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Endoscopically-assisted intraoral vertical ramus osteotomy to prevent injury of the maxillary artery and mandibular neurovascular bundle

KEYWORDS

Complication;
Endoscope;
Intraoral vertical ramus osteotomy;
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Maxillary artery;
Orthognathic surgery

Bilateral sagittal split osteotomy or intraoral vertical ramus osteotomy (IVRO) is performed for patients with dentofacial deformities, especially mandibular prognathism. However, IVRO has risks of injury of the maxillary artery or mandibular neurovascular bundle. Because the use of an endoscope can provide good visualization and make IVRO easier and safer,^{1,2} we reported endoscopically-assisted intraoral vertical ramus osteotomy to prevent injury of the maxillary artery and mandibular neurovascular bundle.

An intraoral incision was made, and both the lateral and medial periosteum of the mandibular ramus were elevated. We used a 30°, 4-mm diameter, 18 cm-length endoscope with tissue retractor (Karl Storz, Tuttlingen, Germany) for magnification of surgical field (Fig. 1A). Under the endoscopic view, the vertical ramus osteotomy with the oscillating saw was started inferior to the sigmoid notch and posterior to the lingula (Fig. 1B). After medial soft tissues including the maxillary artery and mandibular neurovascular bundle were protected with tissue retractor of the endoscope, the oscillating saw penetrated deep into the

mandibular ramus behind and below the lingula under the medial endoscopic view (Fig. 1C). Then, vertical ramus osteotomy with the oscillating saw was carried out posterior to the antilingula and from the sigmoid notch to the inferior border of the mandibular ramus under the lateral endoscopic view, and the proximal and distal segments were separated completely (Fig. 1D–F).

The antilingula, which is a bony prominence on the lateral mandibular ramus, is a landmark for predicting the location of the mandibular neurovascular bundle during IVRO. However, Kapur et al.³ suggested that vertical ramus osteotomy should be performed 8 mm posterior to the antilingula for geographical variation in the position of the antilingula. The position of the antilingula must be identified by preoperative computed tomography (CT) for each patient.

Because the maxillary artery commonly runs on the outer side of the lateral pterygoid muscle, especially in Japanese and Turk,⁴ IVRO has the potential risk of injury of the maxillary artery. Hara et al.¹ reported an intraoperative

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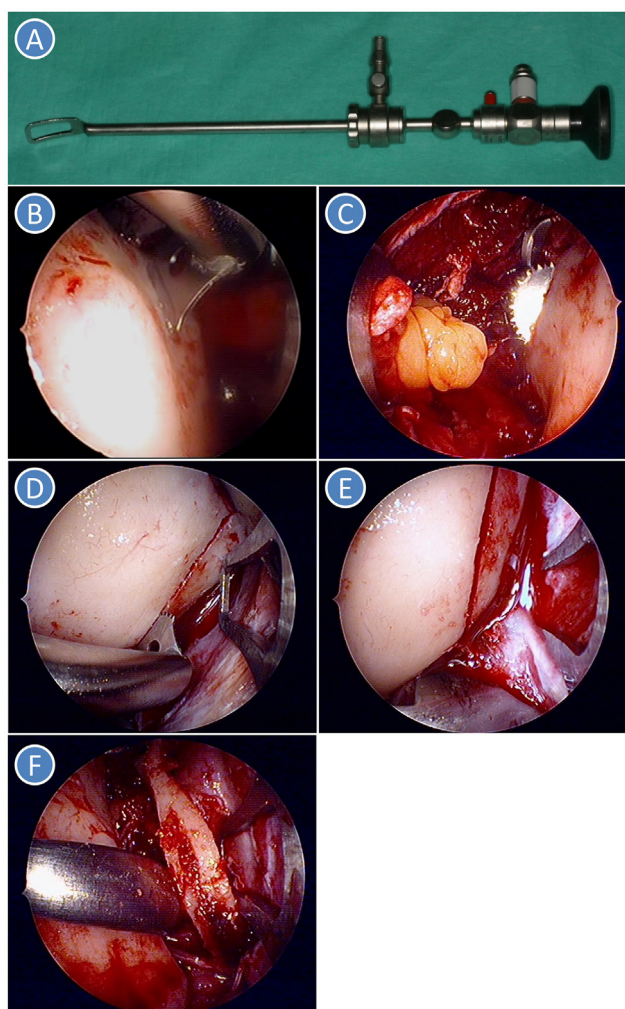


Figure 1 The endoscope with tissue retractor and endoscopic views of the operation field during endoscopically-assisted intraoral vertical ramus osteotomy. (A) A 30°, 4-mm diameter, 18 cm-length endoscope with tissue retractor. (B) Vertical ramus osteotomy with the oscillating saw inferior to the sigmoid notch. (C) Endoscopic view of the medial side of the mandibular ramus. The blade of the oscillating saw was exposed posterior to the lingula after medial soft tissues including the maxillary artery and mandibular neurovascular bundle were protected with the tissue retractor of the endoscope. (D) Vertical ramus osteotomy with the oscillating saw posterior to the antilingula. (E) Vertical ramus osteotomy from the sigmoid notch to the inferior border of the mandibular ramus. (F) Complete separation of the proximal and distal segments.

transcatheter arterial embolization for hemorrhage from the maxillary artery which was injured during IVRO, and suggested preoperative CT vascular imaging as well as

subperiosteal dissection on the medial surface of the mandibular ramus and packing with gauze during IVRO for prevention of injury of the maxillary artery. However, administration of iodinated contrast medium has the potential risk of anaphylactic shock and is not performed for patients with asthma or renal dysfunction. Furthermore, the saw blade may tangle in the packing gauze during osteotomy. In contrast, our method which inserts the endoscope with a tissue retractor in the medial side of the mandibular ramus can easily and safely protect medial soft tissues including the mandibular nerve and artery in good visualization during IVRO.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

References

1. Hara S, Mitsugi M, Kanno T, Nomachi A, Kageyama I, Tatemoto Y. 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? *J Oral Maxillofac Surg* 2014;72:1373–90.
2. de Miranda SL, Abrahão M. Intraoral vertical ramus osteotomy endoscopic surgery. *J Oral Maxillofac Surg* 2007;65:805–8.
3. Kapur M, Shah RA, Ferro A, Basyuni S, Brassett C, Santhanam V. Sexual dimorphism and geographical variance: their impact on the reliability of the antilingula as a landmark in human mandibular surgery. *Br J Oral Maxillofac Surg* 2021;59:898–904.
4. Ottone NE, Sandoval C, Cid-Gutierrez P, Vásquez-Balboa ML, Tubbs RS, Fuentes R. Systematic review and meta-analysis of the anatomy of the maxillary artery using the Anatomical Quality Assurance (AQUA) checklist. *Surg Radiol Anat* 2021;43:1875–86.

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