

## Surgical Experience of Carotid Pseudoaneurysm

Dong-Ik Kim<sup>1</sup>, Se-Ho Huh<sup>1</sup>, Young-Soo Do<sup>2</sup>, Sung-Wook Shin<sup>2</sup>, and Jin-Hyun Joh<sup>1</sup>

<sup>1</sup>Division of Vascular Surgery, <sup>2</sup>Department of Radiology, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea.

An extracranial carotid artery pseudoaneurysm is a rare condition that is caused by various types of arteritis, trauma and infectious causes. Generally, a pseudoaneurysm may be difficult to treat surgically when dissecting the paraaeurysmal fibrotic dense inflammatory tissues. The surgical management of a pseudoaneurysm of the carotid artery involves a risk of nerve and arterial injury. This paper reports the repair of a carotid artery pseudoaneurysm after the proximal and distal control of the internal carotid artery using a Pruitt-Inahara shunt (P-I shunt) and the distal control of the external carotid artery using a small sized occlusion balloon catheter.

**Key Words:** Carotid artery, pseudoaneurysm, Pruitt-Inahara shunt, occlusion balloon catheter

### INTRODUCTION

A Foley catheter or occlusion balloon may be used for proximal and distal control in the surgical repair of an aneurysm or a pseudoaneurysm of the artery. Bleeding during the pseudoaneurysm dissection makes it difficult for surgeons to obtain a clean surgical field. Furthermore, an inappropriate operative field might result in injury to the adjacent organs such as the cranial nerve. This paper reports the repair of a carotid artery pseudoaneurysm after the proximal and distal control of the internal carotid artery using a Pruitt-Inahara shunt (P-I shunt) and the distal control of the external carotid artery using a small sized occlusion balloon catheter.

Received October 14, 2002

Accepted April 30, 2003

Reprint address: requests to Dr. Dong-Ik Kim, Division of Vascular Surgery, Samsung Medical Center, 50 Irwon-dong, Kangnam-gu, Seoul 135-710, Korea. Tel; 82-2-3410-3467, Fax: 82-2-3410-0040, E-mail: dikim@smc.samsung.co.kr

### CASE REPORT

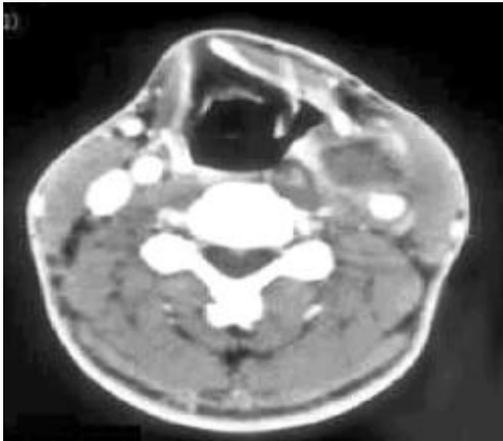
#### Patient history

A 37-year-old man was admitted with a 5-day history of a non-tender, hen egg sized, pulsating neck mass in the left side of his neck. The patient had suffered from chronic pain in his posterior nuchal area. He had visited an acupuncture therapist to control the neck pain. However, the mass developed suddenly after the patient had received acupuncture therapy to the posterior side of the neck. A physical examination revealed no abnormal findings except for a pulsating mass in the left anterior cervical region. His body temperature was 36.7°C, his blood pressure was 130/80 mm Hg in both arms, and his pulse rate was 70 beats per minute. The neurological and ophthalmologic examination showed no abnormal findings. The results of the routine hematological, blood chemical and coagulation tests were all normal except for a erythrocyte sedimentation rate (ESR) of 36 mm/h and a C-reactive protein (CRP) level of 2.7 mg/dl. The test results for the autoimmune antibodies and infectious diseases including syphilis, hepatitis B and C were all negative.

A computed tomography (CT) scan of the neck showed a 35 × 30 × 30 mm eccentric aneurysm with a thick mural thrombus in the bifurcation area of the left common carotid artery (Fig. 1). A three dimensional carotid angiogram showed a pseudoaneurysm filled with contrast dye in the same area (Fig. 2).

**Surgical procedure:** A skin incision following the anterior border of the left sternocleidomastoid muscle was made. The pseudoaneurysm was surrounded by thick inflammatory fibrous tissue.

The distal dissection of the external carotid (ECA) and the internal carotid artery (ICA) was difficult due to the mass effect of the pseudoaneurysm. After the proximal common carotid artery (CCA) apart from pseudoaneurysm was exposed, a 5 mm sized occlusion balloon was inserted through the proximal CCA to the distal ECA using Seldinger's method under the fluoroscopic guidance (Fig. 3). After systemic heparinization, the proximal CCA was clamped. A 2 cm-length arteriotomy was

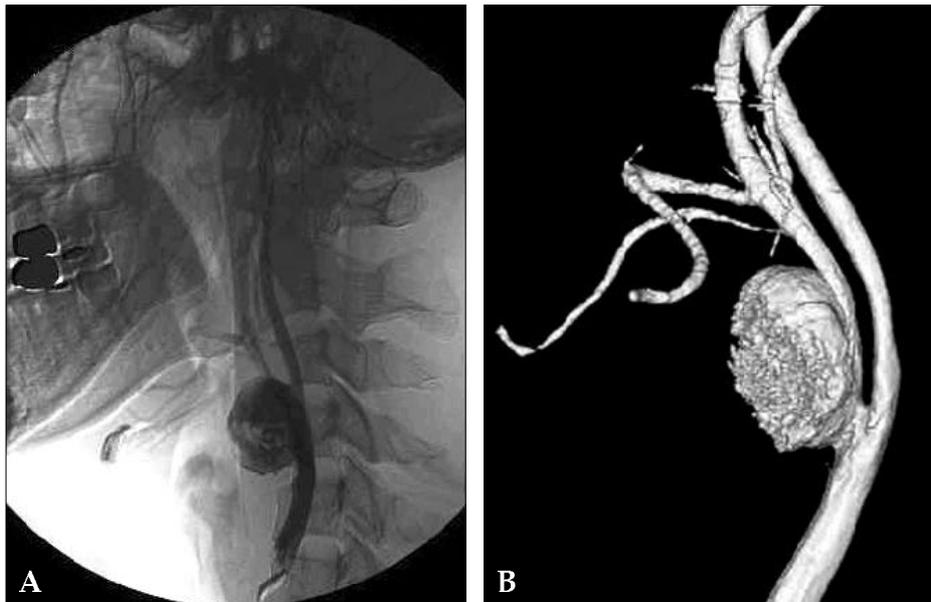


**Fig. 1.** Neck computer tomogram showing a pseudoaneurysm of the left common carotid artery, which was filled with thrombi and caused the trachea deviate to the right side.

made on the CCA through the inlet of the occluder balloon, and a Pruitt-Inahara shunt was inserted between the proximal CCA and the distal ICA in order to maintain blood flow to the brain. After completing the proximal and distal control, the surrounding fibrous tissue of the pseudoaneurysm was dissected meticulously. An approximately 10mm sized defect of the arterial wall was found at the medial side of the CCA bifurcation. The ECA was transected and a continuous suture with 6-0 polypropylene was used to close the distal ECA. The patient was discharged on the 5th postoperative day. A follow-up on the 24th month showed no evidence of recurrence and the patient was asymptomatic.

## DISCUSSION

An extracranial carotid artery pseudoaneurysm is a rare condition that is caused by various arteritis, trauma and infections.<sup>1-5</sup> The purpose of treatment is to prevent a fatal airway obstruction by the mass effect or an aneurysmal rupture and ischemic stroke caused by an embolism from the pseudoaneurysmal sac. However, the surgical management of a pseudoaneurysm of the carotid artery has many technical difficulties. First, the



**Fig. 2.** A. Carotid angiogram. B. Three dimensional reconstructed carotid CT angiogram. The pseudoaneurysm measuring approximately  $3 \times 3$  cm is located at the bifurcation area of the common carotid artery.



**Fig. 3.** The carotid shunt was inserted between the common carotid artery and the internal carotid artery. The occluder balloon was inserted into the external carotid artery through the common carotid artery.

surrounding inflammatory thick fibrous tissue makes the carotid artery difficult to dissect. There is the risk of injury to the intact artery and various extracranial nerves including the hypoglossal nerve or the vagus nerve during the procedure. Second, clamping of the carotid arterial system might increase the risk of a cerebral insufficiency. In our case, an occluder balloon was inserted into the ECA in order to prevent back bleeding from the ECA when the pseudoaneurysm was opened. This method has an advantage in that it decreases the risk of nerve injury, which can occur during the surgical control of the distal ECA. The insertion of a carotid artery shunt from the CCA to the ICA may decrease the risk of a cerebral

insufficiency during the procedure.

Endovascular procedures such as a stent graft insertion are possible alternative therapeutic modalities for treating a carotid artery pseudoaneurysm.<sup>6,7</sup> In our case, the insertion of stent graft from CCA to ICA could not protect the leaking site because the leaking site of the arterial wall was located in the medial side of the bifurcation of the CCA. From our experience, in order to control the proximal and distal artery, the insertion of a carotid artery shunt can be helpful in controlling the distal artery in cases of a carotid pseudoaneurysm, which is difficult to approach surgically.

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