Case 10757

Intracavernous carotid artery injury during trans-sphenoidal surgery for pituitary tumour
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Section: Neuroradiology
Area of Interest: Emergency Neuroradiology brain
Arteries / Aorta Interventional vascular
Procedure: Diagnostic procedure
Technique: CT
Technique: Catheter arteriography
Technique: CT-Angiography

Special Focus: Acute Blood Haemorrhage Aneurysms
Case Type: Clinical Cases
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Patient: 20 years, male

Clinical History:

A 20-year-old male patient with cushingoid features secondary to a microadenoma in the left lobe of pituitary was admitted for trans-sphenoidal tumour resection. Intra-operatively there was sudden arterial bleeding, for which immediate tight packing was done and the patient was rushed for emergency CT Angiogram followed by DSA.

Imaging Findings:

Pre-contrast CT of brain shows haemo-sphenoid sinus with blood densities in the nasopharynx and nasal cavity. Bone window shows a small bone defect in the left lateral wall of the sphenoid sinus close to the sellar floor. CT Angiogram shows a beak-like projection of the left cavernous ICA into the sphenoid bone defect with active contrast extravasation into the sphenoid sinus and Contrast – Fluid (blood) level in the delayed phase. On selective left ICA injection (DSA), there is a small rent in the cavernous ICA with active contrast extravasation into the sphenoid sinus forming a pseudoaneurysm. No evidence of carotico-cavernous fistula. Adequate cross circulation was demonstrated across ACOM and PCOM arteries, with no venous phase delay. Following this, urgent craniotomy and neck exploration with trap ligation of the left cavernous ICA was done. Post-operatively the patient recovered completely with no neurologic deficits.

Discussion:

Intracranial vascular injuries during Trans-Sphenoidal Surgery (TSS) for sellar lesions is a rare and life-threatening complication. The Sphenopalatine artery and Cavernous Internal Carotid Artery (ICA) are the commonly involved vessels [1]. Carotid injuries are more common than sphenopalatine artery injuries. In our case there was injury to the cavernous ICA as demonstrated on CT and DSA. The spatial relationship between the cavernous ICA and the sella turcica explains the reason for carotid injuries [2].

The incidence of cavernous ICA injury is 0.4%–1.4% in TSS [3]. Injury to the carotid arteries during TSS can lead to acute life threatening haemorrhage, carotid cavernous fistula (CCF) or rarely false aneurysm [4]. There are numerous causes which include aggressive dissection of sellar lesions located close to the cavernous sinus, injury to the diaphragma sellae or arachnoid membrane, adherence of the capsule of the lesion to the dural branch of the
ICA, congenital dysplasia of dural vessels surrounding the sella and carotid anomalies [3]. The average distance between the cavernous ICAs is 12mm. Some anatomic variations like bulging of the cavernous ICAs into the sphenoid sinus with or without bony protection and proximity of cavernous ICAs (<12mm) can be predisposing factors to injury during TSS [2]. Therefore a strict midline operative tract is essential to minimise the risk of carotid injury [1, 2].

Immediate post-operative angiography should be done when carotid injury is suspected. Angiographic findings of ICA injury after TSS include contrast material extravasation within the sphenoid sinus, carotid artery occlusion and/or stenosis, pseudoaneurysm of the carotid artery and CCF. Extravasation of contrast material or opacification of a pouch of any shape can be labelled as a pseudoaneurysm. If the findings are negative, angiography should be repeated after the packing is removed [1, 4].

Prompt diagnosis and management of an ICA injury is essential, as any delay may result in exsanguinating haemorrhage and death. In the event of intraoperative carotid injury, the cervical carotid artery should be compressed to give sufficient time for tamponade with a variety of materials [2]. Overpacking should be avoided as it can lead to complications like ICA stenosis or occlusion [1].

Preserving the parent artery with detachable balloons or coils is not possible in case of pseudoaneurysm. When packing completely fails to control the haemorrhage, the situation is acutely life threatening and surgical trapping or endovascular occlusion of the ICA must be performed immediately [4].

**Differential Diagnosis List:** Cavernous ICA injury with pseudoaneurysm in the sphenoid sinus, ICA rupture with active leak, Cavernous ICA (true) aneurysm

**Final Diagnosis:** Cavernous ICA injury with pseudoaneurysm in the sphenoid sinus

**References:**


**Description:** Coronal CT sections of pre- and post- contrast shows bone defect in the wall of sphenoid sinus on left side, with small beak-like projection of ICA (arrow). **Origin:** Department of Radiodiagnosis, Father Muller Medical College hospital, Mangalore, India.
Description: Non-contrast axial CT section at the level of sphenoid sinus shows hyperdense contents with central hypodensity. Origin: Department of Radiodiagnosis, Father Muller Medical College hospital, Mangalore, India
Description: Delayed CT section at the same level, 3 min after CT angiography study shows contrast-fluid level in the sphenoid sinus, confirming active extravasation of contrast agent. Origin: Department of Radiodiagnosis, Father Muller Medical College hospital, Mangalore, India.
Description: Digital subtraction angiography image of left ICA injection (oblique view) shows rent in the cavernous ICA with pseudoaneurysm in the region of sphenoid sinus (arrow). Origin: Department of Radiodiagnosis, Father Muller Medical College hospital, Mangalore, India