Transoral approach for Basilar Invagination

Symptomatic irreducible basilar invagination has traditionally been approached through a transoral-transpharyngeal route with resection of the anterior portion of C1 and the odontoid. Modification of this exposure with either a Le Fort osteotomy or a transmandibular osteotomy and circumglossal approach has increased the access to pathological conditions in this region. These traditional routes all require traversing the oral cavity and accepting the associated potential complications.

This approach has been described and refined, but significant limitations and technical challenges remain. Specifically, should the transoral route be used for intradural pathology, such as a meningioma, or should an inadvertent durotomy occur during extradural dissection, achieving a watertight closure of the dura in such a deep and narrow working channel is limited with the current microscopic and endoscopic techniques. Even closure of the posterior pharyngeal mucosa can be challenging, and problems with wound dehiscence encountered in some case series may be attributable to this difficulty. These problems, and the corollary aversion to the procedure felt by many neurosurgeons, led our group to investigate an alternative approach.

The transoral approach provides the most direct surgical corridor for treatment of congenital bony abnormalities that exert irreducible ventral compression of the cervicomedullary junction.

Perrini et al., based on the experience with the transoral approach over the past three decades, briefly describe the surgical strategies and the operative nuances that allow effective decompression of the craniovertebral junction (CVJ) while minimizing postoperative morbidity.

The surgical strategy is dictated by the type and severity of the malformation. Fibre-optic nasotracheal intubation obviates the necessity of preoperative tracheostomy, and avoidance of a soft-palate incision significantly reduces oropharyngeal morbidity. When feasible, the atlas-sparing technique minimizes postoperative instability. The transoral transatlas approach is generally required in patients with severe basilar invagination and allows wider exposure of the anterior CVJ at the price of a higher incidence of postoperative instability.

The transoral approach is extremely effective in providing excellent decompression of the anterior cervicomedullary junction in patients with fixed malformations. Tailoring the approach to the peculiar anatomy of each malformation reduces iatrogenic instability and minimizes postoperative complications [1].

The Transoral atlantoaxial reduction plate (TARP) operation is effective and safe for treating patients with basilar invagination (BI) with Klippel-Feil syndrome (KFS). The midterm clinical results were satisfactory [2].

Endoscopic Endonasal Odontoidectomy

see Endoscopic Endonasal Odontoidectomy.

Case series

From September 2004 to April 2007, three consecutive patients with basilar invagination and instability in the craniovertebral junction were enrolled. The causes for the invagination and instability included rheumatoid arthritis in two patients and trauma in one patient, and all patients presented with myelopathy and quadriparesis before intervention.

All three patients underwent an endoscopic transnasal transclival approach for anterior decompression and resection of the displaced odontoid process and pannus to decompress the underlying medulla. Subsequently, they received occipitocervical fixation by lateral mass screws and bone fusion to ensure stability. Remarkable neurological recovery was observed after surgery in all patients, and no adverse effects were noted.

Compared with the standard transoral approach, the transnasal transclival endoscopic approach for decompressing basilar invagination is a feasible and effective alternative that avoids common disadvantages like prolonged intubation, excessive tongue retraction, and the need for palatal incision [3].

Hwang et al., reported two patients who underwent transoral odontoidectomy with preservation of the anterior arch of the atlas and suboccipital craniectomy with C1 laminectomy followed by C1-C2 arthrodesis. Preservation of the anterior arch of the atlas in conjunction with C1-C2 arthrodesis stabilizes the occipito-atlanto-axial segments while conserving more cervical mobility as compared to an occipitocervical fusion [4].

McGirt et al., performed endoscopic transcervical odontoidectomy (ETO) in a consecutive series of pediatric patients presenting with myelopathy or bulbar dysfunction resulting from basilar invagination or cranial settling. All clinical, radiographic, surgical, and follow-up data were prospectively collected. The initial experience with ETO in the pediatric population is analyzed and outcomes are reported. Three patients required ETO for basilar invagination and 1 required ETO with anterior C-1 arch and distal clivus resection for cranial settling. All patients presented with myelopathy. One patient was wheelchair bound with severe quadriparesis. The mean age was 14 +/- 3 years (mean +/- standard deviation [SD]) in the 2 male and 2 female patients. The ETO and posterior fusion were performed as a 2-stage procedure in 2 (50%) and as a single-stage procedure in 2 (50%) cases. Prolonged intubation or postoperative placement of a gastrostomy tube was not needed in any case. The postoperative hospitalization lasted 9 +/- 4 days (mean +/- SD). At last follow-up (mean 5 months), head and neck pain had resolved and motor strength had improved or stabilized in all cases. All 4 children were independently functioning and ambulatory at the last follow-up. In the authors' initial experience, ETO has allowed ventral brainstem decompression without the need for prolonged intubation, worsening dysphagia requiring enteral tube feeding, or prolonged hospitalization, and has resulted in cosmetically appealing results. The ETO technique allows an alternative approach for the treatment of ventral pathological entities at the craniocervical junction in

pediatric patients [5].

Wolinsky et al., developed a novel surgical approach, an endoscopic transcervical odontoidectomy, which allows access for resection of the odontoid and for brainstem and spinal cord decompression without traversing the oral cavity. They described the technique and its advantages and presented three cases in which patients underwent the endoscopic transcervical odontoidectomy for basilar invagination. Three consecutive patients (age range 42-74 years) who had irreducible basilar invagination underwent the endoscopic transcervical odontoidectomy. All were symptomatic and had neck pain and myelopathy. All were evaluated preoperatively and postoperatively with computed tomography and magnetic resonance imaging. In all cases the procedure resulted in complete decompression. There were no serious complications. No patient required prolonged intubation, tracheostomy, or enteral tube feeding. One patient had an intraoperative cerebrospinal fluid leak, which had no postoperative sequelae. The authors present an alternative surgical approach for treating ventral compression of the brainstem and spinal cord. The technique is safe and effective for decompression and provides a surgical route that can be added to the armamentarium of treatments for pathological conditions in this region [6].

Nine patients underwent transoral odontoidectomy, posterior foramen magnum decompression, occipitocervical fixation, and bone grafting. All but two patients had ventral and dorsal operations in one surgical sitting. One of these two individuals had previously undergone posterior decompressive surgery at another hospital, but his condition had deteriorated rapidly afterward. The mean follow-up time was 19 months (range, 14-30 months). There was no mortality and no significant morbidity in this series. All but one of the patients showed significant improvement in their symptoms. Chiari malformations have a surprisingly high association with basilar invagination, and patients may have symptoms in both conditions. If there is a marked anterior compression, anterior transoral and posterior decompression, fusion, and instrumentation is an optimal strategy for treating patients with basilar invagination associated with type I Chiari malformation [7].

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