury to the vertebral artery during cervical discectomy, resulting in an arteriovenous fistula. Cosgrove and Théron [19] reported two cases with "troublesome" and "difficult hemostasis," in which delayed vertebral arteriovenous fistulae were treated endovascularly. De los Reyes et al. [20] reported the direct repair of a pseudoaneurysm that developed 3 days after a drill injury to the vertebral artery during an anterior cervical vertebrectomy. Schweighofer et al. [24] reported injury to the vertebral artery during vertebrectomy and reduction of a locked facet. In this case, the artery was ligated with clips, and no neurologic injury was observed. Smith et al. [15] reviewed a 5-year experience and reported an incidence of vertebral artery laceration of 0.5% (10 of 1,195 operations); most of these occurred during vertebrectomy for

Download English Version:

<https://daneshyari.com/en/article/9359660>

Download Persian Version:

<https://daneshyari.com/article/9359660>

[Daneshyari.com](https://daneshyari.com)