



# Simultaneous Glossectomy with Orthognathic Surgery for Mandibular Prognathism

Young-Wook Jung, Sung-Woon On, Kyu-Rhim Chung, Seung-Il Song

Division of Oral and Maxillofacial Surgery, Department of Dentistry, Ajou University School of Medicine

## Abstract

Macroglossia can create dental and skeletal instability after orthodontic treatment or orthognathic surgery for mandibular prognathism. In relevant literature, partial glossectomy is suggested for a good post-treatment prognosis. Most of the published partial glossectomy cases are two-staged surgery, because of concern about postoperative airway obstruction. As orthognathic surgical techniques and fixation method develop, however, concerns about postoperative airway obstruction have lessened. In this case, mandibular setback surgery and partial glossectomy were performed simultaneously, leading to stable recovery without any postoperative respiratory problems. After surgical technique to preserve the tongue tip, we achieved good outcomes without postoperative side effects of lingual hypoesthesia, pronunciation disorder and dyskinesia. We report this case with a literature review.

**Key words:** Macroglossia, Glossectomy, Orthognathic surgery

## Introduction

Macroglossia can create dentomusculoskeletal deformities such as open bite and mandibular prognathism, and create instability after orthodontic and orthognathic surgical treatment. Therefore, in some cases, partial glossectomy is necessary for a good post-treatment prognosis[1,2].

Macroglossia is divided largely into true macroglossia and pseudomacroglossia. True macroglossia is a condition where the tongue itself is enlarged. Congenital factors include muscle hypertrophy, glandular hyperplasia, hemangioma, and acquired factors may include acromegaly, myxedema, amyloidosis[1].

Pseudomacroglossia is a condition where the tongue is normal in size, but appears relatively large compared to surrounding anatomic structures. Possible causes include habitual posturing of the tongue, transverse, vertical, or antero-posterior deficiency of the maxillary or mandibular arches that decreases the oral cavity volume, and severe mandibular deficiency[1].

To determine whether a reduction glossectomy is necessary, it is important to clarify sign and symptoms of macroglossia. Wolford and Cottrell[1] described several clinical and cephalometric features. The clinical features include (1) grossly enlarged, broad and flat tongue, (2) open bite, (3) mandibular prognathism, (4) crenations on

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### Correspondence to Seung-Il Song

Division of Oral and Maxillofacial Surgery, Department of Dentistry, Ajou University School of Medicine  
164 WorldCup-ro, Yeongtong-gu, Suwon 443-749, Korea  
Tel: 82-31-219-5328, Fax: 82-31-219-5329, E-mail: seungilsong@daum.net

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the tongue, and (5) glossitis. The cephalometric radiographic features include (1) mandibular dentoalveolar protrusion, (2) overangulation of anterior teeth, (3) increased gonial angle, mandibular plane angle, occlusal plane angle.

In mandibular setback surgery for macroglossia, postoperative relapse can be reduced by partial glossectomy[3]. Most reports were of two-stage surgery, because of concern about postoperative airway obstruction secondary to tongue edema and bleeding immediately after surgery. However, as orthognathic surgical techniques and fixation method developed, postoperative airway management problems were reduced.

In this case, mandibular setback surgery and glossectomy were performed simultaneously, leading to stable recovery without any postoperative respiratory problems. After surgical technique to preserve the tongue tip, we achieved good outcomes without postoperative side effects of lingual hypoesthesia, pronunciation disorder and dyskinesia. We report this case with a literature review.

## Case Report

A 24-year-old male patient, with no history of a congenital abnormality such as Down syndrome or Beckwith-Widemann syndrome, showed severe mandibular prognathism (−19 mm incisor overjet) and excessive anterior open bite (−8.7 mm incisor overbite, not occluded from the mandibular left first molar to the mandibular right first molar). Several clinical features of macroglossia (grossly enlarged and broad tongue, crenations on the tongue) were seen. Following diagnostic criteria suggested by Wolford and Cottrel[1], pseudomacroglossia was diagnosed. Lateral cephalometric analysis revealed severe mandibular prognathism and Angle Class III malocclusion (point A-nasion-point B=−9.19, sella-nasion-point A=89.86, sella-nasion-point B=99.05; Fig. 1A).

For mandibular setback surgery, bilateral sagittal split ramus osteotomy was performed. Following 10 mm mandibular setback movement, semi-rigid fixation was conducted with miniplates and screws. Subsequently, Le Fort

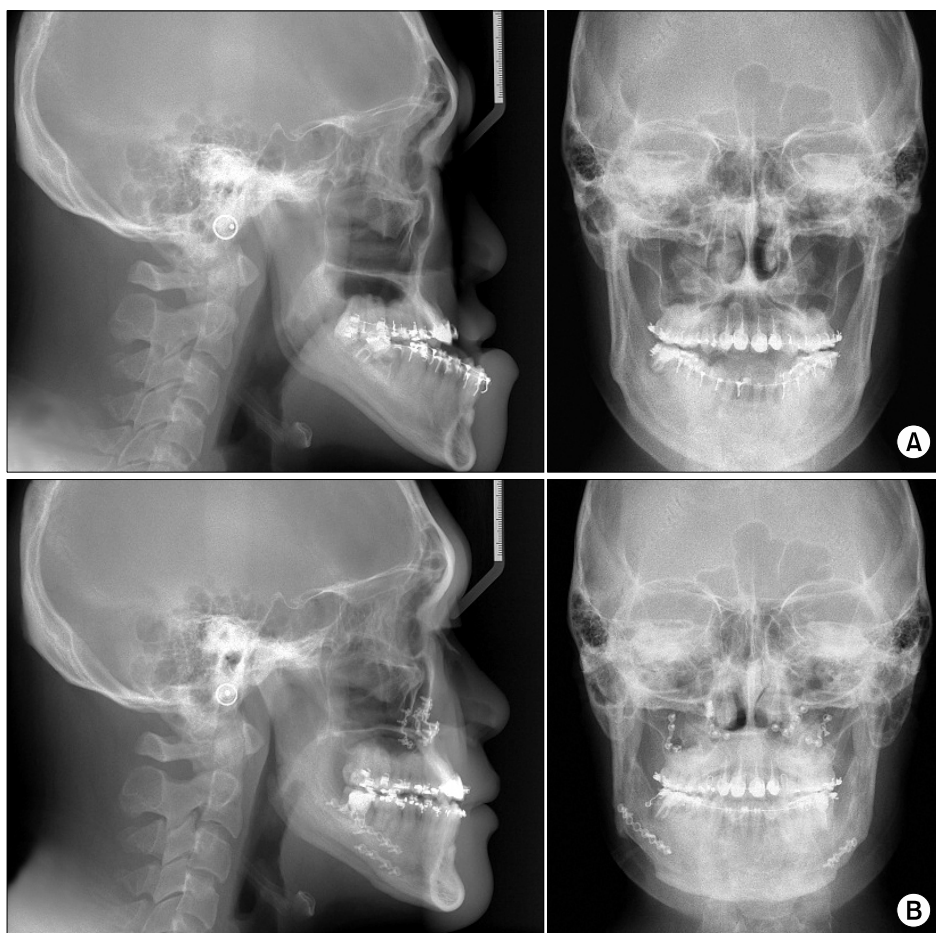


Fig. 1. (A) Preoperative cephalogram. (B) Postoperative 9 months cephalogram.

I maxillary osteotomy was performed. After 5 mm advancement and 5 mm posterior impaction, semi-rigid fixation was placed using miniplates and screws (Fig. 1B). The Harada-Enomoto method[2] was employed for glossectomy. A wedge-shaped incision was made along the middle of the tongue, and a crescent-shaped incision on the posterior portion of the dorsum (Fig. 2). Weak intermaxillary fixation using elastic guiding rubber was applied to allow the patient to breathe more readily through the mouth. Immediately after the surgery, there were no airway problems and stable recovery was achieved.

To observe any changes in occlusion, clinical examinations were done preoperative and postoperative 2 weeks and 3 months. At postoperative 2 weeks, the open bite resolved and stable occlusion of Angle Class I was seen (Fig. 3B). At postoperative 3 months, no findings suggestive of occlusion worsening including recurrent open bite were observed, and the occlusion remained stable (Fig. 3C).

Tongue movement, sensation, taste, pronunciation were evaluated during the observation period. The patient complained of dysesthesia and pronunciation problems shortly after the surgery, but the symptoms were gone at the three month exam.

## Discussion

The effects of glossectomy on the skeletal and dental components after orthodontic treatment or orthognathic

surgery in patients with pseudomacroglossia are an open question. Some studies insisted that there was no effect of glossectomy on skeletal and dental stability after mandibular setback surgery. Kawakami *et al.*[4] found no significant difference in the skeletal and dental changes between glossectomy or no glossectomy. They insisted that adaptation of the hyoid bone position and tongue position precludes the necessity for glossectomy.

Other research suggests that the tongue is important in the recurrence after orthodontic treatment or orthognathic surgery[3,5-7]. The tongue size may be increased by the mandibular setback, increasing the force on the mandibular and anterior teeth, resulting in recurrence. The risk of relapse might be higher especially in cases of severe open bite or severe mandibular prognathism. In our case, the patient had a severe open bite and mandibular prognathism; even worse he had a pseudomacroglossia. Orthognathic surgery with glossectomy was considered because of a strong risk of postoperative relapse.

Wolford and Cottrell[1] described three choices on surgical sequencing: (1) Stage 1: reduction glossectomy, Stage 2: orthognathic surgery; (2) Stage 1: orthognathic surgery, Stage 2: reduction glossectomy; and (3) perform the orthognathic surgery and reduction glossectomy in one surgical stage. In comparison with two-staged surgery, simultaneous surgery has the benefits of reducing the frequency of general anesthesia and the possibility of relapse immediately after surgery. However, most cases reported are

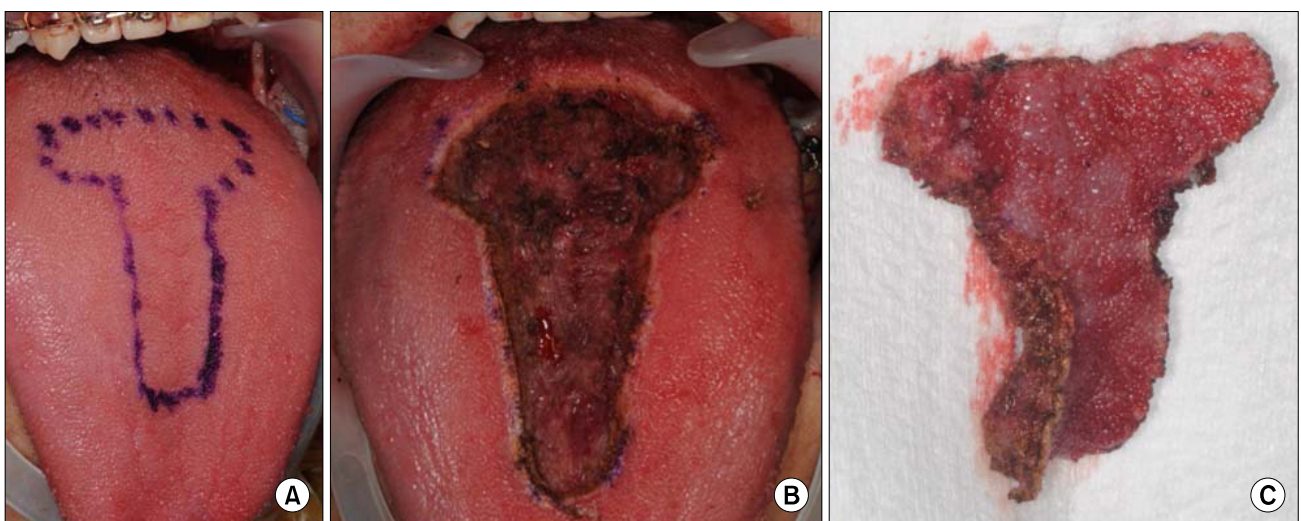
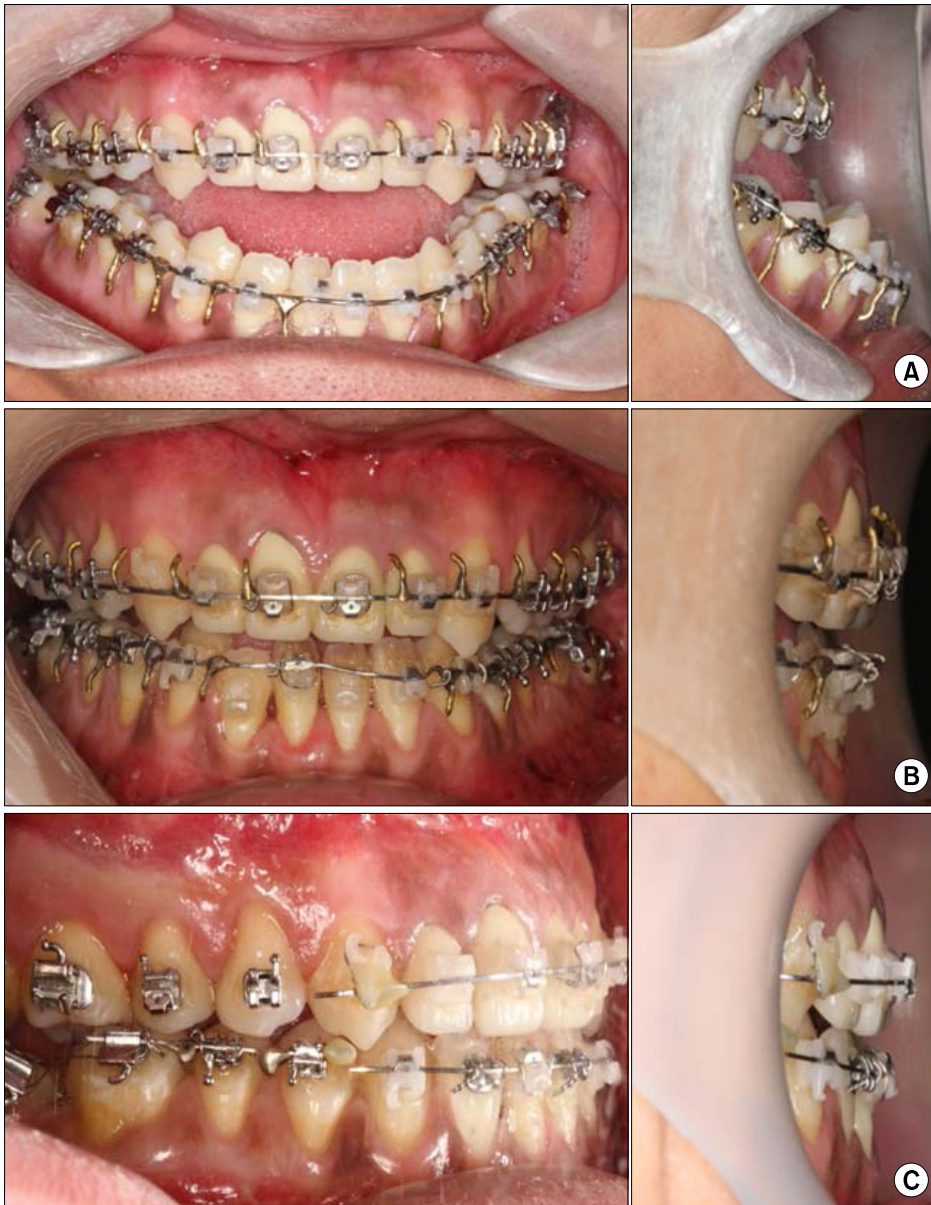


Fig. 2. T-shape tongue reduction method was used as suggested by Harada and Enomoto[2].



**Fig. 3.** (A) Preoperative photograph. (B) Postoperative 2 weeks photograph. (C) Postoperative 3 months photograph.

two-staged surgery, because of concern about postoperative airway obstruction secondary to tongue edema and bleeding immediately after surgery.

As orthognathic surgical techniques and fixation method develop, the risk of postoperative airway obstruction is reduced. Rigid fixation (or semi-rigid fixation) makes it possible to release the intermaxillary fixation, if necessary, and it is a significant advantage to prevent airway problems. Petdachai *et al.*[6] reported successful outcomes performing orthognathic surgery and glossectomy simultaneously. They insisted that intermaxillary fixation should not be performed until at least 12 hours have passed to allow tongue

edema reduction and to be able to assist the patient immediately in any airway emergency. In our surgical experience, there are no postoperative airway management problems in the absence of intermaxillary fixation. The other concern about airway management problem is postoperative tongue bleeding. The partial glossectomy technique used in this case is a minimally invasive surgical technique. In our surgical experience, the glossectomy-induced bleeding was negligible. Therefore the risk of airway obstruction was low, and there were no significant postoperative airway management problems.

There is a variety of partial glossectomy techniques in

the literature, although in most, the tip of tongue is excised. Mixer *et al.*[8] reported that standard partial glossectomy may result in an ankylosed, globular tongue with an insensitive tip. Harada and Enomoto[2] reported a new method of tongue reduction in which the tip of tongue is maintained, solving the problems associated with losing the tip of the tongue. Matsumoto *et al.*[9] reported that while their patient felt some sensory changes soon after using this technique, after a few weeks, all sensation returned to normal. Consistent with their results, this patient reported hypoesthesia just after the surgery, but sensation returned to normal at three months after the surgery.

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