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The endoscopic endonasal transsphenoidal approach to sellar lesions allows a high radicality: The benefit of angled optics

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ABSTRACT

Objective: The endonasal endoscopic approach is currently under investigation for perisellar tumour surgery. A higher resection rate is to be expected, and nasal complications should be minimized. Here, the authors report their technique of transnasal endoscopic neurosurgery with a special reference to the impact of the use of angled optics.
Material and methods: Two-hundred-and-seventy-one endoscopic endonasal transsphenoidal procedures were performed for sellar lesions between January 2000 and August 2013. One-hundred-and-twenty-nine patients out of them could be used for analysing the use of angled endoscopes including completed follow up, MR imaging as resection control and documentation of the intraoperative use and benefit of angled optics. Exclusion criteria were: planned incomplete resection or incomplete data set. The surgical technique was carefully analysed; and these cases were followed prospectively.
Results: Standard technique was a mononostril approach with 0° endoscopes. Angled endoscopes were used for assessment of radicality during the tumour resection and at the end of the procedure. In 95 cases (72%), an angled endoscope was used. Remnant tumour was visualized with angled optics in 27 of the 95 cases (28%). In all these cases, remnant tumour tissue was subsequently further removed. Complete resection was seen on MRI FU in 91 of 95 cases (96%) in this subgroup. In the cases without application of angled optics, there was already a sufficient sight via the 0° endoscope (14/34; 42%), or a significant bleeding from the cavernous sinus made the application of an angled endoscope impossible (19/34; 55%). On follow up, MRI revealed radical tumour resection in 93% (120/129). In the subgroup without angled optics use, radicality reached 88% (30/34) in contrast to 96% in the angled optics subgroup. Recurrent tumour growth was observed in four patients (3%).
Conclusions: The endscopic technique has been shown to be safe and successful with a high radicality and only minor complications. The application of various angled endoscopes allows a look "around the corner" resulting in a potentially higher radicality of tumour resection in endonasal transsphenoidal surgery.

1. Introduction

Treatment strategy and surgical technique in patients suffering from sellar lesions have undergone significant evolution over the last decades. The transsphenoidal microsurgical approach [1–7] which was investigated and further established over almost a century of continuous research represents the "gold standard" for surgical treatment of sellar lesions today. Since the last one to two decades, the endoscopic technique is increasingly been used for skull base surgery. Numerous publications on endonasal endoscopic surgery have stressed the less invasive nature of this techniques [7–24] and the feasibility approaching the clivus as well as the anterior fossa [25–27]. With increasing experience, surgeons have tackled more formidable pathologies such as clivus chordomas, brainstem cavernomas besides others. Theoretical advantages of the endoscopic endonasal approach include better illumination of the region of interest, the 'look around the corner' with angled endoscopes and the better identification of the pituitary gland [11,28,29] as illustrated in Fig. 1.

However, the role of the endonasal endoscopic surgery for sellar and anterior skull base lesions is still not clearly defined. In this report, we present our results in a series of endoscopic endonasal procedures for sellar lesions concerning the use of angled

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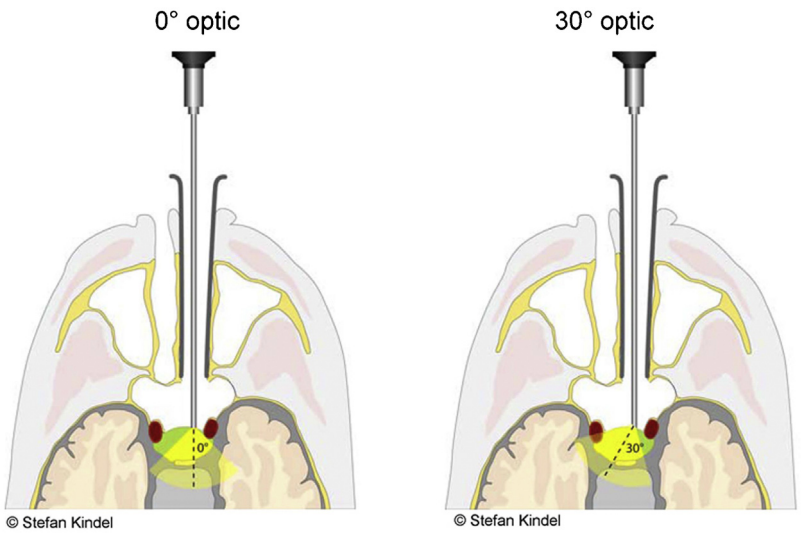

Fig. 1. The use of 0° and angled endoscopes. With the angled endoscope, a look around the corner far lateral to both sides of the sphenoid sinus and also within the sella is possible.

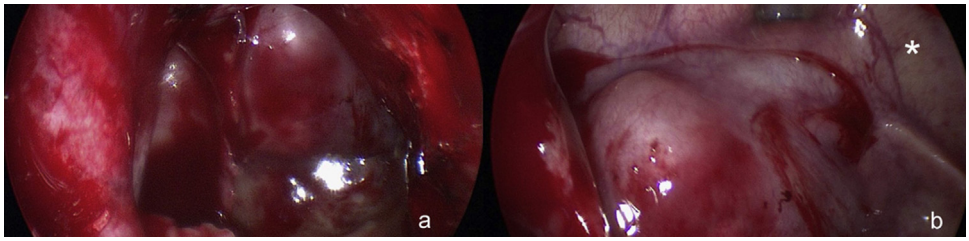

Fig. 2. With the 0° optic (a) the visualisation of the corners of the sphenoid sinus is not possible after opening of the floor. Using the 30° angled endoscope (b) a panoramic view far lateral to the corners is possible and the carotid canal (*) can be identified.

endoscopes and the influence of its application on intraoperative resection radicality.

2. Material and methods

2.1. Patient criteria and histopathology

Between January 2000 and August 2013, 271 endoscopic endonasal transsphenoidal procedures were performed for pituitary adenomas and several other sellar and perisellar lesions via an endonasal endoscopic transsphenoidal approach in its presented form by one of the authors. Exclusion criteria for this study were: planned incomplete resection prior to surgery, incomplete surgical data set and loss to follow up. Thereby only patients who were scheduled for surgery aiming at complete sellar lesion resection were included in this study. Thus 129 patients could be followed in detail with respect to resection control on MR imaging, use of angled optics intraoperatively and long-term follow up. The patient population consists of 55 males and 74 females. The mean age at surgery scored 50 years with a range of 17–86 years.

2.2. Perioperative management

All patients underwent preoperative endocrine and visual function evaluations including formal visual field testing. Postoperative visual evaluations were performed only in patients who showed preoperative visual impairment or presented visual symptoms postoperatively. Pre- and postoperatively, all patients received endocrine evaluations by an endocrinologist. The postoperative evaluations were performed during the patients' in-hospital stay within the first week after surgery and six weeks after surgery followed by a variable time schedule depending on their hormonal and MRI findings. Preoperative and postoperative magnetic resonance imaging was obtained as a routine. Also as a routine, a computer tomography scan with axial and coronal reformations was performed to define the bony boundaries of the sellar region including the sphenoid cavity prior to surgery.

2.3. Postoperative follow up

All patients could be prospectively followed for this study (6 months–7 years, mean 3.1 ± 1.6 years). Follow-up examinations in outpatient clinic were performed at 3 months postoperatively and then followed by a variable time schedule depending on their hormonal and MRI findings on a yearly or half-yearly basis. The patients obtained a postoperative MRI as resection control after three to six months. Special attention was paid to complications, surgical radicality in follow up MRI, symptom and symptom relieve.

2.4. Surgical technique

The procedures in the sellar region and also the nasal approaches were performed by the authors. The patient was maintained supine with the upper part of the body slightly elevated to about 20° and the head tilted to the left. The patient's head was fixed with a three-pin head-fixation system. Lateral fluoroscopy (C-arm) and MRI-based neuronavigation were routinely used for intraoperative imaging. The nasal cavities were prepared with an alcohol-based disinfectant. Mepivacaine with 1:100 000 adrenaline soaked cotton was placed into bilateral nasal cavities for local haemostasis.