CASE REPORT

Endoscopic endonasal transsphenoidal approach for resection of a coexistent pituitary macroadenoma and a tuberculum sellae meningioma

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ABSTRACT

The coexistence of a pituitary macroadenoma and a tuberculum sellae meningioma is very rare. This article demonstrates the surgical technique of the simultaneous resection of a pituitary macroadenoma and a tuberculum sellae meningioma using an endoscopic, endonasal, biportal, transsphenoidal approach. A 36-year-old woman presented with frontal headache and extended visual field loss of the right eye. She underwent cranial magnetic resonance imaging (MRI) revealing a 2 × 2× 2.5 mm contrast-enhancing intrasellar and suprasellar lesion with compression of the optic chiasma. The coexistence of a pituitary macroadenoma and meningioma was suggested. A biportal endoscopic endonasal transsphenoidal approach was performed to remove both lesions. The histological results confirmed the coexistence of the pituitary macroadenoma and meningioma, World Health Organization (WHO) grade I. The endoscopic, endonasal, transsphenoidal approach is a safe and reliable minimal invasive surgical alternative for resection of the intra-, supra- and parasellar lesions, avoiding additional craniotomy.

Key words: Coexistence, endoscopic resection, pituitary adenoma, tuberculum sellae meningioma

Introduction

The coexistence of pituitary adenoma and meningioma is a very rare finding. Only few cases have been reported in the literature describing the simultaneous coexistence of pituitary macroadenoma and tuberculum sellae meningioma.[1-5] A disease associated with the simultaneous development of these two different tumor entities is unknown. However, new developed meningiomas after radiotherapy are well-known, and have also been described after radiotherapy of pituitary adenomas.[6,7] For microsurgical resection of these lesions, there are different alternative approaches. The transsphenoidal approach to the skull base is well-described[4,8-17] and is considered as the standard approach for microsurgical removal of pituitary adenoma. However, for excision of the tuberculum sellae or a planum sphenoidale meningioma, craniotomy is usually required. With the increased use of endoscopic or endoscopic-assisted techniques for skull base lesions and the possibility of improved visualization to perform extended transnasal approaches, the transsphenoidal removal of such meningiomas is a reliable alternative to craniotomy and has been described by different groups.[8,12,16,17]

We describe our experience in a unique case of coexistent pituitary macroadenoma and tuberculum sellae meningioma involving the planum sphenoidale and the complete and successful endoscopic resection of both tumors via a solely endonasal transsphenoidal transplanum approach.

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Case Report

A 36-year-old woman was admitted to our hospital with frontal headache and extended visual field loss of the right eye. In her further medical history, she described a loss of the 3D effect one year ago, when watching a 3D movie in the cinema. A visual examination showed concentric field loss and extended acuity loss of the right eye (seeing only hand movement). The visual acuity of the left eye was 0.2. On account of this, contrast-enhanced magnetic resonance imaging (MRI) was performed. The MRI demonstrated an

intrasellar lesion with compression of the optic chiasma, which was suspected to be due to a pituitary macroadenoma. Furthermore, a second contrast-enhancing extra-axial lesion was detected at the tuberculum sellae with a "dural tail" reaching the planum sphenoidale, which was supposed to be a meningioma [Figure 1]. The patient had no history of neoplasia or radiotherapy. Preoperative serum hormone levels (thyroid stimulating hormone, T4, free T4, cortisol level, growth hormone, and prolactin) were normal.

Surgical technique

The patient was placed in the supine position. The head was placed on a gel cushion without Mayfield fixation. She underwent an endoscopic, endonasal, transsphenoidal, transplanum, transtuberculum approach with a rigid nasal 0° and 30° endoscope (Wolf, Tuttlingen, Germany).

A nasal flap was prepared for reconstructing the skull base defect at the end of surgery, which was based on the nasal mucosa, with blood supply from the sphenopalatine artery. The flap was placed downward in front of the Eustachian tube during the whole surgery. After opening the sphenoid sinus the sella floor was removed with a high speed drill under endoscopic 0° vision. The dura opening was performed with a diamond knife and the pituitary adenoma was removed using different curved curettes and a double suction system. After intrasellar endoscopic examination with the 30with the 30° scope and total removal of the adenoma, the intrasellar floor was tamponaded and the approach was extended anteriorly by removing the bone to enlarge the opening of the sella in the direction of the anterior clinoid process, to approach the planum sphenoidale and tuberculum sellae. Again the bone was removed using a high speed drill. The region of adhesion of the meningioma to the tuberculum sellae was identified and cauterization of the dura was performed to cut the blood supply of the tumor matrix. After opening the dura with a diamond knife the tumor was identified and was removed completely with microinstruments under pure endoscopic 30° vision[Figure 2]. The defect was reconstructed with the initially prepared nasoseptal flap, which were placed above the skull base defect.

After surgery, a lumbar drain was inserted for three days. The patient did not develop a cerebrospinal fluid leak postoperatively. In the postoperative course, the patient showed symptoms of diabetes insipidus and pituitary insufficiency. On account of this, hormonal substitution was carried out postoperatively. At the six-week follow up, continued hormonal dysregulation, with a need for substitution of the thyroid hormone axis was present. Four months after surgery the visual field and visual acuity recovered completely showing a normal finding.

A postoperative MRI scan two days and six months after surgery demonstrated complete resection of both lesions, with sufficient decompression of the optic (nerve and chiasma)-carotid-pituitary complex [Figure 1]. The histopathological results confirmed the coexistence of a pituitary adenoma and meningioma WHO I.

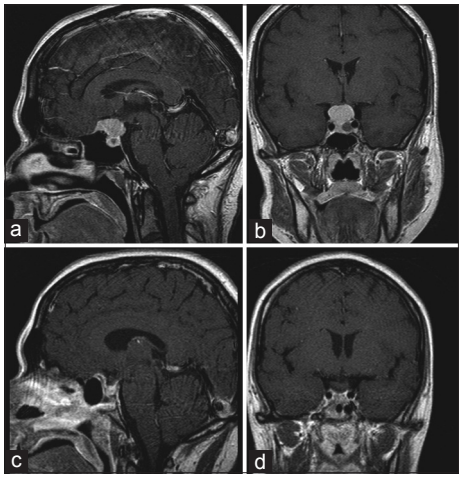

Figure 1: Magnetic resonance images: T1 weighted contrast-enhanced sagittal (a) and coronal (b) preoperative images showing coexistent macroadenoma and tuberculum sellae meningioma. Postoperative T1-weighted contrast-enhanced sagittal (c) and coronal (d) MRI, six months after surgery, showing complete resection of both lesions and sufficient decompression of the optic (nerve and chiasma)-carotid-pituitary complex

Discussion

The coexistence of a pituitary macroadenoma and meningioma has been reported in the literature and is a very rare finding.[1-4] The cause of the simultaneous occurrence of these two different tumor entities is unknown, although after radiation therapy a higher incidence for the development of tumors has been reported.[6,7] However, the microsurgical resection of these lesions should be performed to avoid impairment of the neurological deficits and to achieve histological diagnosis.

For surgical removal of the pituitary adenoma and tuberculum sellae/planum sphenoidale meningioma, different techniques and approaches have been described.[4,14,18] The classic approaches include the pterional, subfrontal, supraorbital,

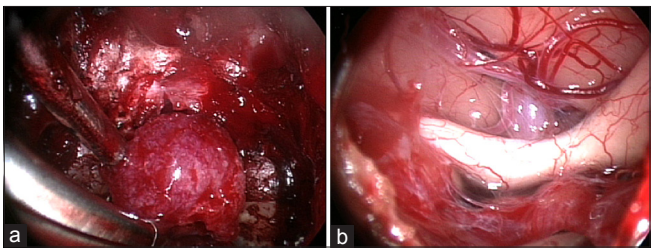

Figure 2: (a) The intraoperative endoscopic view (screenshot) of the endonasal transsphenoidal approach to the planum sphenoidale and tuberculum sellae and identification of the meningioma. (b) The tumor was removed completely under endoscopic vision and sufficient decompression of the optic nerve and chiasma was achieved

and transsylvian approaches, and require craniotomy for microsurgical extirpation of the lesions. With development of microneurosurgery, using microinstruments and an intraoperative microscope, the transsphenoidal approach for resection of pituitary adenoma has become the gold standard. However, the approach and surgical exposure with a microscope has limited visualization, even if an extended transsphenoidal approach is required. In these cases, the endoscopic or endoscope-assisted approach is a reliable alternative for better visualization of the anatomical and pathological structures. The endoscopic transsphenoidal approach to the sellar region for resection of pituitary adenomas is well-described.[9,11,13,15,19-21] For transsphenoidal extirpation of the tuberculum sellae and planum sphenoidale lesions, an extended transsphenoidal approach has been performed by different groups successfully, but is not considered as the standard approach by all neurosurgeons. Many lesions of the anterior skull base like the tuberculum sellae, planum sphenoidale or olfactory groove meningioma can be removed reliably by performing the endoscopic transsphenoidal approach.[8-13,16,22] Feasibility of the endoscopic approach depends on the tumor size, localization, parasellar extension, and infiltration of the ethmoid bone, sphenoid sinus, and nasal cavity. Therefore, an endoscopic endonasal approach is not indicated for all patients. In selected cases, it is a reliable alternative for neurosurgeons who are familiar with endoscopic techniques, avoiding craniotomy and the classic approach to the anterior skull base for such patients. Using modern endoscopes, with different angles of view, the extended transsphenoidal approach with improved visualization has been performed more often,[21] and can be considered as the approach of choice in the indicated cases. Furthermore, many experienced endoscopic working neurosurgeons and Ear, Nose, and Throat (ENT) surgeons also use three-dimensional techniques, with improved visualization and depth perception, to enter the nasal and sphenoidal cavities.[8,22-25]

Our patient had a pituitary macroadenoma and a tuberculum sellae meningioma simultaneously. For the macroadenoma resection in this case, the transsphenoidal approach was indicated. For the extirpation of the tuberculum sellae meningioma, there were two alternatives, craniotomy or the transsphenoidal transtuberculum approach. The criteria we followed were that both lesions were located in the midline, between both carotid arteries, and were approachable via the sphenoid sinus [Figure 1], according to the keyhole concept, with a minimal invasive nasal tissue and bone destruction procedure. We decided to remove both lesions through one endonasal, transsphenoidal, transsellar, transtuberculum approach, using different angled endoscopes for better visualization, to avoid craniotomy for this young patient. The described technique is safe and reliable to achieve decompression of the opto-carotid and pituitary complex and for reaching complete resection of the two lesions in one surgical procedure only, if the lesions satisfy the anatomical and surgical strategic important criteria like those described earlier. With this report we aim to discuss the indication of endoscopic approaches to the anterior skull base as a reliable and less invasive technique, according to the keyhole minimal invasive concept. With advances in endoscopic techniques and instrumentation, and improved knowledge of the endoscopic anatomy, the endoscopic transsphenoidal approach has to be kept in mind as an alternative to the traditional microsurgical craniotomy, in selected cases.

Conclusion

The endoscopic endonasal transsphenoidal approach is a safe and reliable minimal invasive surgical alternative for resection of intra-, supra- and parasellar lesions, avoiding additional craniotomy, in selected cases.

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