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Clinical Study

Modified trans-oral approach with an inferiorly based flap

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ABSTRACT

The trans-oral approach allows direct access to pathologies of the anterior craniocervical junction. However, the classic midline incision of the posterior pharyngeal wall can be surgically burdensome and limits its lateral exposure. We reviewed the medical records of nine patients undergoing the trans-oral approach. The sites of the pathology ranged from the clivus to C2, and surgical exposure ranged from the clivus to C3. Each operation utilized an inferiorly based flap. None of the patients experienced vascular or neurologic complications, and no patient had a cerebrospinal fluid fistula, pseudomeningocele, or meningitis postoperatively. The trans-oral approach with an inferiorly based flap can therefore be safely and effectively performed with minimal oropharyngeal and neurologic morbidity. Not only does a U-shaped flap allow adequate exposure from the lower half of the clivus to C3, a flap improves lateral exposure, provides a clear operating field, and allows superficial mucosal closure not directly overlying the operative field.

1. Introduction

Pathologies of the anterior craniocervical junction are rare and present a significant challenge to the neurosurgeon. In such cases, a trans-oral approach allows for direct access to the lesion while avoiding major vascular and neurological structures.[1] This approach is most commonly used for bony tumors (clivus chordoma), atlanto-axial pathology (subluxation and odontoid fracture), and vascular pathology (basilar artery aneurysm) and basilar invagination.[1–4]

The trans-oral approach was first described in 1909 by Kanavel when he used it to access a bullet at the craniocervical junction.[1] Many have suggested modifications, with the current technique being attributed to Crockard and colleagues[1,2] and Menezes and VanGilder.[4] Classically, the trans-oral approach begins with a midline incision in the posterior pharyngeal wall. However, such an approach can be surgically burdensome. At our Institution, we have used an inferiorly based flap technique in a subset of patients requiring trans-oral surgery.

We present a series of patients who underwent trans-oral surgery utilizing an inferiorly based flap technique, and show that using the flap allows for a safe and effective procedure with minimal oropharyngeal and neurosurgical morbidity.

2. Materials and methods

The study population consisted of nine consecutive patients who underwent a trans-oral procedure using an inferiorly based flap between 1995 and 2007 at the University of Michigan (Table 1). Patients were evaluated and treated by a multidisciplinary team of surgeons. Patient demographics, clinical presentation, radiological records, operative notes, and clinical outcomes were obtained from medical records. Demographic data collected included sex, lesion pathology, and location of lesion. Operative variables including operation type, approach, incision length, durotomy, and complications were noted. Outcome variables included bleeding, dehiscence, infection, neurological deficit, and need for tracheostomy or gastrostomy. Simple descriptive statistics were used in our analysis.

This study was approved according to the guidelines set forth by the Institutional Review Board of the University of Michigan.

2.1. Operative technique

Patients were given preoperative steroids 1 hour prior to incision. With the patient under general endotracheal anesthesia in the supine position, the Dingman mouth gag was inserted to not only open the mouth but also to apply the lateral cheek retractors to provide optimal exposure to the operative site. An incision was then made starting at the juncture of the hard and soft palate in the midline of the soft palate and, as the incision extended towards the uvula, it was then angled off to the paramedian position so as not to transect the uvula. This staggered type of incision also reduced

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Table 1
Preoperative and postoperative data for patients undergoing a trans-oral procedure using an inferiorly based flap

Patient no.	Diagnosis	Location	Surgical extension	Palatal incision	Velo-pharyngeal insufficiency	Tongue edema	Wound dehiscence
1	C1–C2 subluxation	C1–C2	Clivus–C2	None	Moderate		
2	Metastatic Hurthle cell carcinoma of thyroid	Left occipital condyle	Clivus–C2	Soft			
3	Chordoma	Clivus	Clivus–C3	Soft			
4	Giant cell tumor	C2	C2–C3	Soft	Mild		Yes
5	Chordoma	Clivus	Clivus–C1	Hard & soft	Mild		
6	Chordoma	Clivus–C2	Clivus–C3	Soft		Yes	
7	Meningocele	Clivus	Clivus–C1	Soft			Yes
8	Giant cell tumor	C2	C2–C3	None			
9	C1–C2 subluxation	C1–C2	Clivus–C3	Soft	Mild	Yes	

the amount of vertical scar contracture, which can lead to velopharyngeal insufficiency (VPI). If further exposure was necessary, the mucosa of the hard palate could be dissected free from the posterior edge and the Kerrison rongeur used to remove a portion of the posterior edge of the hard palate.

Attention was then turned to the posterior pharyngeal wall where the clivus was palpated as well as the tubercle of the anterior arch of C1. Immediately above the tubercle, a transverse incision was made in the soft tissues, allowing enough of a soft tissue cuff on the superior margin to provide adequate tissue for closure. Incisions were then carried out laterally from this transverse incision, inferiorly along the lateral-most part of the posterior pharyngeal wall, to the level of the base of the tongue (Fig. 1). The incisions were continued through the mucosa, submucosa, and muscle. Dissection in the areolar plane between the muscle and the prevertebral fascia was then accomplished, either with curved scissors or with a Freer elevator. Once the flap was reflected inferiorly, a vertical midline incision was made in the prevertebral fascia and self-retaining retractors were then used to retract that tissue laterally (Figs. 2 and 3). Following resection, the vertical midline incision was closed with resorbable sutures in a simple, interrupted fashion. The pharyngeal flap was then replaced and the incisions were closed with interrupted horizontal mattress, resorbable sutures so that the edges of the incision were slightly everted. The soft palate was then closed in 3 layers: nasal; muscular; and oral mucosal. Careful attention was paid to closure at the junction of the hard and soft palate, given the common occurrence of dehiscence at that interface.

3. Results

The records of nine patients were studied (Table 1). Three patients had presented with chordoma, two with giant cell tumor,

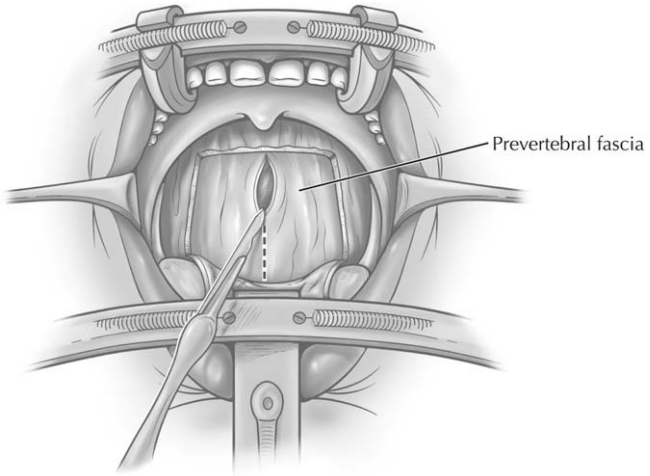

Fig. 2. Illustration showing midline incision of the prevertebral fascia in a modified trans-oral approach with an inferiorly based flap.

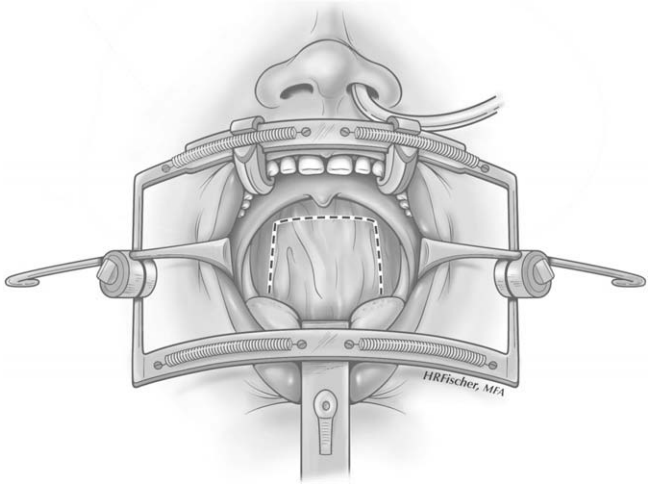

Fig. 1. Illustration showing the incisions (dotted line) for an inferiorly based flap in a modified trans-oral approach.

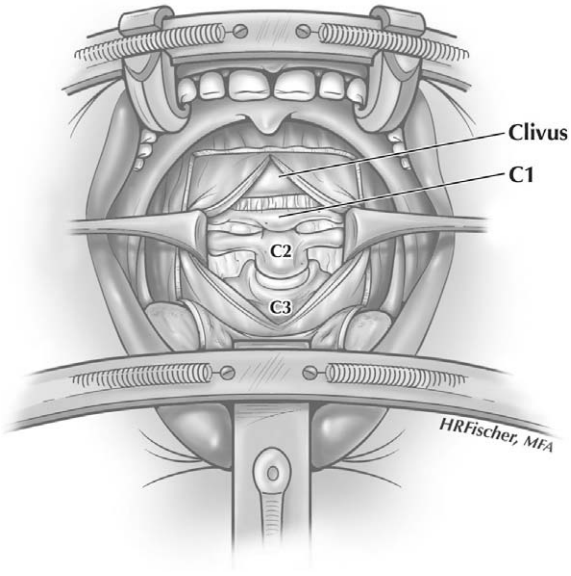

Fig. 3. Illustration showing exposure obtained after lateral retraction of the prevertebral fascia in a modified trans-oral approach with an inferiorly based flap.