

# Pseudoaneurysm of the Carotid Artery: Severe Complication after Carotid Endarterectomy

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## ABSTRACT

Infection after endarterectomy with carotid pseudoaneurysm formation is uncommon, but shows a high mortality rate. This report describes the case of a patient with a history of ischemic stroke and subsequent left carotid endarterectomy. The patient presented with febrile syndrome and signs of inflammation at the surgical site of the left endarterectomy. Carotid artery Doppler ultrasound and digital angiography revealed the presence of a left carotid pseudoaneurysm. Once diagnosed, the patient was placed on antibiotics, the wound was cleansed, patch dehiscence was removed, and a common carotid to internal carotid bypass graft was performed using the reversed saphenous vein technique. The patient recovered without complications and was discharged after a 4-week course of antibiotics.

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**Key words** > Pseudoaneurysm - Carotid Arteries - Postoperative Complications; Carotid endarterectomy

**Abbreviations** > **Stroke** (CVA) Stroke (cerebrovascular accident) | **CAT** Computerized axial tomography  
**MRSA** Methicillin-resistant Staphylococcus aureus

## BACKGROUND

Carotid endarterectomy is still the standard approach for the management of carotid artery stenosis with invasive treatment, due mainly to its low perioperative and postoperative morbidity and mortality, in addition to significantly reducing rates for stroke in the short- and long-term follow-up.

Perioperative complications of carotid endarterectomy include stroke, myocardial infarction, and death, while postoperative complications include cranial nerve injury, restenosis, wound hematoma, infections, etc.

Infection after endarterectomy with carotid pseudoaneurysm formation is rare, but has a high mortality rate (embolization, rupture, etc.). According to some case series, the incidence of patch infection and pseudoaneurysm is < 1%. (1-4)

This report describes the case of a patient with a history of ischemic stroke and left carotid endarterectomy. Ten days after the procedure, the patient presented with febrile syndrome and signs of inflammation at the surgical site of the left carotid endarterectomy, and was referred to our center. Carotid artery

Doppler ultrasound and digital angiography revealed the presence of left carotid pseudoaneurysm.

## CASE REPORT

We present the case of a 59-year-old male patient, with a history of hypertension, dyslipidemia, ischemic stroke with right carotid endarterectomy in August 2008. He underwent left carotid endarterectomy in December 2010. He was prescribed daily aspirin 100 mg, carvedilol 12.5 mg, enalapril 10 mg, and atorvastatin 20 mg. On December 27, 2010, he presented with febrile syndrome and signs of inflammation at the surgical site of the left carotid endarterectomy, and was referred to our center for evaluation and treatment. Physical examination revealed fever and neck lump (surgical site) with purulent discharge. Dysphonia and deglutition disorders were also evidenced. Laboratory results were: 12.800/mm<sup>3</sup> white blood cells, with an erythrocyte sedimentation rate of 80 mm/min. In view of suspected infection, samples were collected for culture, and empiric antibiotic therapy with vancomycin/cefepime was started. With blood cultures positive for methicillin-resistant Staphylococcus aureus (MRSA),

the therapy was changed to cephalothin. Additional imaging studies (carotid artery Doppler ultrasound and digital angiography) revealed a left carotid pseudoaneurysm (Figure 1). The neck CAT scan showed pseudoaneurysm in the left jugular carotid region and rightward airway displacement (Figure 2).

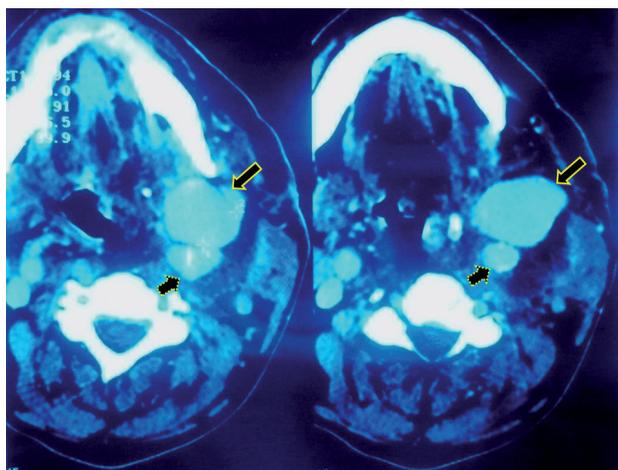
Forty-eight hours after admission, he underwent wound toilet with patch dehiscence removal, and carotid-carotid bypass grafting with reversed saphenous vein technique (Figure 3). Specimen culture collected during surgery also tested positive for MRSA. The patient recovered well after surgery and was discharged after a 4-week course of antibiotics.

## DISCUSSION

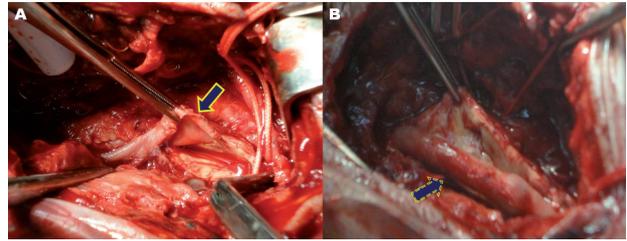
Infection following carotid endarterectomy is one of the most feared complications; fortunately, it is rare. Moreover, within this infection, carotid pseudoaneurysm is even rarer, but its mortality rate is high (potential risk for rupture, embolization, or thrombosis). Less than 100 cases have been reported in the litera-



**Fig. 1.** Digital angiography of neck vessels, displaying aneurysmal dilation at endarterectomy site (*left arrow*), with late visualization of pseudoaneurysm at the left internal carotid artery (*right arrows*).



**Fig. 2.** Neck CAT scan with intravenous contrast revealing pseudoaneurysm (*continuous arrow*) in the left jugular-carotid region with rightward airway displacement. Dilated homolateral internal carotid artery at the endarterectomy site (*broken arrow*).



**Fig. 3.** Intraoperative images. **A.** Internal carotid artery patch dehiscence is shown (*continuous arrow*). **B.** Carotid-carotid venous bypass grafting connected in surgery (*broken arrow*).

ture, with recent reviews showing a rate of occurrence < 1%. (1-4)

Causes of pseudoaneurysm include suture failures, degeneration of prosthetic material, or infection. Febrile syndrome with local symptoms of infection (erythema, pain and surgical wound discharge) is the most common clinical presentation. Stroke can also occur from thrombus embolization associated with pseudoaneurysm, bleeding from rupture, and symptoms from compression of adjacent structures (airway, esophagus, or cranial nerves). (3, 4) Our patient had fever, signs and symptoms of local inflammation, laryngeal stridor, swallowing disorders, and hypoglossal paresis. Lab data revealed leukocytosis and elevated acute phase reactants. Microbiological studies (blood cultures and cultures of surgical cleaning supplies) revealed that *Staphylococcus* was the most commonly isolated microorganism. (3-5) Regarding additional imaging studies, carotid Doppler ultrasound is the first tool of choice because it is non-invasive, affordable, and cost-effective. CT angiography, MR angiography, and digital angiography have greater sensitivity for the diagnosis of pseudoaneurysm. The neck CAT scan targets involvement of adjacent structures. (4) Standard treatment of carotid artery pseudoaneurysm after carotid endarterectomy consists of a course of intravenous antibiotics (broad spectrum, until results from culture are obtained with treatment duration between 4 and 6 weeks after surgery), wound cleansing with removal of patch dehiscence and carotid-carotid bypass grafting. The rate of complications (stroke and death) is < 10%. (4-6)

## CONCLUSIONS

Patch infection after carotid endarterectomy is rare but should be considered for diagnosis and treatment due to its high mortality rate. Diagnosis is based on clinical presentation and imaging studies (echo-Doppler, CT angiography, MR angiography, or digital angiography). The extended course of antibiotics and surgery (debridement, patch removal, bypass) are necessary to avoid major complications in these patients.

## Conflicts of interest

None declared.

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**RESUMEN****Seudoaneurisma carotídeo: una complicación grave posendarterectomía**

La complicación infecciosa posendarterectomía con formación de un seudoaneurisma carotídeo es poco común pero de elevada mortalidad. En esta presentación se describe el caso de un paciente con antecedente de accidente cerebrovascular isquémico y posterior endarterectomía carotídea izquierda. Presentó síndrome febril con signos de inflamación en la región quirúrgica de la endarterectomía izquierda. Se realizaron un eco-Doppler carotídeo y una angiografía digital que evidenciaron un seudoaneurisma carotídeo izquierdo. Una vez establecido el diagnóstico se indicaron antibióticos y una limpieza de la herida con extracción del parche protésico dehiscente y bypass carótido-carotídeo con vena safena invertida. El paciente evolucionó sin complicaciones y fue dado de alta después de haber completado cuatro semanas de antibioticoterapia.

**Palabras clave** > Seudoaneurisma - Arterias carótidas - Complicaciones posoperatorias - Endarterectomía carotídea

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