



# New Nasopharyngeal Flap for Posterior Skull-base Reconstruction: The Upper-Tongue Flap

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## Abstract

**Introduction** Reconstructions of clival resection are still challenging, and additional reconstructive methods may be necessary to achieve full coverage of the skull-base defect in patients with middle- and lower-clivus disease.

**Objective** To describe a new nasopharyngeal flap for the middle and lower clivus.

**Methods** Using nasal endoscopy in a cadaver dissection, we demonstrated a new nasopharyngeal flap to cover the lower and middle clival resection.

**Results** We described a new nasopharyngeal flap capable of covering the lower and middle portion of the clivus.

**Discussion** The new nasopharyngeal flap, called the upper-tongue flap, is particularly adequate as an alternative for the reconstruction of middle and lower clivus defects, and it is better used in association with a nasoseptal flap in cases in which the nasoseptal flap alone does not provide enough mucosal coverage.

**Conclusion** The new nasopharyngeal flap can be used in the reconstruction of clival resection.

## Keywords

- ▶ nasopharynx
- ▶ flap
- ▶ nasal

## Introduction

Endoscopic endonasal resection of clival lesions is well-described in the literature, but is still challenging, even to the most experienced surgeons. The clivus is formed by sphenoidal and occipital portions, and it is usually divided into the upper, middle, and lower clivus. The upper clivus is located above the crossing of the trigeminal and abducens nerves. The middle clivus is located between the exits of the trigeminal and glossopharyngeal nerves, while the lower clivus is the portion between the glossopharyngeal nerve and the foramen magnum. The last two thirds are bounded anteriorly by the nasopharynx and retropharyngeal tissues.<sup>1,2</sup>

Despite the complexity of its anatomy and surgical access, the reconstruction of the clivus and posterior base of the

skull following an endoscopic endonasal approach requires a special attention. Vascularized flaps, the nasoseptal flap (NSF) in particular, are the mainstay for the reconstruction of skull-base defects.<sup>3,4</sup> However, additional reconstructive methods may be necessary to achieve full coverage of the skull-base defect in patients with middle- and lower-clivus disease.<sup>5</sup>

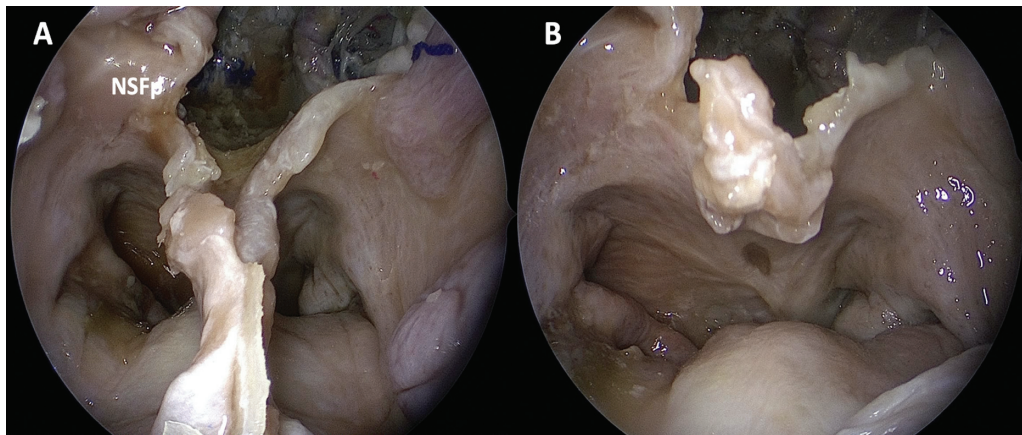
## Objective

The present study has the goal of presenting a new option for the reconstruction of the middle and lower-thirds of the clivus through a flap, called the upper-tongue flap (UTF), harvested starting from the roof of the nasopharynx.

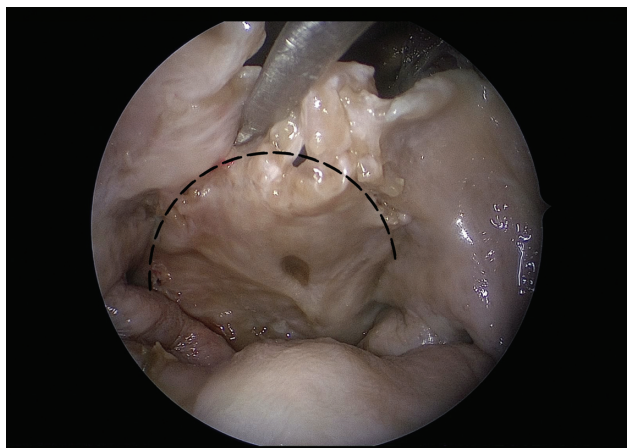
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**Fig. 1** Endonasal endoscopic view after harvesting a bilateral nasoseptal flap (NSF). (A) Before resection of the posterior nasal spine and vomer. (B) Ideal view of the field before making the upper-tongue flap (UTF). Abbreviation: NSFP: nasoseptal flap pedicle.



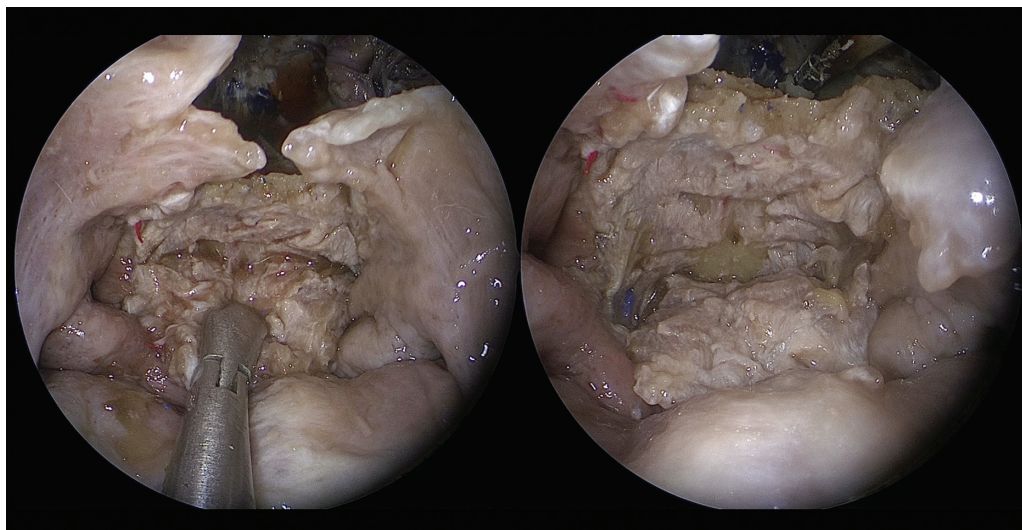
**Fig. 2** Incision shaped like an inverted U.

## Method

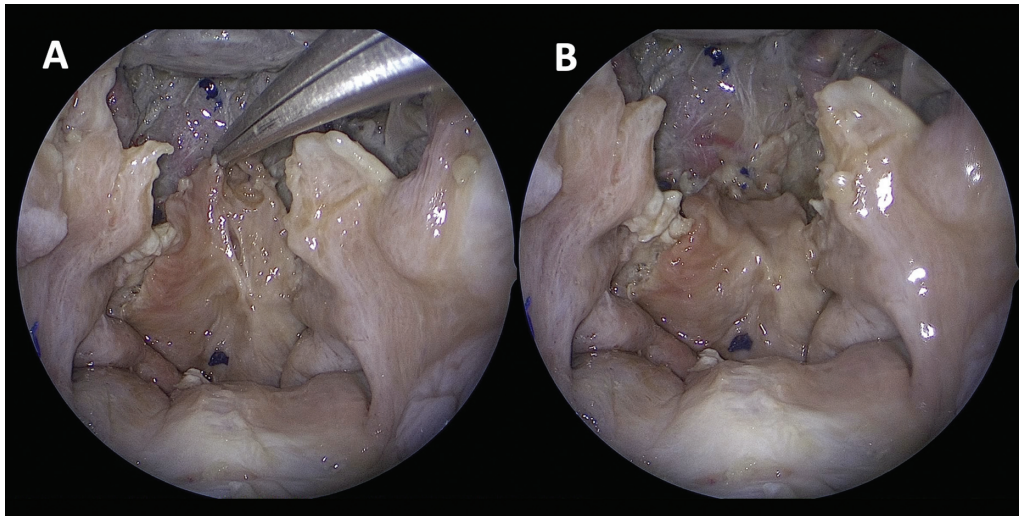
To demonstrate the technique, we used a human cadaver and accessed the nasal cavity and nasopharynx by endonasal

endoscopy. Using a 0-degree endoscope, the UTF is made after harvesting a unilateral or a bilateral nasoseptal flap (NSF) and performing an outfracture of the inferior turbinates. Drilling of the posterior nasal spine and vomer provides better access to harvest the UTF, which will be inferiorly based in an incision shaped like an inverted U (**Fig. 1**).

Two lateral and vertical incisions starting at the level of the middle third of the torus tubarius, and just posterior to it, are drawn on both sides. These incisions are connected by extending them superiorly toward the inferior edge of the NSF pedicle (**Fig. 2**). Following this, one surgeon performs an *en bloc* dissection of the mucosa and muscles of the roof of the nasopharynx using the sharp edge of a freer, while another surgeon holds the superior edge of the UTF downwards using a Blakesley forceps. The dissection progresses caudally by freeing the longus capitis muscle until the imaginary line drawn between the middle third of both torus tubari (**Fig. 3**). Careful coagulation is performed with a monopolar suction device when necessary. Surgical dissection of the UTF using electrocautery should be



**Fig. 3** Dissection of the soft tissue from the anterior edge of the sphenoid floor toward the nasopharynx.



**Fig. 4** (A) Length of the UTF. (B) Placement of the UTF covering the drilled area of the lower clivus.

avoided to preserve the length of the flap, which would otherwise suffer significant retraction.

The UTF is placed in the oropharynx, where the soft palate helps to hold it during the following procedure, by the end of which it is placed back in its original site (→**Fig. 4**).

## Results

We described a new nasopharyngeal flap with the shape of an upper tongue which is capable of cover the lower and middle portions of the clivus. It is also a modification of the previously described basipharyngeal flap,<sup>6</sup> more extended anteriorly since the junction of the anterior wall of the sphenoid with its inferior wall.

## Discussion

The UTF receives blood mainly from the ascending branch of the pharyngeal artery and descending branches of the lesser palatine arteries.

The UTF is particularly adequate as an alternative for the reconstruction of middle- and lower-clivus defects, and it is better used in association with an NSF in cases in which the NSF alone does not provide enough mucosal coverage. Further, by caudally displacing the soft tissues that are anterior to the inferior two-thirds of the clivus instead of transecting and resecting it, a midline aperture that sometimes remains open when using only an NSF is avoided.

## Conclusion

The new nasopharyngeal flap can be used in the reconstruction of middle and lower clival resection.

### Conflict of Interests

The authors have no conflict of interests to declare.

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