

Effectiveness of piezoelectric surgery in reducing surgical complications after bilateral sagittal split osteotomy

Tatsuo Shirota^{a,*}, Takaaki Kamatani^a, Tetsutaro Yamaguchi^b, Hiroshi Ogura^c,
Kotaro Maki^b, Satoru Shintani^a

^a Department of Oral and Maxillofacial Surgery, School of Dentistry, Showa University, 2-1-1, Kita-senzoku, Ohta-ku, 145-8515 Tokyo, Japan

^b Department of Orthodontics, School of Dentistry, Showa University, 2-1-1, Kita-senzoku, Ohta-ku, 145-8515 Tokyo, Japan

^c Department of Information Science, Faculty of Arts and Sciences at Fujiyoshida, Showa University, 4562, Kamiyoshida, Fujiyoshida, 403-0005 Yamanashi, Japan

Accepted 28 November 2013

Available online 3 January 2014

Abstract

Our aim was to investigate the effectiveness of piezoelectric surgery, where the osteotomy is made using ultrasonic vibration, in reducing surgical complications after bilateral sagittal split osteotomy (BSSO). Fifty-nine patients with skeletal mandibular prognathism who had mandibular setback with BSSO between January 2009 and April 2011 were included in the study. Piezosurgery was used in 29 cases, and the bone was split using a separator. In the remaining 30 cases, a Lindeman bur was used for the osteotomy and a chisel was used to split the bone. The amount of intraoperative bleeding and the Semmes Weinstein test scores were used as objective variables to evaluate the degree of neurosensory disturbance, and sex, age, use of piezosurgery, degree of setback, operating time, and method of fixation were used as explanatory variables. We used analysis of covariance (ANCOVA) to assess the significance of differences. Intraoperative bleeding was significantly less with age ($p=0.003$), and longer when operating time was prolonged ($p=0.017$), and was not influenced by the use of piezosurgery. The Semmes Weinstein test score significantly increased with age ($p=0.01$), and was significantly greater when piezoelectric surgery was used ($p=0.008$), and at 3 months, there were signs of more neurosensory disturbance in older patients and those who had had piezoelectric surgery. In this retrospective non-random study piezoelectric surgery reduced neither blood loss nor the incidence of neurosensory disturbance in BSSO.

© 2013 The British Association of Oral and Maxillofacial Surgeons. Published by Elsevier Ltd. All rights reserved.

Keywords: Piezosurgery; Bilateral sagittal split osteotomy; Surgical complication

Introduction

Bilateral sagittal split osteotomy (BSSO) is the most common mandibular corrective operation for skeletal malocclusion. As the mandibular body is moved by BSSO, there is a risk of excessive operative bleeding.¹ There is also a risk of post-operative neurosensory damage to the inferior alveolar nerve because of the anatomical course of the mandibular canal.²

Piezoelectric surgery uses ultrasonic vibration for osteotomy, and selectively removes the bone, which allows operations to be done with minimum invasion of the soft tissues such as blood vessels and nerves.^{3,4} Geha et al.⁵ used an ultrasonic bone scalpel for BSSO, and reported that the risk of operative nerve damage was lower than when rotary cutting instruments were used. However, many factors are involved. Not only the use of an ultrasonic bone scalpel, but also patients' age, sex, degree of setback, operating time, and method of skeletal fixation may influence the degree of nerve damage and blood loss in orthognathic surgery.

* Corresponding author. Tel.: +81 3 3787 1151; fax: +81 3 5498 1543.

E-mail address: tshirot@dent.showa-u.ac.jp (T. Shirota).

Table 1
Details of patients and clinical results.

Variable	Mean (SD)	Range
Age (years)	28 (9)	16–49
Setback (mm)	13 (4)	5–20
Operating time (min)	174 (37)	107–255
Total blood loss (ml)	189 (113)	18–584
Semmes Weinstein test (Fmg) ^a	3.7 (0.8)	3.3–6.4

^a Fmg is the value of the filament mark displayed on the Semmes Weinstein tester.

In the present study we analysed the effect of factors such as sex, age, use of piezoelectric surgery, degree of setback, operating time, and method of skeletal fixation on blood loss in BSSO and postoperative neurosensory damage.

Patients and methods

The Ethics Committee of the School of Dentistry, Showa University, Tokyo, Japan approved the study.

A total of 59 patients who had been diagnosed with skeletal mandibular prognathism between 2009 and 2011, and who had been treated by mandibular setback with BSSO by the same operator, were included. There were 24 men and 35 women, whose ages ranged from 16 to 49 (mean 28) years. Piezoelectric surgery was used for osteotomy in 30 cases, and a Lindeman bur fitted on to a straight handpiece was used in the remaining 29 (Table 1).

Surgical technique

We used the Epker method.⁶ When we used piezosurgery (Mectron Piezosurgery, Medical Technology, Carasco, GE, Italy) for the osteotomy, we made grooves in bone with a layer of cortical bone that did not reach the bone marrow using a fissure bur. Then the tip of an ultrasonic bone scalpel was pressed into these grooves to cut the cortical bone completely. The tip of the ultrasonic scalpel was inserted along the inner surface of the cortical bone of the mandibular ramus to cut the cancellous bone, and the bone was separated sagittally using a bone separator. In the patients who did not have piezosurgery the cortical bone was cut completely using a Lindeman bur followed by sagittal separation with a bone chisel. Semirigid fixation was achieved with an absorbable miniplate (Super-FIXSOR[®]-MX, Takiron Co., Ltd., Osaka, Japan) or titanium miniplate (Medicon Co., Ltd., Tuttlingen, Germany). The choice of whether piezoelectric surgery or a bone chisel was used was randomly selected by surgeons, as was the type of miniplate used, but biases such as surgeons' opinions were not completely eliminated.

All patients were given vitamin B12 supplementation in the form of methylcobalamin (Methycobal[®], Eisai Co., Ltd. Tokyo, Japan) 1500 µg/day to promote early recovery from any neurosensory disturbance.⁷ This was continued until the disturbance had resolved.

The amount of setback was measured as the distance from the mesial cusp of the mandibular first molar on the lateral cephalometric radiographs.

Evaluation of the postoperative neurosensory disturbance

Numbness of the lower lip was evaluated by the same examiner using the Semmes Weinstein sensory tester 3 months postoperatively. Data are expressed as Fmg, which is the value of the filament marking displayed by the tester. The patient was placed horizontally with the eyes open. The Semmes Weinstein tester was lowered vertically to the measurement point in about a minute, pressure was applied so that the filament bent slightly, and then the pressure was released after a minute. The measurement started from 1.65, the minimum marking number, and we gradually increased it until the patients felt the pressure. The first number that patients felt was regarded as the measurement. Three points including the vermilion, the transitional part of the vermilion, and the rest of the lip were measured on each side. The highest value of these was regarded as the Semmes Weinstein test value (Fmg).

Software

We used the R2.12.0 software (freely available from <<http://www.R-project.org/>>, R Foundation for Statistical Computing, Vienna, Austria) to assess the significance of differences between the groups.⁸

The causal connection between the left and right mandibular distance and Semmes Weinstein test value

Correlations between the right and left setback, and Semmes Weinstein test values of the right lower lip and left lower lip, were confirmed by calculating the correlation matrix between right setback, left setback, right lower lip, and left lower lip. The results showed that there was a good correlation between right setback and left setback, and right lower lip and left lower lip, but there was no correlation between right setback, left setback, and right lower lip, left lower lip. To evaluate the setback and the Semmes Weinstein test value for each patient, the total amount of bilateral setback was regarded as the patient's total setback. The total test value of the bilateral lower lip was regarded as the patient's test value.

Influence of the use of piezoelectric surgery on the operating time

The influence of the use of the ultrasonic bone scalpel on the duration of operation was analysed using the Wilcoxon rank sum test.

Download English Version:

<https://daneshyari.com/en/article/3123889>

Download Persian Version:

<https://daneshyari.com/article/3123889>

[Daneshyari.com](https://daneshyari.com)