Endoscopic transsphenoidal resection of sellar tumors with conchal sphenoid sinus: A report of two cases

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Received February 20, 2014; Accepted October 29, 2014

DOI: 10.3892/ol.2014.2732

Abstract. A conchal non-pneumatized sphenoid sinus was previously considered to be a contraindication to the endoscopic transsphenoidal route to the sella due to its small sellar floor and poor anatomical landmarks, such as the optic nerve canal, opticocarotid recess and internal carotid arteries canal. The present study aimed to investigate the methodology and characteristics of the endoscopic transsphenoidal resection of sellar tumors with a conchal sphenoid sinus. Two patients with sellar tumor patients and non-pneumatized sphenoid sinuses received endoscopic transsphenoidal surgery. The two conchal sphenoid sinuses were accessed safely, total resection was achieved and no serious complications occurred. Therefore, the presence of a conchal non-pneumatized sphenoid is not an absolute contraindication for employing the endoscopic transsphenoidal route in the resection of sellar tumors; a positive outcome may be achieved, in particular when the surgery is performed by an experienced otolaryngologist.

Case reports

Case one. A 60-year-old female was admitted to the Department of Otolaryngology - Head and Neck Surgery of the Third Xiangya Hospital (Changsha, China) on August 28, 2011, presenting with a two-day history of a severe headache, projectile vomiting and blepharoptosis of the left eye. Nasal examination was normal. The right pupil size was 2.5 mm (normal range, 2.5-5.0 mm) with normal papillary reflex and the left pupil size was 4.0 mm with no papillary reflex. Visual acuity and visual field of the two eyes were normal. No strabismus or diplopia were observed and the eye movement was normal. Endocrinological investigations demonstrated decreased adrenocorticotropic hormone (ACTH; 1.10 pg/ml, normal range, 7.20-63.60 pg/ml) and luteinizing hormone (LH; 2.78 mIU/ml, normal range, 15.90-54.00 mIU/ml), normal thyroid stimulating hormone (TSH; 1.56 mIU/ml, normal range, 0.40-4.78 mIU/ml), follicle-stimulating hormone (FSH; 15.96 mIU/ml, normal range, 23.00-116.30 mIU/ml), growth hormone (GH; 0.43 ng/ml, normal range, 0.12-9.88 ng/ml) and prolactin (PRL; 2.48 ng/ml, normal range, 1.80-20.30 ng/ml) (Table I). Magnetic resonance imaging indicated a sellar tumor extended into the left cavernous sinus and a non-pneumatized sphenoid sinus (Fig. 1A). Following the aforementioned physical and clinical examinations, the tumor was excised under general anesthesia via the endoscopic transsphenoidal route. Skull base closure was achieved with a combination of autologous fascia lata grafts, fibrin glue and nasoseptal flap(s). The excised tumor was subjected to histopathology, which indicated a diagnosis of pituitary adenoma.

Postoperatively, the patient developed transient diabetes insipidus for six days, however no other complications, such as intracranial infection, cerebrospinal fluid leakage, intracerebral hemorrhage or cranial nerve palsies, were observed. Blepharoptosis recovered on day 13 after surgery. A magnetic resonance image captured one year following the surgery
Table I. Preoperative endocrinological investigations of the two cases.

| Endocrinological investigation | Normal range          | Case one          | Case two          |
|-------------------------------|-----------------------|-------------------|-------------------|
| FSH                           | 23.00-116.30 mIU/ml   | 15.96 mIU/ml      | 4.09 mIU/ml       |
| GH                            | 0.12-9.88 ng/ml       | 0.43 ng/ml        | 0.31 ng/ml        |
| LH                            | 15.90-54.00 mIU/ml    | 2.78 mIU/ml       | 0.39 mIU/ml       |
| ACTH                          | 7.20-63.60 pg/ml      | 1.10 pg/ml        | 21.09 pg/ml       |
| PRL                           | 1.80-20.30 ng/ml      | 2.48 ng/ml        | 70.43 ng/ml       |
| TSH                           | 0.40-4.78 mIU/ml      | 1.56 mIU/ml       | 3.29 mIU/ml       |

FSH, follicle stimulating hormone; GH, growth hormone; LH, luteinizing hormone; ACTH, adrenocorticotropic hormone; PRL, prolactin; TSH, thyroid stimulating hormone.

Figure 1. Case one: (A) Preoperative and (B) postoperative coronal MRI demonstrating the total removal of a pituitary adenoma. Case two: (C) Preoperative and (D) postoperative sagittal MRI demonstrating the total removal of a pituitary adenoma. MRI, magnetic resonance imaging.

Figure 2. Intraoperative endoscopic view of endoscopic transsphenoidal excision of the sellar tumor in case two. (A) Anterior wall of sphenoidal sinus. (B) Exposure of the sellar dura. (C) Sellar region after total tumor resection. ECS, ethmoid cell superior to the sphenoid bone; CS, crista sphenoidalis; ASW, anterior sphenoidal wall; SD, sellar dura; DS, diaphragma sellae; SH, hypophysial.
demonstrated that total resection was achieved (Fig. 1B). No recurrence was observed prior to the termination of follow-up, two years after the surgery was performed.

Case two. A 45-year-old female presented with a three-month history of vision loss and was treated in the Department of Otolaryngology - Head and Neck Surgery of the Third Xiangya Hospital on December 3, 2013.

The nasal examination was normal. The patient's visual acuity (normal range, >1.0) was measured at 4 m using a retroilluminated logarithm of the minimum angle of resolution chart with tumbling-E optotypes (Precision Vision, La Salle, IL, USA), which revealed that the [visio oculus sinister (VOS)] in the right eye was counting fingers/30cm and the [visio oculus dexter (VOD)] in the right eye was 0.3. Additionally, a visual field defect of bitemporal hemianopia was observed. Endocrinological investigations demonstrated elevated PRL (70.43 ng/ml, normal range, 1.80-20.30 ng/ml), decreased FSH (4.09 mIU/ml, normal range, 23.00-116.30 mIU/ml) and LH (0.39 mIU/ml, normal range, 15.90-54.00 mIU/ml), and normal TSH (3.29 mIU/ml, normal range, 0.40-4.78 mIU/ml), GH (0.31 ng/ml, normal range, 0.12-9.88 ng/ml) and ACTH levels (21.09 pg/ml, normal range, 7.20-63.60 pg/ml) (Table I). Magnetic resonance imaging indicated the presence of a sellar tumor, which had extended into the suprasellar cistern and caused compression of the optic nerves and optic chiasma, as well as a non-pneumatized sphenoid sinus (Fig. 1C). The surgical technique utilized in case two was identical to that used in case one; the intraoperative view is shown in Fig. 2. Subsequent histopathological examination of the lesion indicated a diagnosis of pituitary adenoma.

Postoperatively, the patient developed transient diabetes insipidus for 11 days. Prior to discharge (13 days following surgery), visual acuity was determined to be 0.8 VOS and 1.0 VOD, and visual field was fully recovered. Magnetic resonance imaging indicated that total resection of the tumor had been achieved, however, a hematoma was observed in the posterior pituitary fossa with no clinical symptoms (Fig. 1D). No additional complications were observed at the most recent follow-up examination in February 2014.

Discussion

Sphenoid sinuses develop within the sphenoidal concha from the third embryonic month and may result in varying degrees of pneumatization in the corpora ossis sphenoidalis by the age of 14 years (5). According to the commonly used classification system proposed by Hammer and Radberg (6), the pneumatization of the sphenoid sinus is divided into three types: Conchal, presellar and sellar. The conchal type accounts for ~2% of the population, while the presellar and sellar types account for ~98% (6). The pneumatization of the sphenoid sinus develops from the third embryonic month and may result in varying degrees of pneumatization (5).

In conclusion, for sellar tumors with non-pneumatized sphenoid, transcranial approaches are usually preferred by neurosurgeons, however, brain retraction and manipulation of neurovascular structures during the procedure may induce severe trauma and postoperative reactions, in addition to numerous complications which may increase the duration of the patient's hospital stay. In the present study, a conchal non-pneumatized sphenoid does not appear to be an absolute contraindication for endoscopic transsphenoidal route in the resection of sellar tumors; endoscopic transsphenoidal surgery has a number of advantages when compared with other surgical approaches, including decreased morbidity, improved panoramic visualization and increased illumination and magnification. Furthermore, a positive outcome may be achieved, in particular when the surgery is performed by an experienced otolaryngologist. However, due to the small sample size used in the present study, future studies are required to confirm the efficacy and safety of the endoscopic route in the resection of sellar tumors with non-pneumatized sphenoid.

Acknowledgements

The present study was supported by the Hunan Provincial Innovation Foundation for Postgraduate (China; grant no. CX2013B125). The authors would like to thank Dr Yexun Song for aiding with the data collection, Dr Tiansheng Wang for facilitating the performance of the statistical analyses, and Professor Jiangbo Chen and Professor Guolin Tan for assisting in the writing of the manuscript.

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