Selected techniques

Enhanced Surgical Exposure for the High Extracranial Internal Carotid Artery

Steven Richard Nelson, DDS, Sterling Robert Schow, DMD, Stephen Milton Stein, DDS, Lance Alexander Read, DDS, Clement McCarty Talkington, MD, Dallas, Texas

The need for enhanced surgical exposure for the high extracranial (Zone III) internal carotid artery is not uncommon. In certain circumstances, the posterior border and angle of the mandible may interfere with access to the distal internal carotid artery (ICA). The use of modified mandibular osteotomies has provided vascular surgeons in our institution with improved exposure of the ICA in selected cases. The intraoral sagittal split and extraoral vertical ramus osteotomies of the mandible allow manipulation of the posterior border and angle of the mandible with low morbidity and minimal postoperative complications. These procedures can be performed for both dentate and edentulous patients without the need for intermaxillary fixation. This paper introduces these modifications and discusses the benefits over previously described methods of mandibular manipulation. (Ann Vasc Surg 1992;6:000–000).

KEY WORDS: Carotid endarterectomy; mandibular osteotomy; internal carotid artery.

Surgical access for most lesions encountered during carotid endarterectomy can be obtained through a standard approach with hyperextension and contralateral rotational positioning of the patient's head. However, in cases of high bifurcation, distal extension of carotid plaques, or in blunt or penetrating trauma, additional exposure of the carotid artery may be necessary to obtain distal control. Numerous and innovative techniques to enhance exposure have been described in the vascular, neurosurgical, and otolaryngological literature, each with their own potential morbidity and shortcomings. These include division of the stylohyoid and digastric muscles, mandibular subluxation, mastoidectomy, removal of the styloid process, mandibular osteotomies, and resection of the temporomandibular joint articulation [1–15].

In this paper, we present modifications of two mandibular osteotomies that are commonly performed by oral and maxillofacial surgeons to correct maxillofacial deformities [16]. These modified procedures can be utilized by the vascular surgeon to obtain direct exposure for distal control of the internal carotid artery in difficult access cases.

TECHNIQUES

Prior to performing either of the following techniques, a preoperative panoramic radiograph is ob-
tained, if possible. This assists in locating the position of the mandibular foramen and allows the surgeons to identify bony pathology of the mandible which could be addressed, if indicated, prior to the procedure.

Intraoral sagittal split osteotomy

This technique is performed intraorally, avoiding an extension or modification of the external incision used for exposure of the carotid artery as well as contamination of the surgical site. The oral and maxillofacial surgery team performs this osteotomy prior to beginning the carotid approach. A transoral incision is made to allow access to the mandibular ramus and body. The ramus of the mandible is then divided by creating a horizontal osteotomy on the medial aspect of the ramus above the mandibular foramen and a vertical osteotomy on the lateral aspect of the mandible in the molar tooth region. These osteotomies are connected by an anterior ramus osteotomy (Figs. 1a,b).

At this point, a four hole bone plate is contoured to fit passively near the inferior border of the mandible with two holes on either side of the vertical bone cut (Fig. 1b). A percutaneous trocar is introduced into the surgical site through a 5 mm stab incision in the cheek adjacent to the lateral osteotomy site on the mandible. Monocortical bone screws are placed through the trocar cannula to secure the bone plate. The screws and bone plate are removed and saved and the mandible is then carefully separated into proximal and distal segments (Fig. 1c). This allows the mandibular ramus to be rotated superiorly and anteriorly, improving surgical access to the carotid artery (Fig. 2).

At this point, the oral cavity can be isolated from the carotid surgical site with a steridrape and the vascular surgery team can proceed. It is important to note that communication with the internal carotid artery (ICA) surgical site is avoided. This is because