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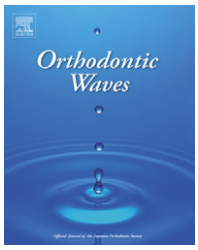

Research paper

Characteristics of mandibular advancement surgery dependent on lower facial height differences in study of skeletal Class II patients with long-term stability

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ABSTRACT

We studied patients who underwent mandibular advancement surgery and showed a stabilized occlusal condition at 5 years after surgery. The patients were classified into 2 groups [long face type (LF group: 16 cases), short face type (SF group: 10 cases)] according to immediate presurgery face type. To clarify the characteristics of the operative method formulated based on lower facial height, morphological changes during the 5-year post-operative period were compared between the groups.

There was no statistically significant difference in amount of advancement between the two groups, though lower facial height showed a tendency to increase in group SF. The proximal segment was advanced to the anterosuperior position in both groups.

To determine postoperative stability, in the LF group, there were no statistically significant differences for lower face height. In the SF group, the condylar axis increased in the period from immediately after to 6 months after surgery. Correlation analysis revealed that the backward rotation of the proximal segment was greater during the first 6 months, as the amount of surgical advancement of the chin was larger. As a result, the chin was advanced during surgery and the proximal segment was advanced toward the anterosuperior position in both groups. In the SF group, the characteristics of the operative design increased the lower facial height.

1. Introduction

There are a number of reports of relapse condition in cases in which the mandible was advanced surgically [1–11]. Factors related to such relapse are considered to be amount of mandibular advancement [1,2], operative procedure [1–6], fixation method utilized [1,2,5], morphological problems of the mandible concerned with tipping of the mandibular plane [4], positioning of the condylar head [6–8], effects of the suprahyoid muscles [9], and preoperative orthodontic treatment [10,11].

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To obtain stability following orthognathic surgery in patients with short and long face types [3,4], maxillary osteotomy alone and that with simultaneous two-jaw surgery have been frequently employed for the long-face type, as one-jaw surgery is generally excluded from consideration due to difficulties in attaining postoperative stability. Accordingly, we speculated that the optimum operative procedures for skeletal Class II patients with a flat inferior border of the mandible and for those with a high-pitched border are different.

To clarify the characteristics of the optimum operative procedures based on lower facial height, patients who underwent one-jaw advancement surgery at a clinic in southern California and showed stable occlusion at 5 years after surgery were studied. They were classified into two groups by cluster analysis of the maxillofacial morphology using longitudinal and vertical factors of the upper and lower jaws as indices, and morphological changes were followed for 5 years after surgery.

2. Materials and methods

2.1. *Subjects*

The patients were 39 adult Caucasian females who underwent a bilateral sagittal split osteotomy during the period from 1982 to 1993 at Long Beach Memorial Medical Center, in southern California. Their mean age at the time of surgery was 29 years 3 months (range, 17 years 0 months to 45 years 2 months). In all cases, the bone segment was fixed by rigid fixation using a screw with a direct interosseous wire placed between the segments at the superior border on each side [2,7]. A suprahyoid myotomy was performed concomitantly [9]. The term of intermaxillary fixation using an orthodontic appliance with a wire was a mean 8.5 weeks. Patients who did not undergo a genioplasty and demonstrated a close occlusion at 5 years after surgery were selected, while those with facial asymmetry, cleft palate, and a large number of prosthetic appliances were excluded. For our analysis, a total of 186 lateral cephalometric radiographs taken in the central occlusal position using the usual method were examined. All tracing was done by the same examiner. After setting the landmarks, measurements were obtained (Figs. 1 and 2). The radiograph examination periods were as follows: immediately before surgery (T1, preoperative 1–2 months), immediately after surgery (T2, postoperative 1–3 months), postoperative 6 months (T3, postoperative 5–7 months), postoperative 1 year (T4, postoperative 10 months to 1 year 5 months), postoperative 3 years (T5, postoperative 2 years 6 months to 3 years 4 months), and postoperative 5 years (T6, postoperative 4 years 6 months to 5 years 3 months).

3. Measuring procedures

3.1. *Measurements*

3.1.1. *Angular measurements (in degrees) (Fig. 1)*

SNP: The angle formed by the S–N and N-Pog planes.
SNA: The angle formed by the S–N and N–A planes.

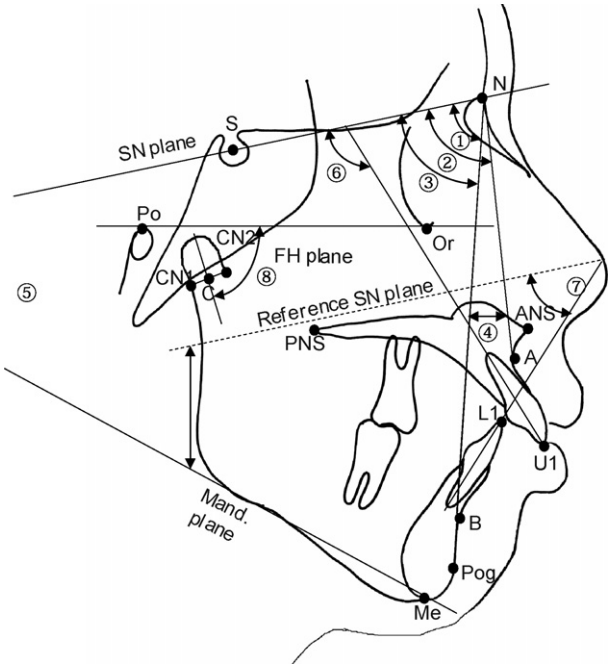

Fig. 1 – Cephalometric angular measurements. (1) SNP; (2) SNA; (3) SNB; (4) ANB; (5) SN–MP; (6) U1–SN; (7) L1–SN; (8) condylar axis. C: The vertical line passing through point. CN1 and CN2: positioned between the two halves of the line segment connecting points.

SNB: The angle formed by the S–N and N–B planes.
ANB: Difference between SNA and SNB values.
SN–MP: The angle formed by the S–N and mandibular planes.
U1–SN: The angle formed by the S–N plane and the axis of the central incisor of the maxilla.

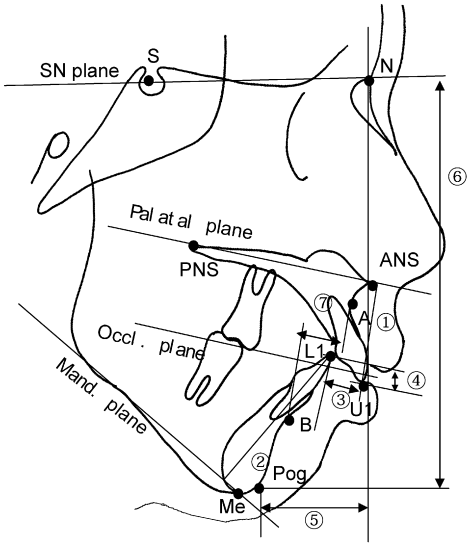

Fig. 2 – Cephalometric linear measurements. (1) U1–PP; (2) L1–MP; (3) overjet; (4) overbite; (5) POG (X); (6) POG (Y); (7) wits appraisal.