# Transbasal anterior approach

By definition, the transbasal approach (TBA) is a transcranial extradural anterior approach to the midline anterior skull base, sellar region-suprasellar region, and clivus.

On November 21, 1936, Walter Edward Dandy used a transbasal approach to resect a large frontal meningioma involved with the ethmoid sinus [1)]

Since its first description, numerous modifications and terminologies have been described in the literature [2)].

## Classification

### Level I Transbasal Approach

Involves a frontal craniotomy with an orbital bar and/or nasal bone osteotomy. It provides access to the anterior skull base, planum sphenoidale, sphenoid sinus, sellar/suprasellar region, and clivus. Traditionally, the orbital bar is removed as a second piece after the frontal craniotomy.

1-piece frontal approach involving a low-lying craniotomy involving the frontal sinuses, without removal of the orbital bar [3) 4) 5)].

Effendi et al. successfully performed a 1-piece variation of this approach. They noted that the 1-piece variant provides easier bone reconstruction, decreased operative time due to the simplified closure technique, and improved cosmesis by eliminating unaesthetic bone cuts.

A traditional, 2-piece TBA has unique cosmetic implications because it requires that a craniotome be used to create an osteotomy across the entire low frontal bone, essentially creating a defect in the face. Repairing this osteotomy requires either shifting the bone flap inferiorly (an imperfect solution causing increased gap in the superior aspect of the flap), placement of cement to fill the gap, and/or placement of additional hardware. These maneuvers may hinder bone healing or lead to suboptimal facial cosmetic outcomes. The 1-piece approach, which lacks this osteotomy, eliminates these issues [6)].

### Level II Transbasal Approach

### Level III Transbasal Approach

Free article [7)].

## Technique

The TBA typically involves a bifrontal craniotomy with orbital bar and/or nasal bone osteotomy performed in 2 separate steps (extended transbasal approach) allows for additional basal exposure,

thereby minimizing brain retraction.

The inferior margin of the osteotomy is made as low as possible through the anterior wall of the frontal sinus, starting at the nasofrontal suture and extending laterally over both orbital rims by following the contour of the anterior skull base in the coronal orientation. This modification provides an excellent line of sight to the anterior skull base without any obstruction from bone overhang, which obviates the need for any supraorbital rim removal [8].

## Indications

The transbasal approach is considered the workhorse for removing a variety of benign and malignant tumors of the anterior skull base.

Olfactory groove meningioma

Retrochiasmatic craniopharyngiomas

Olfactory region schwannoma.....

Effendi et al. explored the feasibility of routinely performing this approach in 1 piece with a quantitative cadaveric anatomical study, and present an operative case example of their approach.

Seven latex-injected cadaveric heads underwent a 1-piece TBA, followed by additional bone removal typical for a traditional 2-piece approach. Six surgical angles relative to the pituitary stalk, as well as the surface area of the orbital roof osteotomy, were measured before and after additional bone removal. The vertical angle from the frontonasal suture to the foramen cecum was measured in all specimens. In addition to an anatomical study, the authors have used this technique in the operating room, and present an illustrative case of resection of an anterior skull base meningioma.

Morphometric results were as follows: the vertical angle from the frontonasal suture to the foramen cecum ranged from 17.4° to 29.7° (mean 23.8° ± 4.8°) superiorly. Of the 6 surgical angle measures, only the middle horizontal angle was increased in the 2-piece versus the 1-piece approach (mean 43.4° ± 4.6° vs 43.0° ± 4.3°, respectively; $p = 0.049$), with a mean increase of 0.4°. The surface area of the orbital osteotomy was increased in the 2-piece versus the 1-piece approach (mean 2467 mm(2) ± 360 mm(2) vs 2045 mm(2) ± 352 mm(2), respectively; $p < 0.001$). The patient in the illustrative clinical case had a good outcome, both clinically and cosmetically.

The 1-piece TBA provides an alternative to the traditional 2-piece approach. It allows easier reconstruction, potentially decreased operative time, and improved cosmesis. While more of the orbital roof can be removed with the 2-piece approach, this additional bone removal offers only a small increase in 1 of 6 surgical angles that were measured [9].

## Complications

### Olfactory nerve sacrifice

Olfactory nerve sacrifice depending on the location of the lesion and amount of exposure required. However, if the surgical goal is to preserve olfaction or to perform an olfactory preserving cribriform osteotomy, then the frontonasal cut in the 1-piece TBA should not disrupt the cribriform plate [10].

### Enophthalmos

More orbital roof may be removed in a piecemeal fashion following a 1-piece craniotomy, but this permanent removal of bone increases the risk of enophthalmos, possibly requiring delayed reconstruction [11) 12) 13)].

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