

## Management of internal carotid injury with sidewall clipping technique during endoscopic endonasal pituitary surgery

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### ARTICLE INFO

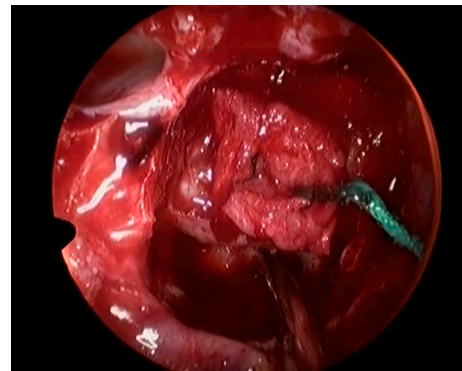
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### Abstract

Injury to the internal carotid artery (ICA) during endoscopic endonasal skull base surgery is extremely rare (<1%) and it appears in the literature mostly as case reports [1–3]. Nevertheless, it is still one of the most feared complications due to its catastrophic morbidity and mortality [2], which may cause massive hemorrhage and lead to exsanguination within minutes [3]. The majority of reports on the management of ICA injury involve packing for immediate control of the bleeding followed by neuroendovascular therapy [1]. Management strategies include packing (muscle, fat or other material), bipolar coagulation, endoscopic microsurgical clip reconstruction, endovascular endoluminal reconstruction, and vessel sacrifice [4].

In this Video 1, we present a case of iatrogenic ICA injury during endoscopic endonasal pituitary surgery that was managed with sidewall clipping technique. A 63-year-old female patient presented with diagnosis of acromegaly. The magnetic resonance imaging revealed a sellar lesion with extension to the left cavernous sinus compatible with pituitary adenoma (Knosp 3A). Left ICA injury at the cavernous segment occurred during dural opening with a sickle knife. The injury was initially controlled with packing and subsequent partial clipping of affected vessel wall was performed due to unavailability of neuroendovascular therapy.



**Video 1.** Management of Iatrogenic ICA injury during endoscopic endonasal pituitary surgery with sidewall clipping technique. The patient had an uneventful recovery with no deficits. Postoperative diagnostic cerebral angiography showed normal flow through the left ICA with no signs of pseudo-aneurysm. At the 3-month follow up, we performed a computed tomography angiography (CTA) to evaluate eventual complications related to the clipping of the carotid artery. At 6-month follow up, we decided to perform a magnetic resonance imaging (MRI), but the patient declined for fear of complications, so we performed another CTA to evaluate the sellar region and re-evaluate the carotid artery. At 6-month follow up, patient revealed normalization of Insulin-like Growth Factor-

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1 (IGF-1) levels.

Techniques that preserve vessel integrity and blood flow are always preferable over vessel sacrifice. Endovascular endoluminal reconstruction is a commonly used treatment for ICA injury. Flow diverter (FD) stents do not provide immediate protection to the injured vessel and overlapping FD stents may be used as alternative. The Willis covered stent is the only stent-graft device small enough to be used in the intracranial vasculature and it has been reported in the management of intracranial arterial injury. In addition, endoluminal stent reconstruction requires anticoagulation or anti-platelet therapy which results in increased sinonasal bleeding risk [5].

The use of an aneurysm clip in the setting of an endoscopic endonasal surgery may be considered in selected cases. The technique is under-reported in the literature due to its associated technical complexity and the rarity of the ICA injury events. Gardner et al. [6], in 2016, managed an ICA lesion during endoscopic endonasal surgery for petroclival meningioma resection with the use of an aneurysm clip. Similar to the present study, Miguel et al [3], recently reported the use of an aneurysm clip to control an iatrogenic ICA injury caused by a Frazier suction tube.

In this report, we highlight an alternative technique that may be used in catastrophic scenarios where neuroendovascular therapy is not available. Patient's risk factors, technical errors and process deficiencies that may have prevented this complication are further discussed.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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