Transcervical Double Mandibular Osteotomy Approach to the Infratemporal Fossa

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Key words
- Carotid canal
- Infratemporal fossa
- Jugular foramen
- Mandibulotomy
- Mental nerve
- Skull base

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BACKGROUND: **In this study, we propose an alternative to the traditional transmandibular lower lip and chin splitting approach for exposing high infratemporal fossa and parapharyngeal space lesions involving the carotid canal and jugular foramen.**

METHODS: **We present 2 cases of high skull base tumors removed transcervically with anterior and posterior segmental mandibulotomies preserving the mental nerve without the use of a lip or chin incision.**

RESULTS: **Making the posterior osteotomy in an inverted L configuration is necessary so that the coronoid process does not prevent rotation of the mandible out of the visual field. Both patients had complete tumor resection with access to the carotid canal and jugular foramen and functional preservation of the mental nerve and marginal branch of the facial nerve. Neither patient had malocclusion or other dental complications from the approach.**

CONCLUSIONS: **This novel technique is useful for providing excellent access to high infratemporal fossa or parapharyngeal space tumors. It avoids the traditional chin or lip incision and preserves the mental and facial nerves and is a useful procedure in the armamentarium of skull base/cerebrovascular neurosurgeons.**

INTRODUCTION

Obtaining optimal exposure for high infratemporal fossa tumors involving the carotid canal and/or jugular foramen can be technically challenging. The traditional approaches, such as the transmandibular approach, the transzygomatic approach, and the posterolateral infratemporal approach, have morbidities that are not insignificant. One of the chief limitations of the transmandibular approach is that it requires an incision through the lower lip and chin to allow the mandible to be swung laterally for exposure. This may be an unappealing consideration in some patients, particularly those who are young and have few skin creases in which to disguise the incision or in female patients who do not have the option of growing facial hair over a lower lip and chin scar. The traditional lateral mandibulotomy approach to avoid a lip-splitting incision has not been widely adopted because of the need to sacrifice the mental nerve and the necessity of mobilizing the facial nerve. We propose an alternative technique that is performed transcervically without a lip-splitting incision and involves a unique double mandibulotomy that preserves the mental nerve and at the same time allows full rotation of the lateral mandible, providing wide exposure to the infratemporal fossa.

METHODS

Surgical Technique

A transverse cervical incision is made 2 to 4 cm below the mandible in a skin crease, and subplatysmal flaps are elevated superiorly and inferiorly (**Figures 1-3**). The sternocleidomastoid muscle is reflected posteriorly with identification and preservation of the spinal accessory nerve. The contents of the carotid sheath are then identified and mobilized. The submandibular gland is excised after identifying and mobilizing the marginal mandibular branch of the facial nerve. The lingual and hypoglossal nerves are identified and preserved. The posterior belly of the digastric muscle and stylohyoid muscle are divided to expose the high parapharyngeal space.

The dissection is carried to the inferior border of the mandible. The periosteum is incised, and in the subperiosteal plane, the lateral mandibular surface is exposed from the sigmoid notch and posterior border to anterior to the mental foramen. The mental nerve is protected and maintained. In the area of the dentition, this dissection does not go beyond the attached gingiva. Attention is turned transorally. The papillae and gingiva are reflected off the teeth adjacent to the anticipated anterior osteotomy, both medially and laterally. This creates a pocket that allows for later rotation of the middle mandibular segment with preservation of the intraoral tissue.

A reconstruction plate is adapted that extends 3 screw holes beyond the anticipated osteotomies. The plate is secured in all of the anticipated segments and is then removed for later use. The posterior osteotomy is an inverted L (**Figures 2** and **3**). The horizontal portion extends from just above and behind the antilingula and traverses to the anterior border of the ramus. The verti-

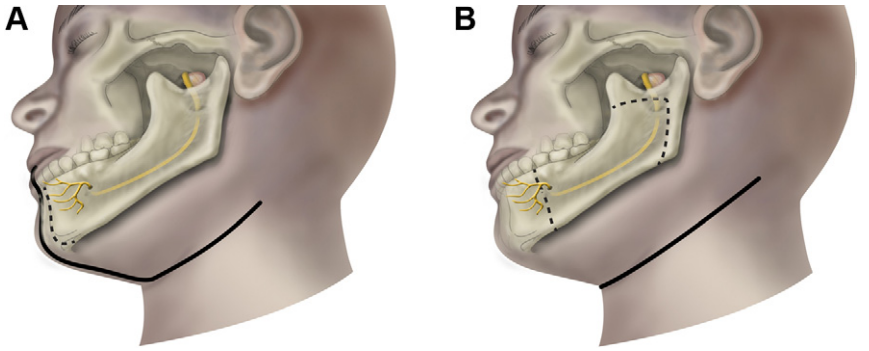

Figure 1. (**A**) The traditional lip and chin incision with anterior mandibulotomy that allows the mandible to be swung laterally to expose the infratemporal fossa. (**B**) The transcervical incision and sites of double mandibulotomy osteotomies. The mental nerve is not transected, and it remains within the mobilized portion of the mandible.

cal portion parallels the posterior border of the mandible and traverses posterior to the antilingula to intersect the horizontal osteotomy. The anterior osteotomy is begun anterior to the mental foramen in the previously described pocket at the alveolar crest and extends inferiorly to the mandibular border.

At the completion of the osteotomies, the middle mandibular segment is retracted superiorly (**Figure 4**). This will expose the infratemporal fossa, including the carotid canal and jugular foramen. Intraoperative monitoring of cranial nerves VII, X, and XII is recommended. After tumor removal, the reconstruction plate is reapplied and the two dental papillae are reapproximated with interrupted 3-0 chronic suture. A suction drain is placed into the resulting dead space, the platysma is closed with a 3-0 absorbable suture, and the skin is closed with 5-0 suture.

RESULTS

Illustrative Cases

Case 1. A 56-year-old female patient presented with obstructive sleep apnea and narcolepsy. She reported a history of a long-standing slow-growing right neck mass for which surgery had been recommended 12 years prior but she had declined. Physical examination revealed narrowing and deviation of the oropharynx by a submucosal mass, and a firm right upper neck mass extending superiorly under the mandible that was only mobile in the anterior–posterior axis (**Figure 4**). All cranial nerves were intact. The remainder of the examination was unremarkable. Computed tomographic and magnetic resonance imaging revealed a hypervascular mass in the right carotid space, encasing the proximal portion of the cervical internal carotid artery and extending to the carotid canal. The lesion deviated the pharynx, resulting in significant narrowing of the upper airway. The 24-hour urine catecholamines were within normal limits. As part of her work, the patient spoke in public, so she was reluctant to undergo a surgical approach through a lip and chin incision. She was taken to the operating room for a transcervical double mandibulotomy approach. Intraoperative monitoring of the lower cranial nerves was utilized. The internal carotid artery was dissected free from the tumor, and the external carotid artery was ligated. The vagus and hypoglossal nerves were encased in tumor but were dissected free. The tumor was completely excised (**Figures 5** and **6**). The pathology was consistent with a paraganglioma. On postoperative day 2, there was a cervical hematoma and the patient was taken back to the operating room for hematoma evacuation and tracheotomy. Before discharge, her tracheostomy was removed. The patient was tolerating a thickened diet, but re-

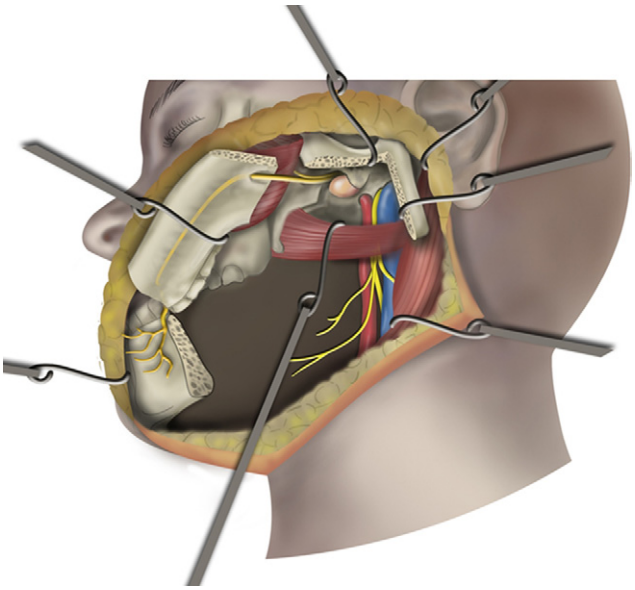

Figure 2. The mental nerve remains within the mobilized portion of the mandible. This is reflected superiorly, providing wide exposure to the infratemporal region of the carotid canal and jugular foramen.

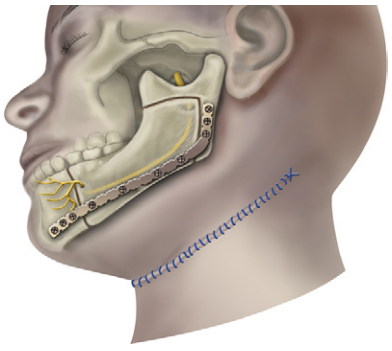

Figure 3. The mandibular reconstruction/plating.