



# Urgent Cerebral Revascularization Bypass Surgery for Iatrogenic Skull Base ICA Injury

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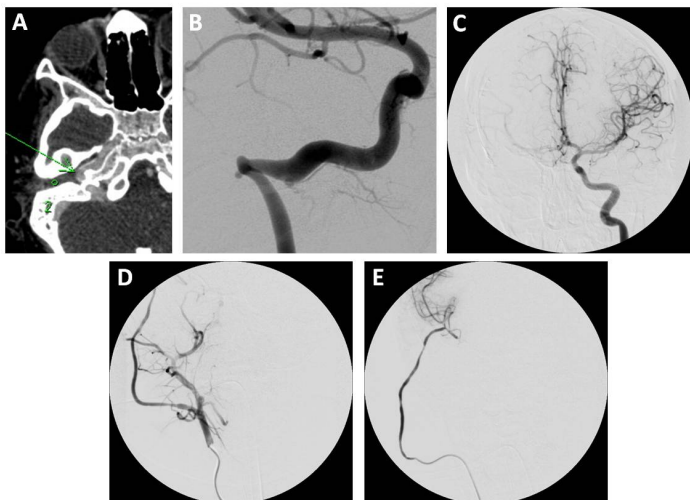
## Introduction

When feasible, the management of iatrogenic internal carotid artery (ICA) injury during skull base surgery is mainly endovascular. We propose a cerebral revascularization procedure as a rescue option when endovascular treatment is not feasible.

## Methods

We retrospectively reviewed all extracranial-intracranial (EC-IC) bypass procedures performed between 6/2007 and 1/2014.

**Figure 1. Direct petrous ICA injury**

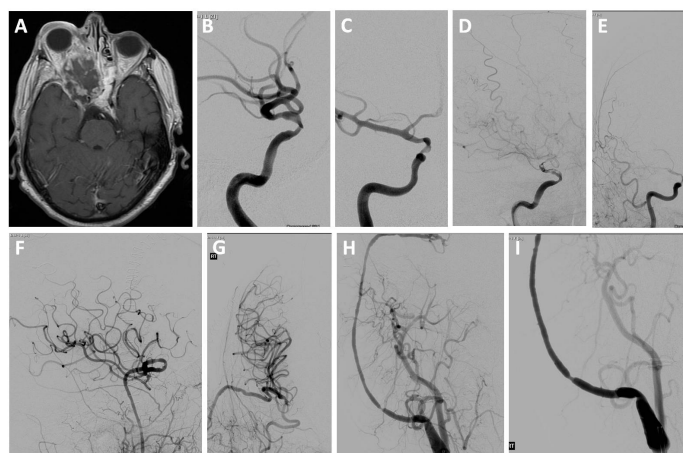


10-year-old boy suffered an iatrogenic petrous ICA injury during a myringotomy. Procedure aborted due to severe arterial bleeding. Patient had bleeding recurrences afterwards. No neurological deficits. A, CT angiogram showed lateral displacement of the ICA (arrow). B, Right ICA showing a pseudoaneurysm. C, Left ICA showing poor collateral circulation. Patient failed BTO. He underwent a high-flow EC-IC bypass with RAG. D and F, follow-up DSA showing excellent graft patency.

## Results

From 235 procedures, we identified 8 consecutive patients with iatrogenic ICA injury managed with an EC-IC bypass. Injury to the ICA occurred during an endoscopic transphenoidal surgery (n=3), endoscopic transfacial-transmaxilar surgery (n=1), myringotomy (n=1), cavernous sinus meningioma resection (n=1), posterior communicating artery aneurysm clipping (n=1), and cavernous ICA aneurysm coiling (n=1). Endovascular management was considered as first line treatment but was not successful. All cases received a high-flow EC-IC bypass. At a mean clinical/radiographic follow-up of 19 months (range, 3-36), all patients had a modified Rankin scale score of 0 or 1. All bypasses remained patent.

**Figure 2. Direct ICA injury during endoscopic tumor resection**

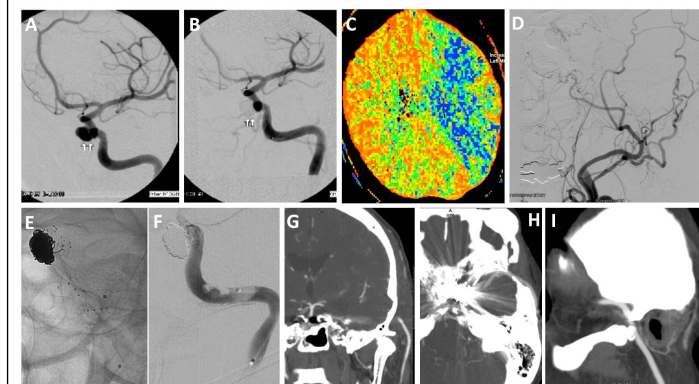


65-year-old male with recurrent skull base chordoma. A, MRI with tumor recurrence. During endoscopic tumor resection the ICA was injured. B-C, immediate post-operative DSA showed stenosis and possible dissection of the cavernous ICA. Patient remained asymptomatic. 24-48 hrs the patient became hemiparetic. D-E, repeat DSA demonstrated worsening of the stenosis. A high-flow EC-IC bypass with a RAG was recommended. F-I, follow-up angiogram showed adequate graft patency. H-I, stenosis of the graft was treated with angioplasty.

## Conclusions

Iatrogenic injury of the skull base ICA is uncommon but can lead to lethal consequences. Many injuries can be treated with endovascular techniques. However, certain cases may still require a cerebral revascularization procedure.

**Figure 3. Subacute ICA thrombosis after stent**



56-year-old with a symptomatic left cavernous ICA treated endovascularly with stent-assisted coiling. Few days later she presented with right progressive hemiparesis. C, CT perfusion showed diminished blood flow to the left hemisphere. D, DSA showed complete occlusion of the left ICA. E and F, mechanical thrombectomy and stent-in-stent technique were unsuccessful. She underwent a high-flow EC-IC bypass with a RAG. Her right hemiparesis improved within the next 3-4 months. G-I, follow-up CT angiogram at 2 year demonstrate adequate patency of the graft.

## Learning Objectives

To assess the limitation of endovascular techniques in the management of traumatic internal carotid artery injury. To understand the importance of cerebral revascularization procedures in urgent internal carotid injury.