



Case Report

Use of “enhanced contact endoscopy for pituitary surgery” in a collision sellar tumor (papillary craniopharyngioma + non-functional pituitary adenoma): Representative case illustration and two-dimensional operative video

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ABSTRACT

Background: Collision sellar tumors are rare disease entities. Less than 30 cases have been reported in the literature in the last 20 years. We present the case of one patient diagnosed with a collision sellar tumor and describe the use of Enhanced Contact Endoscopy for pituitary gland and tumoral identification not previously described in the literature.

Case Description: The patient is a 57-year-old man who presented with visual field deficits and intense frontal headache accompanied by a slight hypothyroidism. Magnetic resonance imaging shows two different lesions in the sellar area, with a pendular effect of the pituitary stalk displaced to the side of the pituitary adenoma. The patient was operated on with an endoscopic endonasal subsellar approach, aiding with an enhanced contact endoscopy to demarcate the pituitary gland from the tumor adequately. Pathology diagnosis was compatible with pituitary adenoma (First lesion) and papillary craniopharyngioma (Second lesion). A short surgical video was added to complement the learning of the technique for enhanced contact endoscopy for a description of the microvasculature pattern.

Conclusion: Collision sellar tumors are a rare pathology in the sellar region and could benefit from a variety of combined treatments for optimal outcomes. Enhanced contact endoscopy for pituitary surgery could be useful for distinguishing the normal pituitary gland from the tumor.

Keywords: Craniopharyngioma, Double collision tumor, Endoscopic endonasal approach, Enhanced contact endoscopy, Pituitary adenoma

INTRODUCTION

A collision tumor is a neoplastic lesion with two or more different histological origins from the same organ along a shared border.^[10] Its presence in the sellar area is not common; it represents an incidence of 0.5–1.7%^[7] and rarely, it involves the existence of two histologically distinct tumors

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(craniopharyngioma + pituitary adenoma).^[8-10] Surgical options for treating this pathology include the microscopic transnasal and the endoscopic endonasal approach (EEA). Notwithstanding, during surgical procedures, it may be difficult to differentiate the normal pituitary gland from the tumor to obtain a complete, safe resection. Enhanced contact endoscopy offers real-time, *in vivo* visualization and can effectively differentiate normal tissue from tumor tissue through vascular pattern analysis.^[5] This innovative method has the potential to identify several tumors during a single procedure, addressing uncertainties surrounding the presence of collision tumors.^[2,4,9]

ILLUSTRATIVE CASE

We report the case of a 57-year-old man with no clinical history who presented with progressive visual field deficits (confirmed by computed campimetry) accompanied by an intermittent intense frontal headache. In blood hormone tests, a decrease in thyroid-stimulating hormone was detected. Pre-operative magnetic resonance imaging (MRI) revealed a contrast-enhancing hyperintense lesion in the left

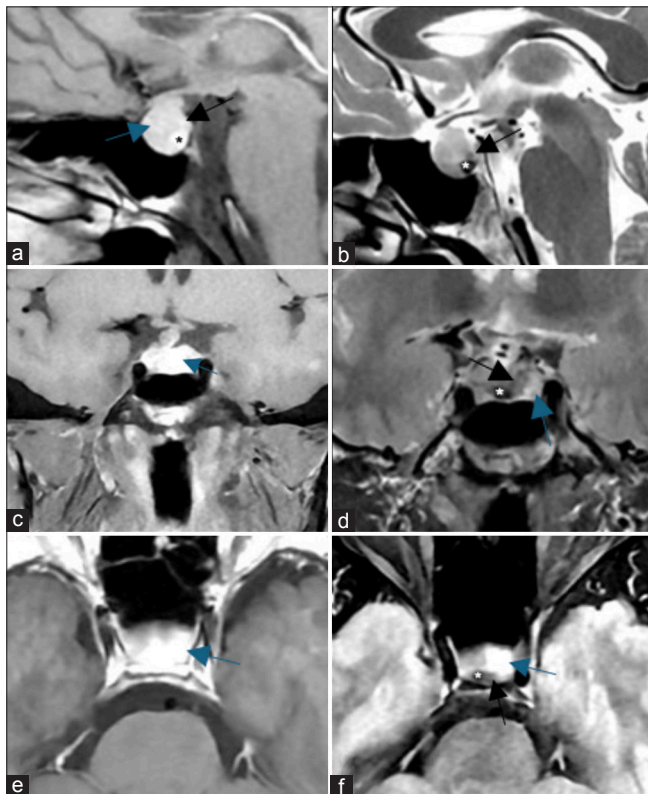
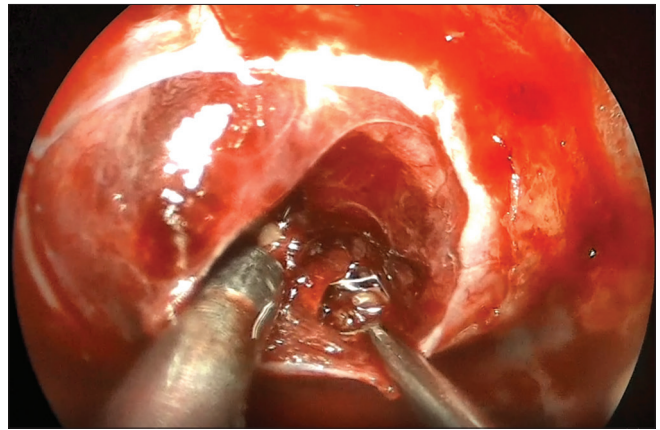


Figure 1: Preoperative MRI (a-b): Sagittal projections (c-d): Coronal projections and (e-f): Axial projections in T1 with contrast, T2, and FLAIR sequences reveal a contrast-enhancing pituitary adenoma (blue arrow), the posterior pituitary lobe (black arrow), and the calcified second tumor (white asterisk). MRI: Magnetic Resonance Imaging; FLAIR: Fluid-attenuated inversion recovery.

sellar area and a non-contrast enhancing hypointense lesion in the posterior sellar area. The pituitary stalk was thicker than normal and deviated to the right side (away from the enhancing lesion) [Figure 1]. This finding is secondary to a left-to-right pituitary gland compression. This last statement is created by the pendular stalk effect created from the contralateral displacement of the tumor.

Surgical treatment was proposed for the patient through the EEA. The utilization of enhanced contact endoscopy is considered optimal for delineating the area of the normal pituitary gland and for effectively identifying and demarcating the tumor upon examination of the pituitary



Video 1: Enhanced contact endoscopy for pituitary surgery.

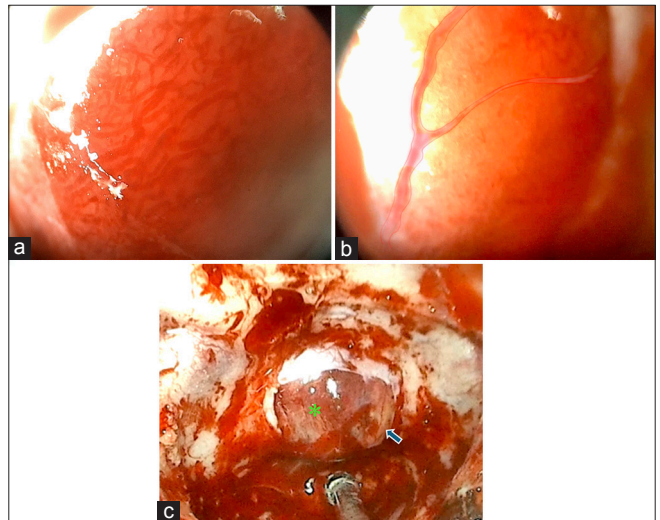


Figure 2: In this image, we can visualize (a) “Enhanced Contact Endoscopy for Pituitary Surgery,” showing the normal capillary microvascular pattern of the pituitary gland. (b) “Enhanced Contact Endoscopy for Pituitary Surgery” shows the abnormal capillary microvascular pattern of the pituitary tumor, represented by a unique and enlarged tortuous vessel over a yellowish surface. (c) Trans-operative image after dural opening, showing glandular tissue (*) separated from tumor tissue (arrow).

dura. A neoplastic lesion was identified on the left side of the sellar, with the normal pituitary gland observed on the right. To help define this “left side tumor – right side gland” suspicion, we performed enhanced contact endoscopy, correctly identifying the tumor and normal pituitary gland without causing any clinical deficit. During the final resection of the tumor, we encountered another solid and calcified lesion behind it [Video 1 and Figure 2]. Both lesions were resected, preserving the anterior and posterior pituitary lobes. Post-operative MRI revealed the complete surgical resection of both sellar lesions [Figure 3].

The two possible tumor samples were analyzed by the neuropathology department, confirming the coexistence of non-secreting pituitary adenoma (First tumor resected) and papillary craniopharyngioma (Second tumor resected). Both diagnoses were confirmed with Immunohistochemical

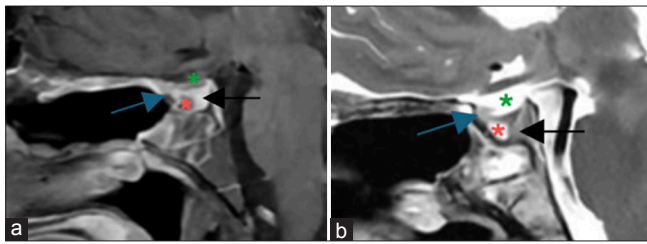


Figure 3: Post-operative magnetic resonance imaging in T1 (a) with contrast and T2 (b) in sagittal projections shows the red asterisk indicating the tumor resection cavity, the blue arrow pointing to the normal anterior pituitary lobe, and the black arrow representing the normal posterior pituitary lobe. The green asterisk depicts optic nerve decompression.

analysis [Figures 4 and 5]. The patient improved his visual field and hormonal deficits during the immediate post-operative period.

DISCUSSION

Pituitary adenoma and craniopharyngioma are particularly common tumors located in and near the pituitary gland, and both tumors share similar radiologic characteristics. Notwithstanding, when both are present in contiguity, it can result in a particular challenge for diagnosis. This last has been defined as a collision sellar tumor and is remarkably rare in this area. In this article, we aimed to provide some insights with an illustrative case (operative video + clinical images) for diagnoses and surgical treatment via EEA with the assistance of enhanced contact endoscopy to delimitate the normal pituitary gland from the tumor.

Collision tumors in the sellar area could be represented in a variety of combinations. The majority of them are simultaneously diagnosed only by a pathology analysis, representing their clinical presentation only by coincidence. Its clinical symptomatology is associated with the site of location (visual and hormonal abnormalities),^[6] as it was present in our case. In the series of articles, there are few cases reported in the literature. To the best of our knowledge, this case represents the first operative video reported of a non-functional pituitary adenoma associated with a craniopharyngioma with the assistance of enhanced contact endoscopy.

No regular computed tomography and MRI patterns or findings have been described for collision sellar tumor

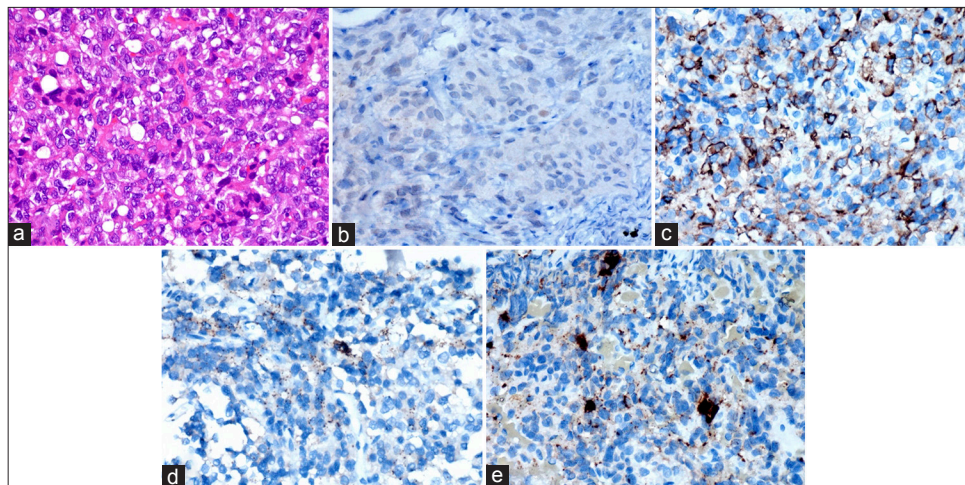


Figure 4: Non-functional pituitary adenoma histopathologic analysis. (a): H&E x10. Medium-sized cells with round nuclei show no atypia. Eosinophilic cytoplasm is seen between capillaries, with no stroma present. (b): P53 x10 immunohistochemical analysis is < 1%. The findings in most cells were primarily positive. (c): Prolactin x10, (d): TSH x10, and (e) ACTH x10. H&E: Hematoxylin & Eosin. TSH: Thyroid-stimulating hormone. ACTH: Adrenocorticotropic hormone.

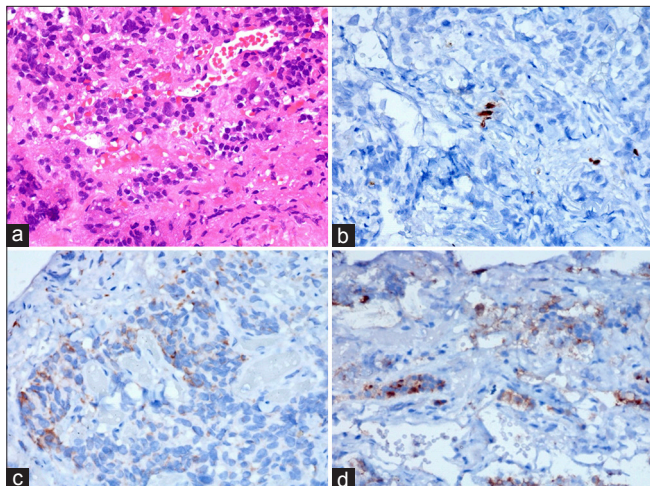


Figure 5: Papillary craniopharyngioma pathology analyses. (a): H&E x10. Here, we can appreciate a different histological group of cells distributed in compact groups between fibrous connective tissue with some visible venous channels. (b): Ki-67 x10 shows its negativity < 1%. Cytokeratin AE1 and AE3 x10 immunohistochemical analyses (Cocktail of high and low molecular weight cytokeratins), (c and d): were positive, showing the areas of distinct smaller cells demonstrating areas of epithelial origin, with negativity to any hormone. H&E, Hematoxylin & Eosin.

suspicion. This represents a challenge of suspicion for the pathology.^[3] For this particular case, the solid part of the lesion created a slight pendular effect, like a yin-yang disposition between the tumors and the normal gland (displacing the pituitary stalk to the contralateral side of the pituitary adenoma). This pendular effect helps us recognize the tumor's location, with subsequent corroboration with enhanced contact endoscopy. In this rare case, it was presented as pituitary adenoma and craniopharyngioma, with both tumors in continuous proximity.

The use of endoscopy in skull base surgery has enabled new advancements in surgical corridors, as well as a reduction in brain or cranial nerve retraction, thereby reducing morbidity. Since its initial application in identifying neoplastic cells or transitions in uterine cancer, enhanced contact endoscopy has been employed in other surgical fields.^[1] This method could allow us to recognize the free margins of the normal pituitary tissue with the recognition of the vascular pattern. In this case, the pituitary gland has a reticular, longitudinal pattern of the microvasculature, and the enhanced contact endoscopy was beneficial for distinguishing the normal pituitary gland from the tumor consistent with pituitary adenoma and also helped us with intraoperative decision-making to delimit the normal gland tissue.^[1,6]

“Enhanced Contact Endoscopy for Pituitary Surgery” is a new and effective technique for *in vivo* identification of normal and pathological microvascular tissue features. It allows the correct identification of normal gland tissue

during EEAs, which may improve the outcomes and overall survival rate of our patients.^[3]

CONCLUSION

This article proposes the use of enhanced contact endoscopy during pituitary tumor surgery. We demonstrate some distinct patterns of the microvasculature of the normal pituitary gland and its difference from tumor tissue vascularity to help optimize pituitary gland preservation. We also discuss collision sellar tumors and present a surgical case video example.

Ethical approval

Institutional Review Board approval is not required.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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