



Available online at  
**SciVerse ScienceDirect**  
www.sciencedirect.com

Elsevier Masson France  
**EM|consulte**  
www.em-consulte.com/en



## REVIEW

# Endoscopic endonasal skull base surgery

B. Verillaud<sup>a,\*</sup>, D. Bresson<sup>b</sup>, E. Sauvaget<sup>a</sup>, E. Mandonnet<sup>b</sup>, B. Georges<sup>b</sup>,  
R. Kania<sup>a</sup>, P. Herman<sup>a</sup>

<sup>a</sup> Service d'oto-rhino-laryngologie, université Paris 7 Denis-Diderot, hôpital Lariboisière, Assistance publique des Hôpitaux de Paris, 2, rue Ambroise-Paré, 75475 Paris cedex 10, France

<sup>b</sup> Service de neurochirurgie, université Paris 7 Denis Diderot, hôpital Lariboisière, Assistance publique des Hôpitaux de Paris, 2, rue Ambroise-Paré, 75475 Paris cedex 10, France

### KEYWORDS

Endoscopic endonasal skull base surgery;  
Cerebrospinal fluid leak

**Summary** Skull base surgery has been transformed by the development of endoscopic techniques. Endoscopic procedures were first used for pituitary surgery and were then gradually extended to other regions. A wide range of diseases are now accessible to endoscopic skull base surgery. The major advantage of the endoscopic endonasal approach is that it provides direct anatomical access to a large number of intracranial and paranasal sinus lesions, avoiding the sequelae of a skin incision, facial bone flap or craniotomy, and brain retraction, which is inevitable with conventional neurosurgical incisions, resulting in decreased morbidity and mortality and, indirectly, decreased length of hospital stay and management costs. Moreover, the increasing number of publications in this field illustrates the growing interest in these techniques. This paper provides a review of endoscopic skull base surgery. The indications and general principles of endoscopic endonasal skull base surgery are described. Progress in exposure and especially reconstruction techniques is described. This progress now allows more extensive resections, while maintaining acceptable morbidity. The limits of this surgery are also discussed; in particular, although this surgery is often described as "minimally invasive", it is not completely devoid of morbidity.

© 2012 Elsevier Masson SAS. All rights reserved.

## Introduction

Skull base surgery has been transformed by the development of endoscopic endonasal surgery. These techniques were initially developed for paranasal sinus surgery, but their indications have been gradually extended to include endoscopic resection of pituitary tumours, and then lesions of the clivus,

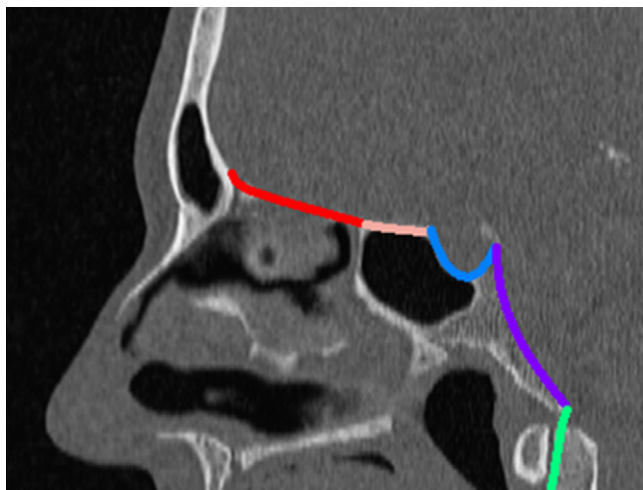
olfactory cleft, planum sphenoidale, but also the petrous apex, or infratemporal fossa.

Endoscopic endonasal surgery provides access to almost all regions of the skull base situated anterior to the foramen magnum (Fig. 1). Tumours are the lesions primarily concerned, but cerebrospinal fluid (CSF) leaks of traumatic or other origin, certain chronic infections and congenital malformations are also accessible to endoscopic surgery.

The growing interest of otorhinolaryngologists and neurosurgeons in this "minimally invasive" surgery is due to the major progress made over recent years: a large number of anatomical studies, variants and innovations in

\* Corresponding author. Tel.: +33 6 61 72 70 94.

E-mail address: benjamin.verillaud@noos.fr (B. Verillaud).



**Figure 1** Regions of the skull base situated in the midline and accessible to endoscopic surgery are shown on this sagittal CT scan; from anterior to posterior: olfactory cleft, planum sphenoidale, sellar region, clivus, cervico-occipital junction.

exposure techniques and especially reconstruction have been reported. Constant progress in imaging, navigation systems, and instrumentation has also largely contributed to the growth of this surgery. The large number of publications reflects the growing interest of surgeons in these new techniques.

We propose a review of the current state of the art of endoscopic skull base surgery: the main indications are discussed, while stressing that some clinical settings remain controversial. Surgical instrumentation and the complementary investigations of the preoperative assessment are described, together with the general principles of the surgical technique, particularly concerning exposure and reconstruction. The limitations of this surgery are also discussed, with particular emphasis on the quality of life of patients following this type of surgery.

## Indications

A recent consensus [1] validated the use of endoscopic techniques in the management of benign tumours: pituitary adenomas, craniopharyngiomas, but also inverted papillomas and nasopharyngeal fibromas can be operated via an endonasal approach. Recent publications have also concerned endonasal management of cholesterol granuloma of the petrous apex and petrous apicitis, congenital malformations (meningoencephaloceles), or CSF leaks, showing a comparable or superior efficacy to conventional open surgery [2–4]. These results also apply to children, taking into account the anatomical specificities related to growth of the facial bones, particularly the paranasal sinuses [5].

The follow-up is currently too short to evaluate the long-term results in series of endoscopic resection of meningiomas, optic nerve gliomas, and chordomas of the clivus. The 2010 European consensus nevertheless emphasized the low operative morbidity of this type of surgery, which has been further decreased by progress in the field of reconstruction.

The rare controlled studies on malignant tumours tend to show a comparable efficacy of endoscopic surgery and conventional surgery [6–10]. Nicolai et al., in 2008, published their experience based on a series of 134 patients undergoing endoscopic resection of various malignant tumours, and reported a 5-year disease-specific survival of 91.4% [11]. However, the results of these studies must be interpreted cautiously due to their limited follow-up and their retrospective and non-randomized design.

A major criticism of endoscopic techniques is that they do not allow *en bloc* resection of the tumour. However, the tumour is also often fragmented in the course of open surgery and the most important aspect is not *en bloc* resection, but complete resection of the zone of insertion: tumours often present an exophytic growth into paranasal sinuses from a smaller pedicle. Finally, the endonasal approach often allows resection without damaging adjacent healthy tissues, which is not the case with conventional open surgery, in which the skin, bone, and sometimes dura mater are opened to provide access to the tumour, with a risk of tumour seeding.

In conclusion, the available data are currently insufficient to define guidelines for the endoscopic management of malignant tumours, but the rules of cancer surgery probably remain the same for endoscopic surgery and open surgery, which must strive to achieve complete resection with healthy margins, while limiting morbidity.

## Instrumentation

Apart from videoendoscopy equipment and standard endonasal instrumentation, endoscopic endonasal skull base surgery may require the use of dedicated instruments [12,13]:

- the microdebrider facilitates exposure time, particularly ethmoidectomy, and can also be used for resection in some cases, or at least for tumour dissection [14]. Some authors propose the use of ultrasonic surgical aspirators (Dissectron®, Cavitron®) for tumour dissection, and ultrasonic bone curettes have also been recently developed [15];
- motors equipped with long handpieces allow drilling of the thickest portions of the skull base. Angled burrs are particularly useful in the frontal sinus region [16,17];
- haemostasis systems mainly comprise sheathed monopolar cautery and bipolar forceps. Diode laser is also useful, particularly during mucosal dissection (for example, for creation of a nasoseptal flap);
- navigation systems are widely available and are very useful for intraoperative anatomical localization;
- some authors propose the use of a Doppler probe to localize large vessels [17], but neuronavigation effectively guides the surgeon in the majority of cases;
- the use of an endoscope-fitted irrigation system depends on each team's usual practices. An endoscope without irrigation system has a much smaller diameter and is therefore easier to use and is less traumatic to the nasal cavity. A simple stream of saline from a syringe delivered by the assistant onto the shaft of the optic endoscope allows rinsing of the endoscope when it is soiled;

Download English Version:

<https://daneshyari.com/en/article/4110232>

Download Persian Version:

<https://daneshyari.com/article/4110232>

[Daneshyari.com](https://daneshyari.com)