



# Ruptured Internal Carotid Artery Pseudoaneurysm 10 Years after Cervical Spine Surgery

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An iatrogenic internal carotid artery (ICA) pseudoaneurysm is an extremely rare complication of cervical spine surgery. Here we report an extraordinary case of massive hematemesis due to a ruptured ICA pseudoaneurysm caused by the laminoplasty plate 10 years after cervical spine surgery. Computed tomography angiography revealed a ruptured 4×10-mm left extracranial ICA pseudoaneurysm probably connected to the pharynx. Emergent surgery was performed because of the uncontrolled massive bleeding. After complete resection of the injured segment, an interposition graft with a 6-mm polytetrafluoroethylene graft was placed and the fistula tract to the pharynx was repaired.

**Key Words:** Carotid artery injuries, Vascular system injuries, Cervical spine surgery, Surgical repair

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## INTRODUCTION

Vascular injuries may occur during cervical spine surgery due to passing beyond the anterior scalenus muscle and pharynx, especially at the C4 and C5 level of the cervical spine. Here we present a case of massive hematemesis due to a ruptured left internal carotid artery (ICA) pseudoaneurysm 10 years after cervical spine surgery.

## CASE

A 52-year-old male patient visited the emergency department with massive hematemesis and hypovolemic shock. After hemodynamic stabilization, emergent bedside upper gastrointestinal endoscopy was performed with no proof of upper gastrointestinal bleeding. Bronchoscopy revealed no abnormalities in the respiratory tract. The relatives of the patient reported a history of a cervical spine surgery 10 years prior. A portable X-ray showed a cervical laminoplasty plate (Fig. 1). The carotid arteries were evaluated by three-dimensional computed tomography angiog-

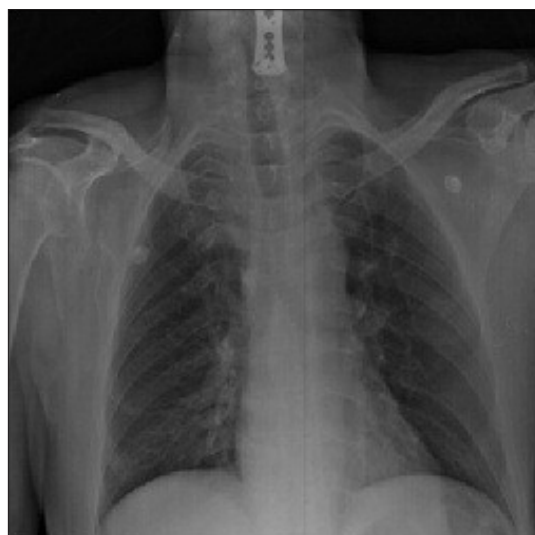
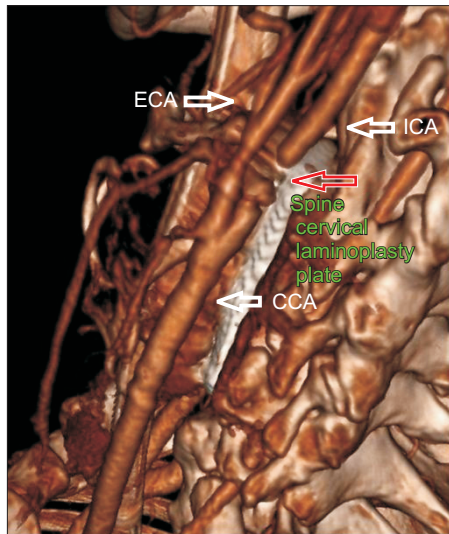


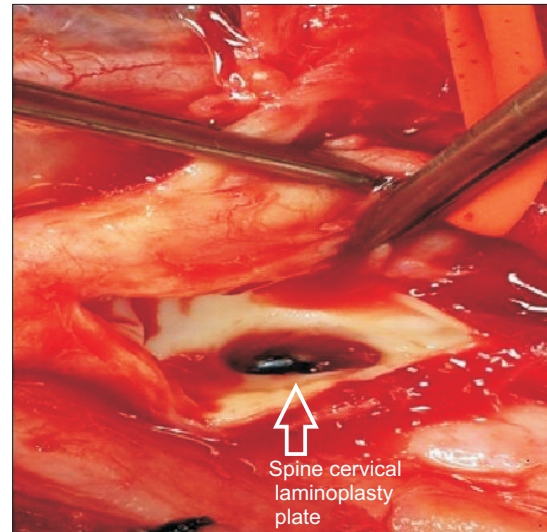
Fig. 1. X-ray image of a cervical laminoplasty plate.

raphy, which revealed a ruptured 4×10-mm left extracranial ICA pseudoaneurysm that was probably connected with the pharynx (Fig. 2). After a fast-track preparation, an emer-



**Fig. 2.** Three-dimensional computed tomography angiogram revealing a ruptured 4×10-mm left extracranial internal carotid artery pseudoaneurysm probably related to the pharynx. ECA, external carotid artery; ICA, internal carotid artery; CCA, common carotid artery.

gent open surgical repair was performed. Under general anesthesia, a longitudinal incision was made from the anterior region of the sternocleidomastoid muscle. The ICA, external carotid artery, and common carotid artery (CCA) were explored and controlled by vascular slings. Systemic heparin 100 U/kg was injected intravenously and vascular clamps were placed. A 5×12-mm injured portion of the posterior wall of the ICA was evident. After a vertical arteriotomy was performed from the CCA to the ICA, a spine cervical laminoplasty plate tip penetrated the posterior wall of the left extracranial ICA segment (Fig. 3). The lesion was not suitable for primary repair. The tip of the laminoplasty plate may have easily injured either the native ICA segment or a saphenous graft after interposition. Therefore, we decided to perform polytetrafluoroethylene (PTFE) graft interposition that was more resistant to the laminoplasty tip injury. The ICA stump pressure was 50 mmHg; a carotid shunt was not used. After complete resection of the injured segment, interposition grafting with a 6-mm PTFE graft was performed. The total clamping time was 22 minutes. Ear-nose-throat surgeons repaired the 3×3 mm fistula tract to the pharynx. There was no gross sign of infection. The patient tolerated the surgery well and the postoperative course was uneventful. An intravenous antibiotic, cefazolin Na 1,000 mg, was given 3 times a day for 5 days. The patient was discharged on lifelong aspirin and clopidogrel on the 6th day after surgery. The patient's case remained uneventful at the 1-, 3-, and 6-month follow-up visits. Duplex ultrasonography performed at 1 and 3 months postoperative



**Fig. 3.** Intraoperative view of the 5×12-mm posterior wall defect of the left extracranial internal carotid artery that was perforated by the spine cervical laminoplasty plate tip.

revealed no abnormalities.

## DISCUSSION

Traumatic ICA pseudoaneurysm is an extremely rare complication of cervical spine surgery. To our knowledge, this is the first case in the English literature of an iatrogenic carotid pseudoaneurysm associated with past cervical spine surgery. A pseudoaneurysm is an encapsulated hematoma or contained rupture that is caused by injury to the carotid artery wall. If untreated, a pseudoaneurysm can rupture, resulting in a life-threatening complication. Various etiologies include carotid endarterectomy [1], trauma, infection [2], arterial dissection, or iatrogenic causes such as venous catheterization. Vasculitis, neck surgery, transsphenoidal surgery [3], and neurofibromatosis type 1 [4] can cause the disease.

Treatment options for carotid pseudoaneurysms include open surgery and endovascular intervention. Open surgery is a safe and effective method of treating complicated ICA aneurysms [5]. Surgical options include primary repair, aneurysm resection and end-to-end anastomosis, resection, and interposition graft with an autologous or synthetic conduit. Carotid ligation with aneurysm resection can be performed in cases of aneurysm rupture that cannot be treated with carotid reconstruction. Endovascular treatment is useful in selected cases. Endovascular repair includes covered stenting, bare metal stenting, and bare metal stenting with adjunctive coiling [6]. Covered stents are currently preferred because they circumvent the limitations of coil embolization or overlapping bare metal stents

by excluding breaches of the vessel wall while maintaining parent vessel patency.

In this case, we decided to perform open surgery because of the massive bleeding and emergency status. There was also a reimbursement problem with the patient's social security, which hindered expansive endovascular procedures. The risk of infection by pharyngeal fistula is another reason for choosing open surgery. Otherwise, endovascular treatment could be the preferred approach because of its less invasive nature.

In conclusion, vascular injuries may occur during or just after a cervical spine surgery. Although iatrogenic an ICA pseudoaneurysm caused by a cervical laminectomy plate is an extremely rare complication, clinical suspicion is important in cases of massive hematemesis with a history of previous neck surgery. Immediate treatment is mandatory to treat this life-threatening complication.

## CONFLICTS OF INTEREST

The authors have nothing to disclose.

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