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Operative Techniques in

Neurosurgery

An Endoscopic Transnasal Odontoidectomy to Treat Cervicomedullary Compression with Basilar Invagination

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The transoral approach to the upper cervical spine and clivus with resection of the odontoid is associated with significant morbidity and limitations. The endoscopic transnasal approach represents a viable alternative to the transoral approach to the craniocervical junction. The endoscopic approach possesses some inherent advantages, including decreased exposure to oral flora and a more rostral-to-caudal trajectory, which is ideal for pathology located superiorly in this region. It also provides excellent visualization while avoiding the use of prolonged retraction and the need for extensive exposure. We detail the operative technique used for an endoscopic transnasal resection of the odontoid process in a 68-year-old woman with pannus compressing her brain stem. A successful resection was achieved without significant morbidity. Clinical evidence will be needed to establish the role of this approach in terms of morbidity, patient satisfaction, and clinical outcomes.

KEYWORDS endoscopy, transnasal approach, craniocervical junction, odontoid process

A transoral-transpharyngeal approach to the cervicomedullary junction is the traditional approach for extradural lesions causing irreducible anterior compression of the cervicomedullary region.[1,2] The transoral approach has been used to treat developmental abnormalities;[2] extradural and, less often, intradural tumors;[1,2] inflammatory disease (most often rheumatoid arthritis with or without irreducible cranial settling);[1,2] basilar invagination;[1,3,4] odontoid hypoplasia;[5] and migration of odontoid fracture fragments.[1]

Over the years, however, approach-related difficulties have been reported. The transoral approach requires opening and transgressing the oropharynx. The tongue and soft palate must be retracted to provide the corridor for resection. The corridor of access becomes of greater concern when pathology extends rostrally. In such cases, the soft palate may need to be split to provide adequate visualization and to facilitate resection. Visualization may be further limited in the presence of decreased flexibility of the neck, trismus, a small oral commissure, prominent dentition, excessive oropharyngeal soft tissues, and a redundant soft palate. All of these factors affect the extent of surgical exposure required.[6]

We describe an endoscopic transnasal approach to the cervicomedullary junction as an alternative to a transoral approach to this region. Theoretically, the risks and difficulties posed by the transoral approach may be alleviated by such an approach. The technique was used to treat a patient with cervicomedullary compression and basilar invagination caused by pannus. The case illustrates the full endoscopic approach used to resect the odontoid process at our institution over the last 2 years.

Case

A 68-year-old female had a 10-month history of progressive upper cervical pain, bilateral hand numbness progressing to involve the feet bilaterally; bilateral hand weakness; and difficulty with balance, ataxia, and clumsiness of the right hand. She complained of recent, progressive dysphagia. In both of her hands, sensation was decreased to light touch. The upper extremities were hyperreflexic (3+) and the ankles were hyporeflexic (1+). These findings were consistent with progressive myelopathy from cervicomedullary compression associated with basilar invagination from a soft tissue mass consistent with pannus as seen on preoperative imaging (Fig. 1).

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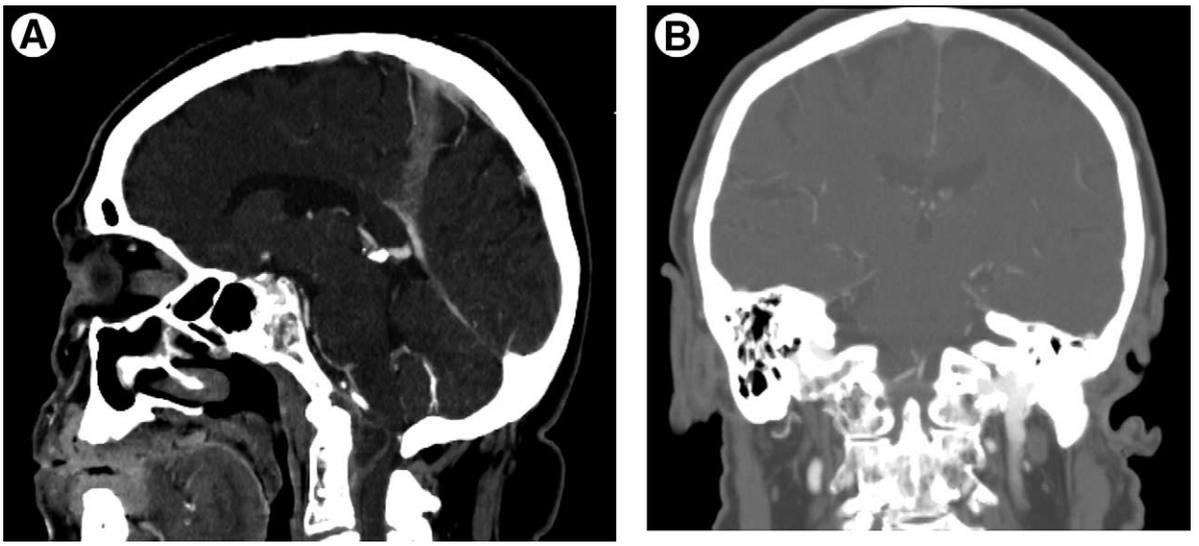

Figure 1 (A) Preoperative sagittal CT shows the basilar invagination and compression associated with the dens and pannus ventral to the cervicomedullary junction. (B) Coronal CT shows the position of the dens.

She underwent an endoscopic transnasal approach with resection of the odontoid process and pannus followed by a posterior occiput-to-C5 fusion. After surgery, she was transferred to the intensive care unit (ICU) in a cervical collar and was extubated the next day. Postoperative imaging confirmed total odontoid resection (Fig. 2). During her stay in the ICU, she had minimal difficulty with gait and balance and was walking without assistance. She was discharged to home on postoperative Day 7. Immediately after surgery, she was able to tolerate her preoperative modified diet and needed no tracheostomy. At her 3-month follow-up examination, her imbalance and ataxia had resolved. In her hands, sensation to light touch had improved as had minimal residual numbness. Her reflexes were 2+ throughout and symmetric. Light touch sensation in her feet was fully intact.

Operative Technique

Instruments

This technique utilizes a 0-degree endoscope fitted with an irrigating sheath for the entire procedure. Standard endoscopic sinus instruments are used for the odontoid resection. Modifications to the instrumentation are delineated as follows.

A TPS Stryker drill (Stryker Navigation, Stryker-Leibinger Corp., Kalamazoo, MI) has been created specifically for endoscopic endonasal surgery with a long-angled design, which permits complete access across the nasal passages. An extendable drill bit can extend beyond the shaft, optimizing visualization for very precise drilling.[7] An even longer drill bit is used to drill the odontoid process, which can be as far as 13

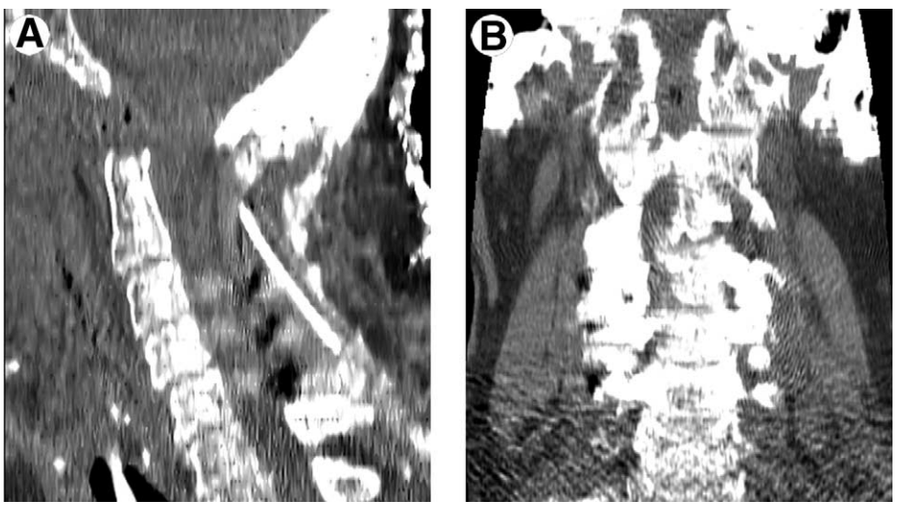

Figure 2 (A) Postoperative reformatted sagittal CT shows removal of the odontoid process and lower clivus. (B) Postoperative reformatted coronal CT confirms complete resection of the odontoid process inferior to the base of C2 and laterally to the lateral masses.