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ScienceDirect
British Journal of Oral and Maxillofacial Surgery xxx (2016) xxx–xxx
BRITISH Journal of Oral and Maxillofacial Surgery
www.bjoms.com

Mandibular stability using sliding or conventional four-hole plates for fixation after bilateral sagittal split ramus osteotomy for mandibular setback

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Accepted 18 November 2016

Abstract

Our aim was to compare the postoperative stability of the mandible when two different fixation methods had been used after bilateral sagittal split ramus osteotomy (BSSRO) for mandibular setback. The study included 23 patients who had two-jaw BSSRO mandibular setback at the Department of Oromaxillofacial Surgery, Korea University Guro Hospital, between January 2011 and June 2014. The first group (four-hole (control) group, n = 13) comprised patients whose bony segments were fixed with conventional four-hole plates, and the second (sliding plate (experimental) group, n = 10) included patients whose bone segments were fixed with sliding plates. Lateral cephalograms were taken and analysed at three time points: preoperatively (T1), and one week (T2), and 1 year (T3) postoperatively. The Mann–Whitney U test was used to compare the postoperative stability of the mandible in each group. There were no significant differences between the two groups in changes in the horizontal and vertical positions of point B and pogonion postoperatively, nor were there any significant differences between them in ramal inclination and inclination of the SN plane with point B at the given time points (p = >0.05 in surgical changes in the mandible immediately after surgery and 0.397, 0.616, 0.082, 0.951, 0.901, 0.476 in postoperative changes in the madible 1 week to 1 year after surgery). Like the conventional four-hole plate, the sliding plate can also be used to achieve stability in the fixation of mandibular bone segments after BSSRO.

Keywords: Sliding plate; Miniplate; Bilateral sagittal split ramus osteotomy; Relapse

Introduction

Bilateral sagittal split ramus osteotomy (BSSRO) is the most widely used technique in mandibular orthognathic surgery, and subsequent relapse of the mandible can result from different factors,[1] among which positional changes in the condyle and proximal segments are the most important.[2] Rigid fixation offers good stability of bony segments, but it is difficult to control the position of the condyle.[3] Non-rigid fixation provides less torque and sagging of the condyle, but inter-maxillary fixation (IMF) is necessary postoperatively.[4] Semirigid fixation allows easier repositioning of the plates, but bony segments are unstable so torque strength produced by muscular tension at the proximal and distal segments is concentrated at the sites of osteotomy.

Sliding plates are widely used to fix bone segments after BSSRO because they have oval holes that allow movement of the proximal segment for repositioning of the condyle during the early postoperative period, and they also allow easy placement.[5] However, we know of few studies that have compared conventional four-hole plates with sliding plates.

The purpose of this study, therefore, was to compare the amount of relapse that occurs with a four-hole plate compared

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http://dx.doi.org/10.1016/j.bjoms.2016.11.318
0266-4356/

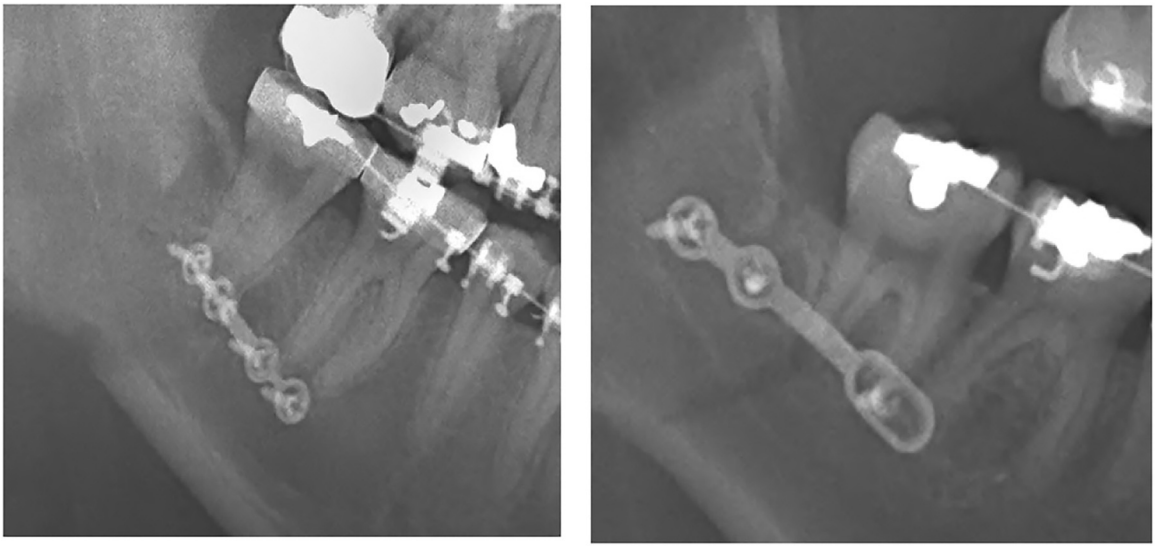

Fig. 1. Conventional four-hole plate and three-hole sliding plate.

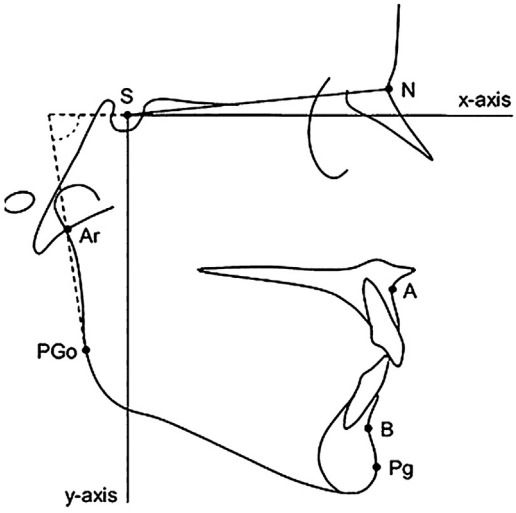

Fig. 2. Landmarks and reference lines on lateral cephalogram. A = A point; Ar = articulare; B = B point; N = nasion; Pg = pogonion; PGo = posterior gonion; S = sella.

with that with a sliding plate in mandibular setback surgery with BSSRO.

Patients and methods

We selected 23 South Korean patients (12 men and 11 women) with mandibular prognathism, who were treated by orthognathic surgery with orthodontic treatment between January 2011 and June 2014 at the Korea University, Guro Hospital. All patients had preoperative orthodontic treatment in the Orthodontic Department of the same hospital. We included adults with skeletal class III malocclusion who had stopped growing, had no temporomandibular joint disease, and had had regular examinations with preoperative and postoperative lateral cephalograms. The protocol was reviewed and approved by the Institutional Review Board (no. MD16015-001, http://www.kumdirb.or.kr), at Korea University Guro Hospital, Seoul, Korea.

Operative technique

All patients had a Le Fort I osteotomy combined with modified BSSRO setback surgery using the short lingual techniques described by Obwegeser–Dal Pont. Fixation after maxillary osteotomy was with two L-shaped miniplates on each side (right and left), and the pterygomasseteric slings were stripped from the posterior and inferior borders. After BSSRO, proximal and distal segments were fixed with both types of plate (Fig. 1).

Patients whose bony fragments were fixed with conventional four-hole plates (Leforte system, Jeil Medical Corporation) were the control group (four-hole plate, n = 13). Patients in the experimental group (sliding plate, n = 10) had their distal and proximal bone segments fixed with three-hole sliding plates (ACR System, BioMaterials Korea,Inc.) The length, width, and thickness of the sliding plate were 24.8, 4, and 0.6 mm, respectively. The length of the oval hole was 4 mm. On the distal segment, one monocortical screw was tightly screwed into the sliding hole from the front.

Postoperative management

All patients wore a final splint with hanging light-forced elastic rings to maintain postoperative occlusion. Orthodontic treatment was started one month postoperatively.

Please cite this article in press as: Lee HG, et al. Mandibular stability using sliding or conventional four-hole plates for fixation after bilateral sagittal split ramus osteotomy for mandibular setback. *Br J Oral Maxillofac Surg* (2016), http://dx.doi.org/10.1016/j.bjoms.2016.11.318