

# Endoscopic Approaches to the Craniovertebral Junction



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## KEYWORDS

- Endoscopic • Endonasal • Transnasal • Transclival • Craniovertebral
- Craniocervical • Odontoidectomy • Foramen magnum

## KEY POINTS

- The endoscopic endonasal approach provides a direct surgical trajectory to anteriorly located lesions at the craniovertebral junction.
- Endoscopic endonasal odontoidectomy allows preservation of the soft palate, and patients can restart an oral diet on the first postoperative day.
- Lesions extending lateral to the lower cranial nerves cannot fully be treated via an endonasal approach.
- The use of vascularized pedicled flaps, such as the nasoseptal flap, has dramatically reduced the incidence of postoperative cerebrospinal fluid leak.
- A 2-surgeon 4-hand approach is recommended with collaborative expertise in rhinology and neurosurgery.

Disclosures: None.

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Otolaryngol Clin N Am 49 (2016) 213–226

<http://dx.doi.org/10.1016/j.otc.2015.08.003>

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## INTRODUCTION

Pathologic lesions located anterior or anterolateral at the craniovertebral (CVJ) pose a surgical challenge given their deep location and proximity to critical neurovascular structures. Historically, surgical treatment of these lesions using a standard midline suboccipital approach resulted in significant morbidity and mortality.<sup>1,2</sup> Over the last several decades, numerous alternative approaches have been described to treat these lesions more effectively. These include the far lateral, extreme lateral, direct lateral, transcervical, transoral, and transnasal approaches.<sup>3–17</sup>

The endonasal approach to the CVJ was originally described by Kassam and colleagues.<sup>9,18</sup> The advantage of the endonasal approach is that it provides direct surgical access to anterior and anterolateral CVJ lesions without the need to mobilize or retract cranial nerves, the lower brainstem, or upper cervical spinal cord. In addition, the endoscope can provide high illumination with a wide field of view.<sup>19,20</sup> However, the endoscopic endonasal approach to the CVJ requires substantial experience to overcome the learning curve associated with the technique and to minimize the risk of potential complications. In this article, the authors outline the surgical technique for the endoscopic endonasal approach to the CVJ, present illustrative cases, review outcomes, and discuss complication avoidance.

## TREATMENT GOALS

The goals of surgery and the anticipated outcomes are discussed with the patient preoperatively. Goals may include obtaining a diagnosis (if not already known), decompression of neural structures, and maximizing survival and quality of life. The latter requires minimizing collateral damage to both nasal and neural structures and lessening the risk of complications.

## PREOPERATIVE PLANNING

Preoperative evaluation begins with thorough radiographic assessment of pathologic and anatomic variations. Thin-slice (1.0 mm) computed tomography (CT) scan of the sinuses, CVJ, and upper cervical spine and volumetric MRI are performed. In addition to the volumetric T1 sequence with gadolinium, a high-resolution constructive interference in steady state sequence can be invaluable in showing the relationship of cranial nerves to the condition and the competency of dural membranes.<sup>21</sup> A preoperative CT angiogram may be performed in certain cases to further evaluate any anatomic variations in the paraclival carotid arteries (the segment of the carotid artery between the foramen lacerum and the cavernous sinus) and to assess intracranial collateralization patterns. These images may be fused and uploaded into a frameless stereotaxy image-guidance unit, which is used on all endoscopic endonasal cases.

In addition to radiographic evaluation, preoperative direct bilateral sinonasal evaluation is imperative. This evaluation is usually performed in the office by the participating otolaryngologist. Anatomic variations, such as septal deviation, spur formation, or perforation, may directly impact the operative approach or reconstruction technique. In addition, screening for concurrent paranasal sinus disease is necessary to determine the need for preoperative antibiotic treatment. If preoperative voice or swallowing symptoms exist, a preoperative swallow evaluation or direct laryngoscopy may be performed to provide baseline function and to appropriately counsel the patients on potential risks of exacerbation after surgery.

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