Asian Journal of Periodontics and Orthodontics
2026, Volume 6, Issue 1, Page No: 80-84
Copyright CC BY-NC-SA 4.0
Available online at: www.tsdp.net

ISSN: 3062-3499

Original Article

Early Skeletal Stability of Mandibular Setback after Bilateral Sagittal Split Osteotomy in Vietnamese Class III Adults

Hung Tan Le[1]*, Huyen My Nguyen[1], Khang Hoang Nguyen[1]

[1]Faculty of Odonto-Stomatology, College of Medicine and Pharmacy of Tra Vinh University, Vinh Long Province, Vietnam.

***E-mail** ✉ letanhung@tvu.edu.vn

Received: 21 December 2025; **Revised:** 22 March 2026; **Accepted:** 28 March 2026

ABSTRACT

Skeletal Class III malocclusion due to mandibular prognathism has a substantial impact on facial aesthetics and masticatory function. Bilateral sagittal split osteotomy (BSSO) remains a reliable procedure for mandibular setback; however, early postoperative mandibular stability, particularly at the B-point and pogonion, is still clinically relevant in treatment assessment. This study aimed to evaluate early mandibular skeletal stability by quantifying positional changes at the B-point and pogonion 6 months after an isolated modified BSSO mandibular setback in adult patients with skeletal Class III malocclusion. A retrospective study was conducted in 46 patients who underwent isolated mandibular setback using BSSO. The sample size was determined based on a previous study evaluating mean B-point stability in 46 patients after mandibular setback surgery. Cephalometric measurements were recorded at three time points: before surgery (T0), 10 days after surgery (T1), and 6 months after surgery (T2). Skeletal and dentoalveolar variables were reported as mean ± standard deviation (SD), and paired comparisons were performed for within-subject changes over time. Postoperatively, the mandibular skeletal relationship returned to Class I, with the SNB angle decreasing by an average of 5.90° and the ANB angle increasing significantly ($p < 0.05$). At the 6-month follow-up, skeletal relapse was not statistically significant ($p > 0.05$). Mandibular setback via BSSO is an effective method for correcting skeletal relationships in Class III malocclusion. Preliminary results at 6 months show a suggested favourable short-term skeletal stability trend; however, studies with longer follow-up periods are necessary for definitive confirmation.

Keywords: Skeletal Class III malocclusion, Bilateral sagittal split osteotomy, Mandibular setback, Early skeletal stability, Orthognathic surgery

How to Cite This Article: Le HT, Nguyen HM, Nguyen KH. Early Skeletal Stability of Mandibular Setback after Bilateral Sagittal Split Osteotomy in Vietnamese Class III Adults. Asian J Periodont Orthodont. 2026;6(1):80-4. https://doi.org/10.51847/0HT6XefOmz

Introduction

Skeletal Class III malocclusion is one of the most challenging dentofacial deformities in orthodontic and orthognathic practice because of its complex craniofacial morphology and the potential risk of postoperative relapse. Class III malocclusion is more prevalent in Asian populations than in Western populations and has been reported in approximately 10-20% of some Asian cohorts [1]. This condition affects not only mastication and speech but also facial aesthetics, typically presenting with a concave facial profile and mandibular prognathism, which may negatively influence psychosocial well-being and self-confidence.

Modern orthognathic treatment for skeletal Class III malocclusion has shifted from achieving occlusal correction alone toward optimizing facial soft-tissue harmony and skeletal stability. Bilateral sagittal split osteotomy (BSSO), introduced by Trauner and Obwegeser and subsequently modified by Dal Pont and then Puricelli (2007), has become a standard mandibular setback procedure. The technique allows controlled mandibular repositioning while maintaining broad bony contact between the proximal and distal

© 2026 Asian Journal of Periodontics and Orthodontics

segments, thereby supporting bone healing and postoperative stability [2].

Nevertheless, postoperative stability after BSSO remains a clinically important issue. Mandibular position after surgery may be influenced by the magnitude and direction of setback, masticatory muscle tension, fixation method, and postoperative orthodontic mechanics. In Vietnam, although BSSO has been widely applied, data focusing specifically on early mandibular skeletal stability after isolated mandibular setback remain limited, especially regarding cephalometric changes at the B-point and pogonion. Therefore, this study was designed to evaluate early mandibular stability 6 months after BSSO in adult Vietnamese patients with skeletal Class III malocclusion caused by mandibular excess.

Materials and Methods

Study design and participants

The present study used a target sample size of 46 adult patients with skeletal Class III malocclusion who had undergone orthognathic correction with isolated BSSO mandibular setback. The inclusion criteria were as follows: male or female patients aged 18 years or older; no previous maxillofacial orthognathic surgery; skeletal Class III deformity with normal SNA, increased SNB, and ANB < 0; treatment by isolated bilateral mandibular sagittal split osteotomy performed by the same surgeon; complete medical records, diagnosis, surgical information, and clinical follow-up notes; and adequate lateral cephalograms at T0, T1, and T2. All patients agreed to participate in the study. The exclusion criteria were dentofacial deformity secondary to trauma; congenital cleft lip and palate or other craniofacial anomalies; and failure to follow the planned treatment protocol.

Data collection and cephalometric measurements

Demographic and clinical variables included age, sex, occupation, and the main reason for seeking surgical treatment. Lateral cephalograms were obtained at three time points: 1-2 weeks before surgery (T0), 10 days after surgery (T1), and 6 months after surgery (T2). All cephalometric measurements were performed by a dentist trained in lateral cephalometric analysis. Each variable was measured twice, and the mean value was used for analysis to reduce measurement error. The hard-tissue and dentoalveolar parameters included A-point, B-point, ANS, PNS, menton (Me), pogonion (Pog), L1-NB, SNA, SNB, ANB, Wits appraisal, overjet, overbite, FMIA, and the occlusal plane angle. Early skeletal stability was assessed primarily by changes in the position of the B-point and pogonion from T1 to T2.

Statistical analysis

Data was entered, managed, and analyzed using SPSS version 27. Quantitative variables were summarized as mean ± SD. Categorical variables were reported as frequencies and percentages. Paired t-tests were used for paired comparisons when appropriate. Fisher's exact test was used to assess the association between sex and treatment motivation. A p-value < 0.05 was considered statistically significant.

Results and Discussion

The study included 46 patients with skeletal Class III malocclusion treated by BSSO mandibular setback. The mean age was 21.67 ± 5.34 years. Female patients accounted for the majority of the sample **(Table 1)**. Aesthetic motivation was more frequent among female patients, whereas functional reasons were more prominent among male patients. Esthetics reasons promote the need for surgical treatment in women at a higher rate than men; 36% in females compared to 14.29% in males in the group for purely aesthetic reasons. In contrast, reasons related to high functioning accounted for 85.71% in men and 68% in women **(Figure 1)**. There was a statistically significant difference between the reason for surgery and sex (p = 0.009).

Table 1. Baseline demographic, cephalometric characteristics, and OQLQ presurgery (T0)

Variable	Reporting format	Simulated value
Age, years	mean ± SD	21.67 ± 5.34
Male	n (%)	21 (45.65%)
Female	n (%)	25 (54.35%)
Follow-up duration, months	mean ± SD	6.24 ± 0.42

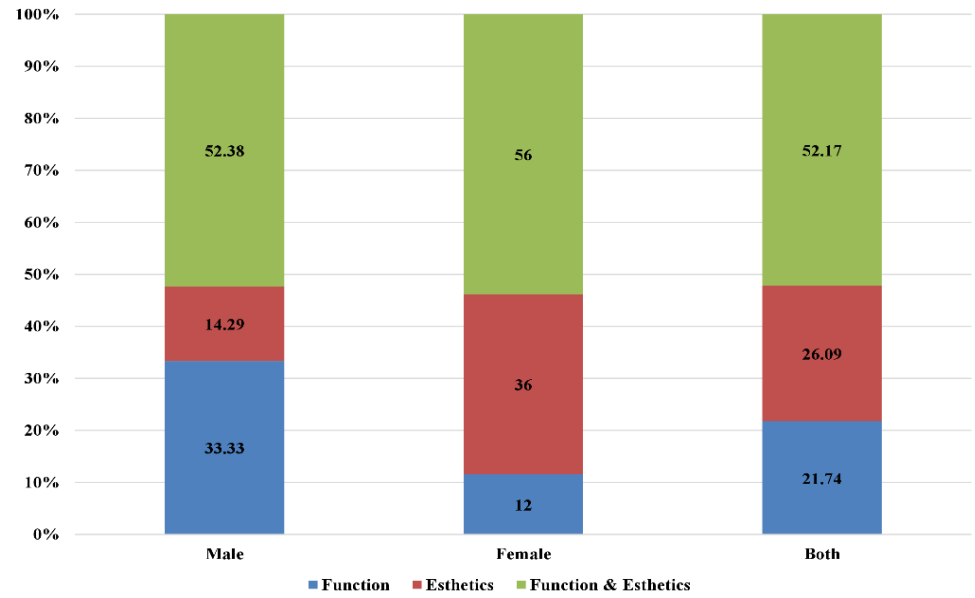


Figure 1. Distribution of treatment reasons by gender (N=46)

Preoperative cephalometric values showed typical skeletal Class III features caused by mandibular excess, including increased SNB, negative ANB, markedly negative Wits appraisal, and negative overjet. The lower incisor measurements suggested dentoalveolar compensation before surgery **(Table 2)**.

Table 2. Preoperative craniofacial and dental cephalometric characteristics at T0 (N = 46)

Cephalometric variable	Mean ± SD
SNA (°)	80.72 ± 2.55
SNB (°)	86.55 ± 3.12
ANB (°)	-6.89 ± 3.56
Wits appraisal (mm)	-11.69 ± 2.55
Overjet (mm)	-3.87 ± 2.74
Overbite (mm)	0.48 ± 2.19
L1-NB (°)	22.29 ± 6.63
FMIA (°)	66.58 ± 9.43

The postoperative SNB decreased by 5.90 ± 1.45° from 86.55 ± 3.12° to 80.65 ± 3.24°, while ANB increased from −6.89 ± 3.56° to 0.62 ± 3.29°. Wits' appraisal improved from −11.69 ± 2.55 mm to −2.61 ± 3.89 mm, and overjet changed from −3.87 ± 2.74 mm to 2.59 ± 1.62 mm. These changes were statistically significant and reflected substantial correction of the skeletal Class III relationship. In contrast, L1-NB showed only a borderline change, indicating that the immediate correction was predominantly skeletal rather than dental. Overall, the immediate postoperative findings indicated marked improvement in skeletal and dental relationships.

Table 3. Changes in hard-tissue cephalometric variables from T0 to T1 (N = 46)

Variable	T0	T1	Immediate change (T1-T0)	p-value
SNB (°)	86.55 ± 3.12	80.65 ± 3.24	−5.90 ± 1.45	**0.005**
ANB (°)	-6.89 ± 3.56	0.62 ± 3.29	7.51 ± 2.05	**0.006**
Wits appraisal (mm)	-11.69 ± 2.55	-2.61 ± 3.89	9.08 ± 2.45	**0.005**
Overjet (mm)	-3.87 ± 2.74	2.59 ± 1.62	6.46 ± 1.88	**0.008**
Overbite (mm)	0.48 ± 2.19	0.72 ± 1.89	0.24 ± 0.77	**0.033**
L1-NB (°)	22.29 ± 2.03	23.74 ± 3.16	1.45 ± 2.05	0.052
FMIA (°)	66.58 ± 9.43	64.57 ± 7.96	−2.01 ± 2.77	**0.005**

Values are presented as mean ± standard deviation. Data were analyzed using paired-samples t-tests.
Statistical significance was set at $p < 0.05$.

From T1 to T2, mandibular positional changes were small and not statistically significant. The mean changes at the B-point and pogonion were less than 1 mm, indicating limited secondary displacement during the 6-month follow-up period. However, a 6-month observation period reflects only early postoperative

stability and is insufficient for evaluating medium- and long-term stability, particularly because postoperative orthodontic treatment and muscle-joint adaptation may still be ongoing.

Table 4. Early mandibular skeletal stability from T1 to T2 after BSSO (N = 46)

Position variable	Minimum	Maximum	Mean change ± SD	p-value
B-X (mm)	-0.48	2.56	0.67 ± 1.82	0.259
B-Y (mm)	-1.28	0.38	-0.78 ± 2.54	0.245
Pog-X (mm)	-0.82	2.34	0.52 ± 3.31	0.407
Pog-Y (mm)	-0.73	0.97	-0.08 ± 2.32	0.871

In this study, the mean age of patients was 21.67 ± 5.34 years, consistent with the adult age range commonly reported in orthognathic surgery studies. Including patients after craniofacial growth completion helps reduce the potential influence of residual growth on surgical outcomes and facilitates evaluation of postoperative skeletal changes.

Most patients sought surgery with the expectation of improving both facial aesthetics and function. The sex-related difference in treatment motivation suggests that gender may influence preoperative expectations. However, because of the retrospective design, psychosocial factors and quality-of-life impairment were not analyzed in depth and should be addressed in future studies.

The preoperative cephalometric profile demonstrated a typical skeletal Class III malocclusion, with increased SNB, negative ANB, and markedly negative Wits appraisal. These findings are consistent with diagnostic criteria for skeletal Class III deformity described in the literature [3, 4]. The negative overjet further reflected anterior crossbite and the clinical severity of dentofacial discrepancy.

After BSSO, the cephalometric variables shifted toward improved skeletal and occlusal relationships. Reduction in SNB and conversion of ANB from negative to positive indicated improvement in sagittal maxillomandibular relationship. The changes in Wits appraisal and overjet also supported the effectiveness of mandibular setback in correcting the anterior occlusal relationship. Similar changes have been reported in previous studies evaluating mandibular setback and orthognathic correction of Class III deformities [5].

The key focus of the present study was early mandibular skeletal stability from 10 days to 6 months after surgery. Positional changes at B-point and pogonion were small and statistically nonsignificant, suggesting limited early relapse. This finding is clinically relevant because the B-point and pogonion are important landmarks for evaluating mandibular position and postoperative sagittal stability. Nevertheless, early stability should not be interpreted as definitive long-term stability, as remodeling, condylar adaptation, muscular readjustment, and postoperative orthodontic mechanics may continue beyond 6 months [6, 7].

This retrospective design made data collection dependent on available records. 6 months of follow-up is sufficient only for evaluating early postoperative stability and cannot confirm medium- or long-term relapse. The study did not include detailed soft-tissue assessment, patient-reported outcomes, condylar position, or postoperative complications such as inferior alveolar nerve disturbance, early malocclusion, infection, or temporomandibular joint changes. Future prospective studies with longer follow-up, standardized reliability testing, and three-dimensional imaging would provide a more comprehensive assessment of mandibular stability.

Conclusion

In adult patients with skeletal Class III malocclusion caused mainly by mandibular excess, BSSO mandibular setback effectively improved sagittal skeletal and anterior occlusal relationships. During the first 6 months after surgery, positional changes at the B-point and pogonion were small and statistically nonsignificant. Because the study was retrospective and the follow-up period was short, further prospective studies with longer observation periods are required to confirm long-term stability.

Acknowledgments: The authors would like to thank Tra Vinh University and the clinical team involved in patient management and data collection.

Conflict of Interest: None

Financial Support: This research was fully funded by Tra Vinh University (TVU) under grant contract number 88/1/2025/HĐ.HĐKH&ĐT-ĐHTV. This work was supported by a research grant from Tra Vinh University (TVU) (https://www.tvu.edu.vn/). The

sponsor played no role in the research design, data management, article drafting, or publication decisions.

Ethics Statement: The study was approved by the Scientific and Training Council of the School of Medicine and Pharmacy and the Medical Ethics Council of Tra Vinh University (Approval No. 286/GCN.DC-HDDD, December 30, 2025). The study purpose, investigator responsibilities, and participant rights were explained to all participants. Participation information was kept confidential and reported only in an aggregated form. The study was based on an independent anonymized dataset that had not been previously used for any publication.

References

1. Chadda D, Majumdar SK, Shome A, Das RK. Evaluation of cephalometric changes and its relation to changes in patients' quality of life after mandibular setback surgery. J Maxillofac Oral Surg. 2022;21(4):1279-85. doi:10.1007/s12663-021-01622-0
2. Reyneke JP, Bryant RS, Suuronen R, Becker PJ. Postoperative skeletal stability following clockwise and counter-clockwise rotation of the maxillomandibular complex compared to conventional orthognathic treatment. Br J Oral Maxillofac Surg. 2007;45(1):56-64.
3. Ay Ünüvar Y, Köse E. Evaluation of maxillary sinus volume of Class III individuals with different jaw positions by cone-beam computed tomography. Turk J Orthod. 2023;36(3):180-5.
4. Martinez P, Bellot-Arcís C, Llamas JM, Cibrian R, Gandia JL, Paredes-Gallardo V. Orthodontic camouflage versus orthognathic surgery for Class III deformity: comparative cephalometric analysis. Int J Oral Maxillofac Surg. 2017;46(4):490-5. doi:10.1016/j.ijom.2016.12.001
5. Jokić D, Jokić D, Uglešić V, Macan D, Knežević P. Soft tissue changes after mandibular setback and bimaxillary surgery in Class III patients. Angle Orthod. 2013;83(5):817-23. doi:10.2319/100112-775.1
6. Proffit WR, Turvey TA, Phillips C. The hierarchy of stability and predictability in orthognathic surgery with rigid fixation: an update and extension. Head Face Med. 2007;3:21.
7. Gao M, Tao Y, Bi S, Li J, Ren Z. Three-dimensional evaluation of stability after bimaxillary orthognathic surgery for skeletal Class III malocclusion in patients with cleft lip and palate. BMC Oral Health. 2025;25:1833. doi:10.1186/s12903-025-07160-2