

**Objective:** To describe the surgical anatomy, fascial relationships, and procedural steps for fascial plane-oriented endoscopic nasopharyngectomy in cases of nasopharyngeal carcinoma with parapharyngeal space invasion, and to propose a classification system based on fascial boundaries.

**Methods:** Cadaveric heads underwent stepwise endoscopic nasopharyngectomy using a four-hand binostrial transpterygoid approach. Key anatomical landmarks, fascial layers, and surgical corridors were documented.

**Results:**

Fascial structures identified included the tensor vascular styloid fascia (TVSF), stylopharyngeal fascia (SPF), interpterygoid fascia, longus capitis muscle fascia, and the fascial layer covering the parapharyngeal internal carotid artery (ppICA).

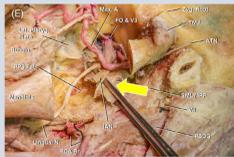
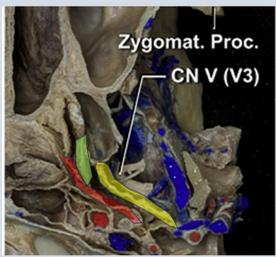
Three fascial plane-based types of endoscopic nasopharyngectomy were proposed. Type A preserves the TVSF and resects up to the SPF–longus capitis fascia junction, suitable for limited parapharyngeal invasion. Type B involves resection lateral to the TVSF, removing the Eustachian tube, levator and tensor veli palatini, and parapharyngeal fat pad, while preserving the interpterygoid fascia, for tumors without infratemporal fossa involvement. Type C includes removal of the interpterygoid fascia (optionally V3), often via a combined Caldwell–Luc approach, for tumors with infratemporal fossa extension. Identification of the intersection between the stylopharyngeal fascia and the longus capitis muscle fascia was critical for defining the deep margin and avoiding ppICA injury.

**Conclusion:** Fascial plane-oriented endoscopic nasopharyngectomy provides a structured anatomical framework for safe and oncologically sound resection of nasopharyngeal carcinoma with parapharyngeal extension. The proposed classification, based on the extent of resection relative to fascial boundaries, may aid surgical planning and warrants validation in clinical cohorts.

## Introduction

Three key fascia layers had been described in the skull base

- Tensor stylovascular fascia
- Stylopharyngeal fascia
- Interpterygoid fascia



- Interpterygoid fascia
- Tensor stylovascular fascia
- Stylopharyngeal fascia

\*Komune, N., et al. (2019). The Fascial Layers Attached to the Skull Base. *World Neurosurgery*

\*Schachtel, M. J. C., et al. (2023). Fascial layers encountered in the lateral skull base region. *Head & Neck*.

Understanding fascial planes along the parapharyngeal space is critical during endoscopic nasopharyngectomy

## Goal of study

-Identification of fascial layers from endonasal endoscopic viewpoint

-Propose a classification system based on fascial boundaries

## Methods

- Inspect fascia layers through visible human project

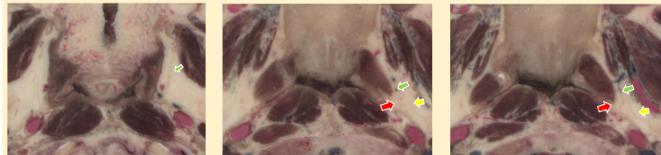
- Cadaveric heads underwent stepwise endoscopic nasopharyngectomy using a four-hand binostrial transpterygoid approach.

## Results

Inspection of fascial layers through The Visible Human Project



The Visible Human Project. U.S. National Library of Medicine. Available from: [https://www.nlm.nih.gov/research/visible/visible\\_human.html](https://www.nlm.nih.gov/research/visible/visible_human.html)



- Stylopharyngeal Fascia (SPF, Red Arrow): This thin fascia maintains a course posterior to the levator veli palatini (LVP) muscle. It originates from the pharyngeal mucosa anterior to the Eustachian tube and extends posteriorly toward the styloid process, forming a major constituent of the carotid fascia.
- Tensor Vascular Styloid Fascia (TVSF, Green Arrow): Identified extending from the posterior aspect of the tensor veli palatini (TVP) muscle. It runs posterosuperiorly, located medial to the interpterygoid fascia, and eventually fuses with the SPF just below the skull base toward the styloid process.
- Interpterygoid Fascia (IPF, Yellow Arrow): This layer covers the medial pterygoid muscle and is clearly visualized running medial to the mandibular nerve (V3). Its trajectory in the axial view aligns with the findings of Komune et al. (2019), confirming its role as a key anatomical boundary.

### Endoscopic view of 3 fascial layers

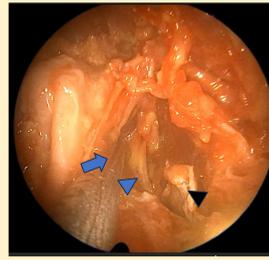
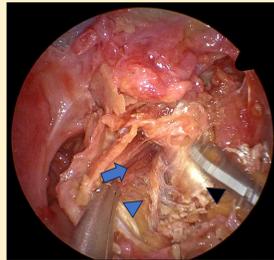
- Stylopharyngeal fascia



This fascial layer is identified after dissecting the plane between the levator veli palatini (arrow) and the tensor veli palatini (arrowhead) muscles (Left side, endoscopic view)



- Tensor vascular styloid fascia



This fascial layer (blue arrowhead) is identified after dissecting the plane between the tensor veli palatini (arrow) and medial pterygoid muscle (black arrowhead) (Left side, endoscopic view)



- Interpterygoid fascia

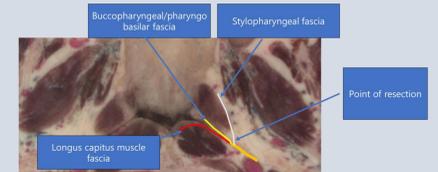


This fascial layer (arrow) lies between medial pterygoid muscle and lateral pterygoid muscle and lies medial to V3 (arrow head)



### Carotid sheath:

### Fascial plane oriented deep margin resection



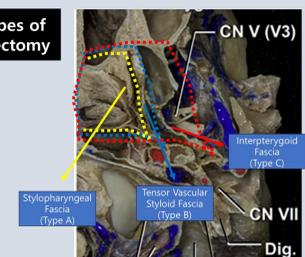
Axial view of a cadaveric dissection illustrating the critical fascial relationships at the deep resection margin. The stylopharyngeal fascia (SPF) (white line) is shown extending toward the carotid sheath. The point of resection (blue arrow) is strategically located at the intersection of the SPF, the buccopharyngeal/pharyngobasilar fascia (yellow line), and the longus capitis muscle fascia (red line). This junction serves as a key anatomical landmark for defining the deep margin while protecting the parapharyngeal internal carotid artery (ppICA)



The stylopharyngeal fascia, buccopharyngeal fascia (blue arrow), and longus capitis muscle fascia (blue arrow head) merge to form the carotid sheath. This intersection (black arrow head) defines the precise point of resection during endoscopic nasopharyngectomy. Identification of this transition point is critical for securing the deep margin while preventing injury to the parapharyngeal internal carotid artery.



### Suggested types of nasopharyngectomy



Type	Surgical Boundary & Resection Extent	Indications
Type A	Resects up to the SPF–longus capitis fascia junction; preserves the TVSF	Limited parapharyngeal invasion
Type B	Resects lateral to the TVSF, removing the Eustachian tube, levator/tensor veli palatini, and parapharyngeal fat pad	PPS extension without infratemporal fossa (ITF) involvement
Type C	Includes removal of the interpterygoid fascia (and optionally V3) via a combined Caldwell–Luc approach	Tumors with extension into the infratemporal fossa

## Summary & Conclusion

- Fascial-Based Classification: Proposed a 3-tier system (Types A, B, C) for endoscopic nasopharyngectomy based on parapharyngeal space (PPS) invasion.
- Key Landmarks: Identified the intersection of stylopharyngeal and longus capitis fascia as the critical marker for deep margins.
- ICA Safety: Navigating along the carotid fascia (alar fascia) ensures oncological clearance while preventing internal carotid artery injury.
- Resection Scope: Types range from limited PPS invasion (Type A) to extensive infratemporal fossa involvement requiring lateral access (Type C).

Sung-Woo Cho<sup>1</sup>, Chae-Seo Rhee<sup>1,2</sup>, Tae-Bin Won<sup>1,2\*</sup>

1. Department of Otorhinolaryngology-Head and Neck Surgery Seoul National University Bundang Hospital
2. Department of Otorhinolaryngology-Head and Neck Surgery Seoul National University Hospital

\* Corresponding  
Name : Tae-Bin Won  
Email : binent@hanmail.net

