ABSTRACT

OBJECTIVE: Recent technological advances and developments in surgical technique have made the craniocervical junction (CCJ) accessible through the transnasal surgical corridor. Endoscopic endonasal transclival and transodontoid approaches have been described in the literature; traditionally, both approaches entail a posterior bony and mucosal septectomy. Here, we present a new variation which preserves the mucosal integrity of the posterior nasal septum.

METHODS: Case report

RESULTS: A 61-year-old woman with a history of rheumatoid arthritis presented with acute onset of loss of consciousness and unresponsiveness. Four years earlier, she had undergone posterior spinal fusion for the treatment of a rheumatic pannus that was causing spinal cord compression at the CCI. Neuroimaging demonstrated non-union of the posterior hardware and a recurrent pannus compressing the brainstem and spinal cord at the CCI. An endoscopic endonasal transclival/transodontoid decompression of the CCI was performed with resection of the pannus. A mucosal-sparing bony septectomy was performed by raising bilateral nasoseptal flaps which were tucked beneath their respective posterior nasal septum at the mucosal interface (Figure 1A). The patient underwent successful resection of the rheumatoid pannus with excellent compromise of panoramic surgical exposure or instrumentation. The patient was extubated in the operating room and transferred to the neurosurgical ICU without complications. The patient’s symptoms had improved slightly but not significantly over the past few weeks. However, in the past year, her symptoms had worsened, with frequent episodes of dysphagia, obstruction, and disorientation. Magnetic resonance imaging revealed significant compression of the brainstem by the odontoid process and rheumatoid pannus (Figure 1B and 1C).

CONCLUSION: This mucosal-sparing variation on the traditional transclival and transodontoid approaches allows for the preservation of posterior mucosal nasoseptal integrity, and salvages a reconstructive option for future usage. This is accomplished at no expense to visualization or surgical access.

INTRODUCTION

Considered the “gold standard” for anterior access to the craniocervical junction (CCJ), the transoral approach has been widely used to gain exposure of diverse pathologies involving the rostral cervical spine and atlantoaxial regions. However, this approach often entails significant disruption of the tongue or palate, and is associated with a significant risk of life-threatening sequelae and prolonged dysphagia necessitating postoperative gastrostomy use. Many in many cases, the procedures are performed routinely. Additional disadvantages of the technique include field contamination, infection, and wound dehiscence. 

Extracranial anterolateral transclival approaches have also been used to access the CCJ without entry into the hypopharynx or oral cavity. Access to the retropharyngeal prevascular or retrovascular approach entails a skin incision, which allows wide surgical exposure while avoiding oropharyngeal contamination. Nevertheless, transclival dissection places multiple neurovascular structures contained in the carotid sheath at risk, as well as the recurrent laryngeal nerve, esophagus, and trachea.

With technological advances in endoscopic surgery, less invasive approaches to the CCJ have evolved. Previously described endoscopic endonasal transclival and transodontoid approaches have allowed surgeons to overcome many of the morbidities and complications associated with transoral or transcervical approaches. Traditionally, both endonasal approaches employ a posterior bony and mucosal septectomy. Here, we present a new variation which preserves the mucosal integrity of the posterior nasal septum.

ILLUSTRATIVE CASE

A 61-year-old woman with a history of rheumatoid arthritis presented with progressive bilateral upper extremity and left lower extremity weakness. Four years earlier, she had been diagnosed with a rheumatoid pannus at C2-3 with compression of the spinal cord; at the time, she underwent posterior fusion of C1-2 with improvement of symptoms. However, over the past year, her symptoms had gradually worsened. At the time of presentation to our institution, computed tomography (CT) and magnetic resonance imaging (MRI) revealed a recurrent C1-2 pannus with worsening basilar impingement causing brainstem and craniocervical spinal cord compression (Figure 1). The patient was taken to the operating room for resection and decompression of the pannus and impingement via an endoscopic endonasal transclival/transodontoid approach to the anterior craniocervical junction. A mucosal-septum sparing variant was selected in order to maximally preserve nasoseptal tissue for reconstruction without compromising panoramic surgical exposure or instrumentation. The patient underwent successful resection of the rheumatoid pannus with excellent brainstem decompression.

PROCEDURE

At our institution, endoscopic endonasal skull base surgery is carried out in a collaborative fashion by an otolaryngologist with fellowship training in rhinology/endoscopic skull base surgery and a neurosurgeon experienced in endoscopic skull base surgery. This dual-surgeon approach permits the use of bimanual dissection techniques, the use of up to 4 instruments simultaneously (after binostro access is established), and dynamic, anatomically-aware camera adjustments in real time. Preoperatively, computed tomography (CT) and magnetic resonance imaging (MRI) are used for intraoperative stereotactic navigation. Dedicated neurophysiological monitoring is carried out routinely.

The patient is positioned supine on the operating table, with the head in three-point fixation using a Mayfield head holder. The nasal cavity is prepped with an iodine-based solution. Topical cocaine is applied to the nasal cavities bilaterally. A 30-degree rigid endoscope is used to inspect the nasal cavities and nasopharynx.

The bilateral inferior and middle turbinates are lateralized with a blunt curette (e.g., Goldman bar). Full visualization and instrumentation in this region typically requires posterior septectomy. Usually, posterior septectomy entails the resection of varying quantities of bone and mucosa.

In our mucosal-sparing septectomy, we begin by elevating a right-sided pedicled nasoseptal flap (PNSF) based on the posterior septal branch of the sphenopalatine artery (Figure 2A, dashed outline). The anterior limit of the incision determines the length of the flap, which is set determined by the expected size and location of the surgical defect or the amount of space necessary for adequate triangulation of instruments. Blunt dissection in a submucoperichondrial and submucoperiosteal plane is carried out posteriorly toward the pedicle. The PNSF is then tunneled into the ipsilateral middle meatus for protection; at the same time, the pedicle is maintained in a safe location superior to the level of the choana (Figure 2B). The same procedure is repeated on the left side with care taken to harvest a different size PNSF to prevent making the incisions directly opposite the contralateral previously elevated PNSF. With both PNSFs elevated, the posterior bony septum can then be resected as needed for exposure and to facilitate instrumentation (Figure 2C).

If one or both PNSFs are needed for reconstruction, they are laid down onto the defect and supported accordingly with packing. In this illustrative case, no CSF leak was encountered, and the use of a PNSF was not necessary. The PNSFs were returned to their native positions and secured in place with absorbable suture in a quilting pattern (Figure 2D).

DISCUSSION

Several prior reports have established the endoscopic endonasal approach to the CJC as an effective and less morbid method than the traditional transoral approach. Usually, these techniques entail a posterior bony and mucosal septectomy. The septectomy, which is helpful for visualization and instrumentation, may theoretically result in increased crusting postoperatively. Moreover, if carried anteriorly enough, it may disrupt the length or integrity of the nasoseptal flap. Our mucosal-sparing posterior septectomy represents a variation on the traditional transclival and transodontoid approaches which preserves the mucosal integrity of the posterior septum and salvages a reconstructive option for future usage. This is accomplished at no expense to visualization or surgical access.