Risk of Maxillary Artery Injury During an Intraoral Vertical Ramus Osteotomy in Japanese Patients is High—Is It Enough Just to Avoid Damaging the Inferior Alveolar Nerve?

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Purpose: Since managing a case in which the maxillary artery was injured during intraoral vertical ramus osteotomy (IVRO) with intraoperative transcatheter arterial embolization, we have conducted preoperative vascular computed tomography (CT) evaluations of the maxillary artery course in patients scheduled to undergo mandibular bone osteotomy. The aim of the present study was to describe the anatomy of the maxillary artery in the infratemporal artery in Japanese patients.

Materials and Methods: The study design was a prospective case series. The study sample included all patients who had undergone IVRO from October 2009 to December 2012. We evaluated the positional relationship between the maxillary artery and the mandible using CT vascular imaging before surgery. The primary outcome variable was the requirement for subperiosteal dissection on the medial surface of the mandible from the perspective of the intersection of the route of the maxillary artery with the IVRO osteotomy line.

Results: A total of 156 sides from 78 patients who had undergone mandibular bone osteotomy were included in the present study. The maxillary artery course was positioned directly below the mandibular notch in approximately one half of the cases, necessitating subperiosteal dissection on the medial surface of the mandible.

Conclusions: IVRO is a common surgical procedure that can be safely and easily conducted in conjunction with endoscopy. However, improved maxillary artery damage prevention methods are recommended, such as subperiosteal dissection on the medial surface of the mandible and filling the medial surface of the mandibular ramus with gauze.

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Intraoral vertical ramus osteotomy (IVRO) is a more straightforward surgical procedure than sagittal split ramus osteotomy (SSRO). It has less risk of injuring the inferior alveolar nerve and allows orthodontists to control occlusion after surgery. Consequently, the IVRO has been more commonly used as a surgical procedure for mandibular setback surgeries in many centers.

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FIGURE 1. Three-month postoperative facial photographs (*A*, frontal and *B*, lateral) and cephalograms (*C* and *D*). TAE, transcatheter arterial embolization. **(Fig 1 continued on next page.)**

Hara et al. Maxillary Artery Course in Japanese Patients During IVRO. J Oral Maxillofac Surg 2014.

Intraoperative hemorrhage has been reported with the IVRO and has usually resulted transection of the inferior alveolar, masseteric, or maxillary artery. The inferior alveolar artery can also be injured during vertical subcondylar osteotomy and has usually been caused by bringing the vertical cut of the ramus too far anteriorly to the posterior border of the mandible. The masseteric artery can be injured by carrying a saw cut too far into the sigmoid notch. In a study of intraoral vertical subcondylar osteotomies, a low incidence of damage to the maxillary artery was found.[1] Quinn and Wedell[2] reported 1 case in which ligation of the external carotid artery was ultimately required for control of bleeding. Ueki et al[3] observed that bleeding with IVRO was usually minimal; however, when it occurred, significant bleeding developed more often than with SSRO.

Since handling a case in which the maxillary artery was injured during IVRO with intraoperative transcatheter arterial embolization (TAE), we have conducted preoperative evaluations of the maxillary artery course in mandibular bone osteotomy cases using computed tomography (CT) vascular imaging. In the present study, we report our observations.

Case Report

A Le Fort I osteotomy (3 mm advancement) and bilateral IVROs (8 mm setback) were planned to manage a skeletal class III facial type, maxillary retrusion/mandibular prognathism, and jaw deformity in a 26-year-old man.

The maxillary bone osteotomy (Le Fort I) was completed using the standard method; however, the maxillary artery, which was believed to have been located directly under the inner mandibular notch, was injured during the left mandibular bone osteotomy (IVRO), causing significant arterial hemorrhaging.

TAE was conducted after review of the contrast-enhanced radiograph of the blood vessels by a radiologist. Local hemostasis was achieved by inserting Bosmin gauze and applying pressure with bare hands while continuing to hold the Bauer hook, embolizing the maxillary artery stem, and confirming hemostasis. The total blood loss from the intraoperative hemorrhage was 1,750 mL. IVRO of the left side was completed after conducting IVRO on the right side, and the planned surgery was completed.