



# Endoscopic endonasal resection of a left pituitary corticotroph microadenoma with carotico-clinoid foramen



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## ABSTRACT

We report a 35-year-old woman with Cushing's disease. Preoperative bone CT revealed bilateral carotico-clinoid foramina encasing the ICA. Endoscopic endonasal resection was performed safely. This case highlights the crucial role of detailed preoperative bony imaging to anticipate anatomical variants, as unrecognized carotico-clinoid foramina can expose patients to major intraoperative risks, including ICA injury.

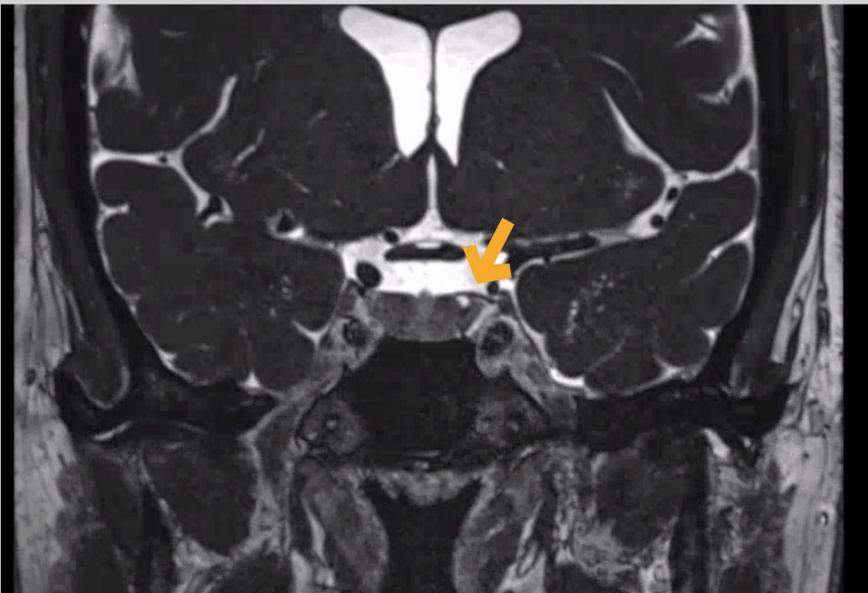


Figure 1. Preoperative coronal T2-weighted magnetic resonance imaging showing a microadenoma located in the upper left portion of the pituitary gland.

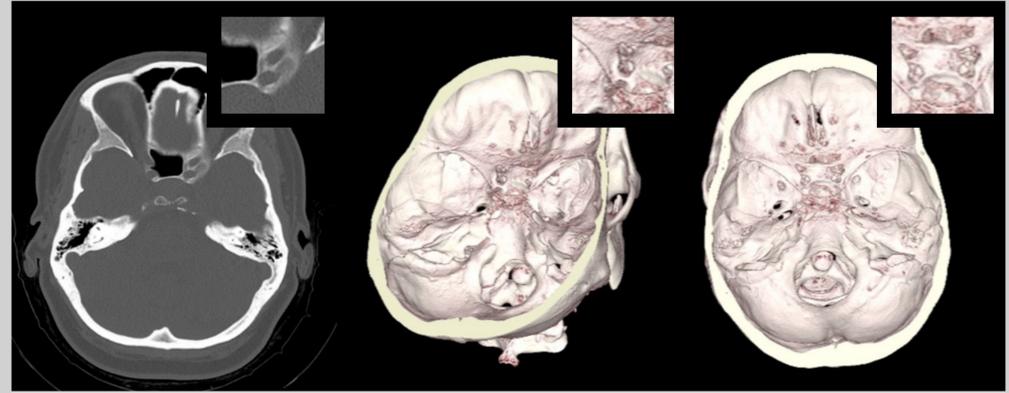


Figure 2. Preoperative computed tomography with axial imaging and three-dimensional reconstruction showing the carotico-clinoid foramen.

## INTRODUCTION

The carotico-clinoid foramen results from partial or complete ossification of the carotico-clinoid ligament connecting the anterior and middle clinoid processes [1] [2], with a reported prevalence of approximately 8% [3]. In this anatomical variant, the internal carotid artery traverses the foramen. Three morphological types have been described: Type I, a complete foramen; Type II, a contact type with a bony suture between the clinoid processes; and Type III, an incomplete type characterized by non-fused bony extensions [4]. This ossification is not age-related, as it has been identified in fetal and infant skulls [5], and appears to be more frequent in individuals with hormonal disorders, developmental abnormalities, epilepsy, and criminal behavior [1][6]. This case emphasizes the need for meticulous preoperative evaluation of bony anatomy prior to transsphenoidal surgery, as unrecognized manipulation of the middle clinoid process may result in internal carotid artery injury.

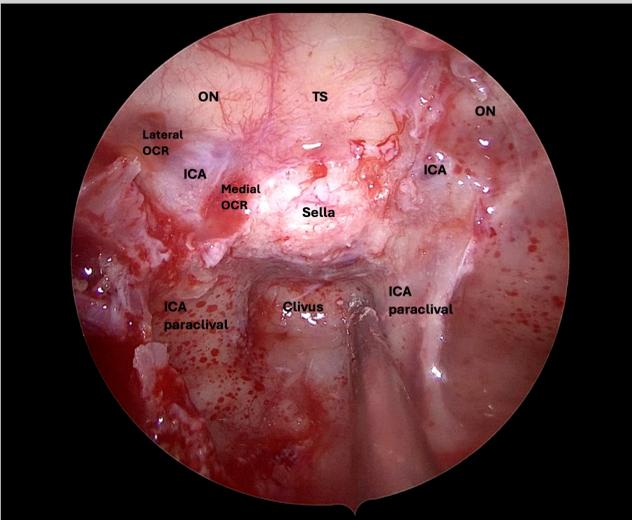


Figure 3. Intraoperative view prior to opening and drilling of the sella turcica. At this stage, all the classical landmarks of the transsphenoidal approach are clearly visualized.

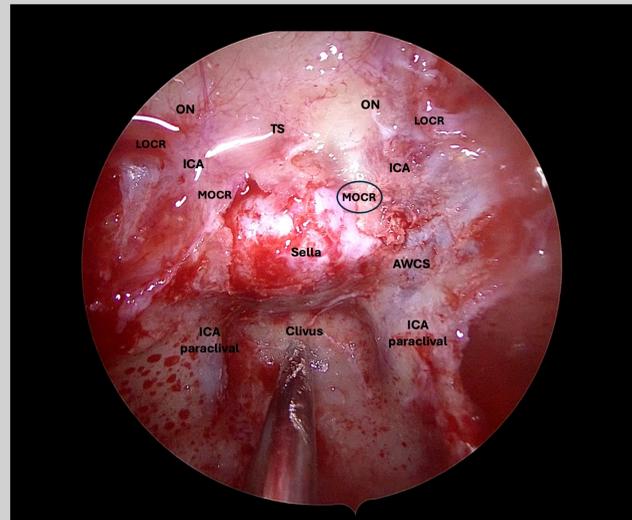


Figure 4. Intraoperative view after drilling of the sella turcica and the anterior wall of the cavernous sinus. At this point, the only way to fully expose the medial OCR is by drilling within the ossified carotico-clinoid ligament beneath the ICA.

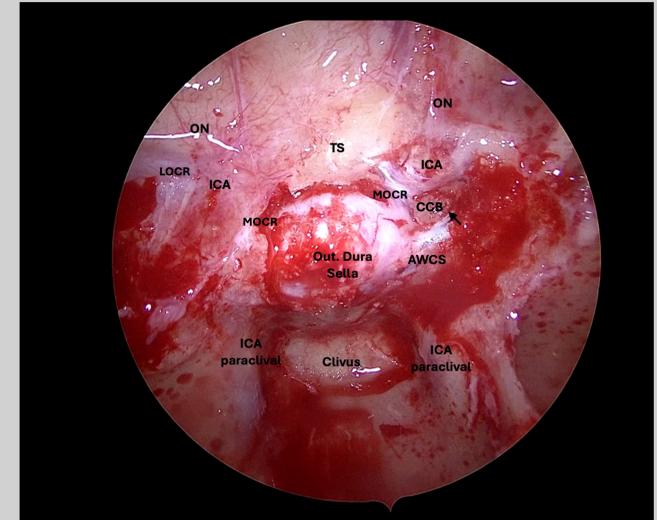


Figure 5. Final surgical exposure demonstrating clear anatomical landmarks, including the middle optico-carotid recess and the bony carotico-clinoid ligament beneath the internal carotid artery (ICA).

## CASE PRESENTATION

A 35-year-old woman with Cushing's disease due to a left-sided pituitary microadenoma underwent endoscopic transsphenoidal surgery. Preoperative CT imaging demonstrated a bilateral carotico-clinoid foramen encasing the intracavernous internal carotid arteries. Following wide sphenoidotomy and sellar exposure, lateral extension to the left cavernous sinus allowed identification of the cavernous ICA and medial optico-carotid recess. Given the presence of the carotico-clinoid foramen, standard middle clinoid removal was avoided to reduce the risk of vascular injury. Instead, controlled drilling of the ossified carotico-clinoid ligament beneath the ICA was performed, enabling safe bony exposure. The sellar dura was opened, and the adenoma was completely resected under endoscopic visualization. Reconstruction with an abdominal fat graft successfully managed a low-flow cerebrospinal fluid leak, with preservation of surrounding neurovascular structures.

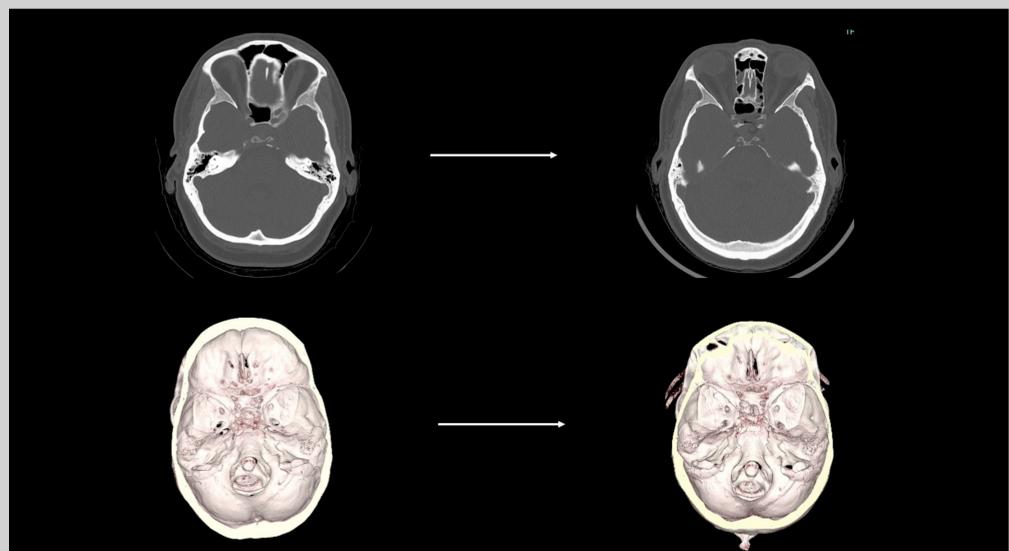


Figure 6. CT scan with pre- and postoperative 3D reconstruction.

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