

# CAVERNOUS SEGMENT INTERNAL CAROTID ARTERY INJURY MANAGEMENT IN ENDOSCOPIC ENDONASAL SURGERY - A CASE REPORT

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## ABSTRACT

Cavernous segment Internal carotid artery (ICA) injury is a catastrophic complication of Endoscopic endonasal surgery (EES). Immediate bleeding control, endovascular management, and consideration of revascularization are essential to prevent catastrophic outcomes of ICA injury. We report a 32 years old male with giant pituitary tumour had cavernous ICA injury during endoscopic endonasal surgery managed by placing flow diverter and nasal packing.

Keywords: Cavernous segment internal carotid artery, Flow diverter, Pituitary adenoma, Endoscopic

## 1. INTRODUCTION

Pituitary adenomas are common intracranial tumors, with prolactin-secreting and incidental lesions representing the majority of cases.(1) These tumors are typically managed through endoscopic transsphenoidal resection. Potential complications of transsphenoidal surgery include vascular and nerve injuries, in addition to nervous system infections. Among them, internal carotid artery (ICA) injury is the most severe, associated with high mortality and disability rates.(2)(3) Most ICA injuries occur in the petrous and cavernous segments where the artery lies in close proximity to the tumor. Even in individuals with normal anatomy, these ICA segments are obscured and difficult to access.(4) The incidence of ICA injury during transsphenoidal surgery is estimated to be 0.1–0.4%. Immediate bleeding control, endovascular management, and consideration of revascularization are essential to prevent catastrophic outcomes of ICA injury.

## 2. CASE REPORT

A 32 years old male presented with watery discharge through right side nostril associated with headache. MRI brain with contrast was done which showed an Irregular T2 hypointense lesion demonstrating mild enhancement and occupying the left parasellar and suprasellar regions and encasing the cavernous sinus on left side. The lesion erodes floor of sella and occupies the left half of sphenoid sinus. There is erosion of the anterior clinoid process. The foramen ovale is widened on left side and lesion extends within the foramen ovale - Differential diagnosis of Granulomatous disorder such as Sarcoidosis / solitary fibrous tumor to be considered. CT cerebral angiogram showed Well-defined lobulated irregular mass in the left parasellar and suprasellar region encasing the cavernous segment of internal carotid artery without causing narrowing. CT cisternogram showed Active CSF leak through a bony defect in the roof of left sphenoid sinus into the sphenoid sinus and into the right nasal cavity through a defect in the anterosuperior wall of right sphenoid sinus. Pituitary hormone profile was done which showed elevated prolaction with other hormones level were normal. Case was done tumour board meeting, planned for Trans nasal transsphenoidal endoscopic excision

under intra operative neuro monitoring. During endsocopic excison we encountered left cavernous ICA injury, which was initially managed with tight nasal packing. Patient was shifted to cathlab, Digital Subtraction Angiography (DSA) was done which confirmed cavernous ICA injury. Flow diverter was placed in Left ICA and CT brain was taken, showed Post-operative changes noted with heterogeneous mildly hyperdense lesion in sella/left parasellar regions - likely residual tumour and multiple wedge shaped hypodense areas involving grey matter and white matter in left frontal and parietal lobes - suggestive of acute infarcts. Patient was shifted to ICU, continued ventilatiory support and started on cerebral antiedema measures. patient was gradually weaned off from ventilator. Histopathological examination reported as Features are consistent with Pituitary Neuroendocrine Tumour/Adenoma. Patient initally had weakness in right side of limbs, then gradullay recovered over 3 weeks. CT brain after 3 weeks showed resolving cerebral oedema and hypodensities. Patient was discharged in a stable condition with medication advice.

## 3. DISCUSSION

EES has become a routine approach for lesions extending from the frontal sinus to the second cervical vertebra in the sagittal plane and from the roof of the orbit and floor of the middle cranial fossa to the jugular foramen in the coronal plane in skull base surgery.(5)(6) The main advantages of EES are absence of skin incisions (cosmetically more acceptable), minimally invasive nature, diminished postoperative pain, and short duration of postoperative hospital stay, which promoted its popularity. In spite of these advantages, certain complications may occur, including but not limited to hemorrhagic vascular complications, rhinorrhea, and infection.(7)(8) Among these, ICA injury is a life-threatening complication of EES.

Anatomical considerations in EES must be kept in the mind to avoid this serious complication. However, ICA injury may still occur in the best of hands, and apart from exsanguination, this injury may lead to a diverse range of vascular findings such as pseudoaneurysms, arterial spasm, arterial thrombosis/emboli, and caroticocavernous fistula formation.(9)(10) Although endovascular treatment is currently the best choice for the management of ICA injury during EES, surgical options must be considered in cases of unavailable or delayed emergent endovascular treatment. It is essential to recognize that worn-out instruments used in microsurgery can cause ICA injury, and consistently gentle maneuvers using degradation-free instruments are mandatory, especially around the ICA segments in the cavernous sinus. Immediate bleeding control, endovascular management, and consideration of revascularization surgery are essential to prevent catastrophic outcomes of ICA injury. Regular training using models to control profuse ICA bleeding can aid in preparing for such events.

## 1. Pre op MRI T1WI brain with contrast



(a)



**(b)** 



(c)



(**d**)





## 3. Immediate Post op CT brain



## 4. Post op CT brain after 3 weeks



**1.** (a)(b)(c) Irregular T2 hypointense lesion demonstrating mild enhancement and occupying the left parasellar and suprasellar regions and encasing the cavernous sinus on left side.

**1.** (d) Well-defined lobulated irregular mass in the left parasellar and suprasellar region encasing the cavernous segment of internal carotid artery without causing narrowing.

- 2. (a) DSA showing vasospasm of Left ICA
- 2. (b) DSA showing Flow diverter placed in left ICA

**3.** (a)(b) Multiple wedge shaped hypodense areas involving grey matter and white matter in left frontal and parietal lobes

4. (a)(b) Resolving cerebral oedema and hypodensities

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