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The Short Split Method: A Solid Alternative to Classical Sagittal Split Osteotomy in Orthognathic Surgery: A Case Report

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ABSTRACT

Background: Orthognathic surgery is a surgical procedure to correct dentofacial deformities, improving function and facial aesthetics.

Method: This case report highlights the use of the short split sagittal osteotomy (SSSO), a modified technique proposed by Posnick, in treating a 32-year-old female patient presenting with retrognathia (Class II skeletal pattern) and obstructive sleep apnea.

Results: The patient underwent bimaxillary advancement with counterclockwise rotation and genioplasty, planned virtually via Dolphin 3D software. The surgical approach aimed to optimise occlusal function, airway space, and facial harmony while minimising potential complications. The SSSO technique, characterised by a low and short medial cut anterior to the lingula, was chosen for its advantages in reducing surgical trauma, nerve injury risk, and operative time. The patient expressed satisfaction with both functional and aesthetic results.

Conclusion: Literature review supports the efficacy and safety of the SSSO, citing lower rates of unfavourable splits, reduced neurosensory deficits, and reliable stability when proper fixation is applied. This case reinforces the potential of the SSSO as a viable alternative to the traditional bilateral sagittal split osteotomy (BSSO), especially in less complex mandibular corrections. Selection of surgical techniques should remain individualised, guided by patient anatomy, surgeon experience, and the specific goals of treatment.

1 | Introduction

Over the past century, orthognathic surgery has evolved significantly to correct a wide range of dentofacial deformities, both functional and aesthetic. The bilateral sagittal split osteotomy (BSSO) remains the standard approach for correcting mandibular positional abnormalities. Modifications over time have aimed to enhance the safety, predictability, and reliability of the procedure.

Several modifications of the sagittal split osteotomy (SSO) have been described, evolving from the original high-ramus technique by Obwegeser to the variations proposed by Dalpont, Hunsuck, and Wolford. More recently, Posnick

introduced a low (occlusal plane) and short medial (anterior to the lingula) cut SSO, aimed at minimising complications, accelerating the surgical procedure, and improving patient satisfaction [1–4].

In addition to general postoperative complications such as infection, bleeding, or fixation device failure, specific risks include neurosensory deficits involving the inferior alveolar nerve, lingual nerve, or, less commonly, the facial nerve. Other potential complications include unfavourable fractures, known as bad splits, or improper seating of the mandibular condyle in the glenoid fossa, which may result in temporomandibular disorders. Additionally, passive segment alignment may be hindered by interferences [5, 6].

The short split technique, a modified form of SSO, has gained increased attention as a reliable alternative, particularly for its advantages in surgical precision, safety, and outcomes. The authors report a case of a female patient treated successfully with orthognathic surgery, reinforcing the advantages of the short split technique.

2 | Case Presentation

A 32-year-old woman was referred to the Department of Oral and Maxillofacial Surgery at São Paulo State University (UNESP), Araraquara, for orthognathic surgery. Her chief complaints were malocclusion secondary to mandibular retrognathia (Class II profile) and obstructive sleep apnea. She had no significant comorbidities and was not on regular medication. She reported occasional smoking. Preoperative orthodontic treatment lasted approximately 1 year.

The primary focus of the surgical intervention was the correction of the dentofacial deformity, with anticipated secondary benefits for airway function. Polysomnography was not performed because the surgical indication was primarily guided by the patient's clinical presentation, cephalometric findings, and airway evaluation performed using manual segmentation on computed tomography (CT) scans with Dolphin 3D imaging software, version 11.95 (Dolphin Imaging & Management Solutions, Chatsworth, CA, USA).

Clinical examination, CT imaging, and standardised preoperative photographs were obtained prior to virtual surgical planning using the Dolphin 3D imaging software. The planned procedure, performed under general anaesthesia, included maxillomandibular advancement with counterclockwise rotation and genioplasty (Figures 1 and 2).

Postoperatively, facial taping and cold compresses were applied to minimise edema. The patient was transferred to the general hospital ward and placed on a liquid/soft diet. After 2 days of inpatient monitoring and intravenous antibiotic therapy, she was discharged in good condition and scheduled for follow-up in approximately 2 weeks for suture removal and wound assessment. At the first follow-up visit, the patient reported mild bilateral paresthesia in the distribution of the mandibular (V3) branch of the trigeminal nerve. Wound healing was within expected parameters, and mandibular mobilisation therapy was initiated at this time. Postoperative CT imaging demonstrated stable results with all fixation devices in proper position (Figure 3).

At the 4-week follow-up visit, the patient expressed satisfaction with the surgical outcome. She presented with an interincisal opening of 30 mm and continued with progressive jaw

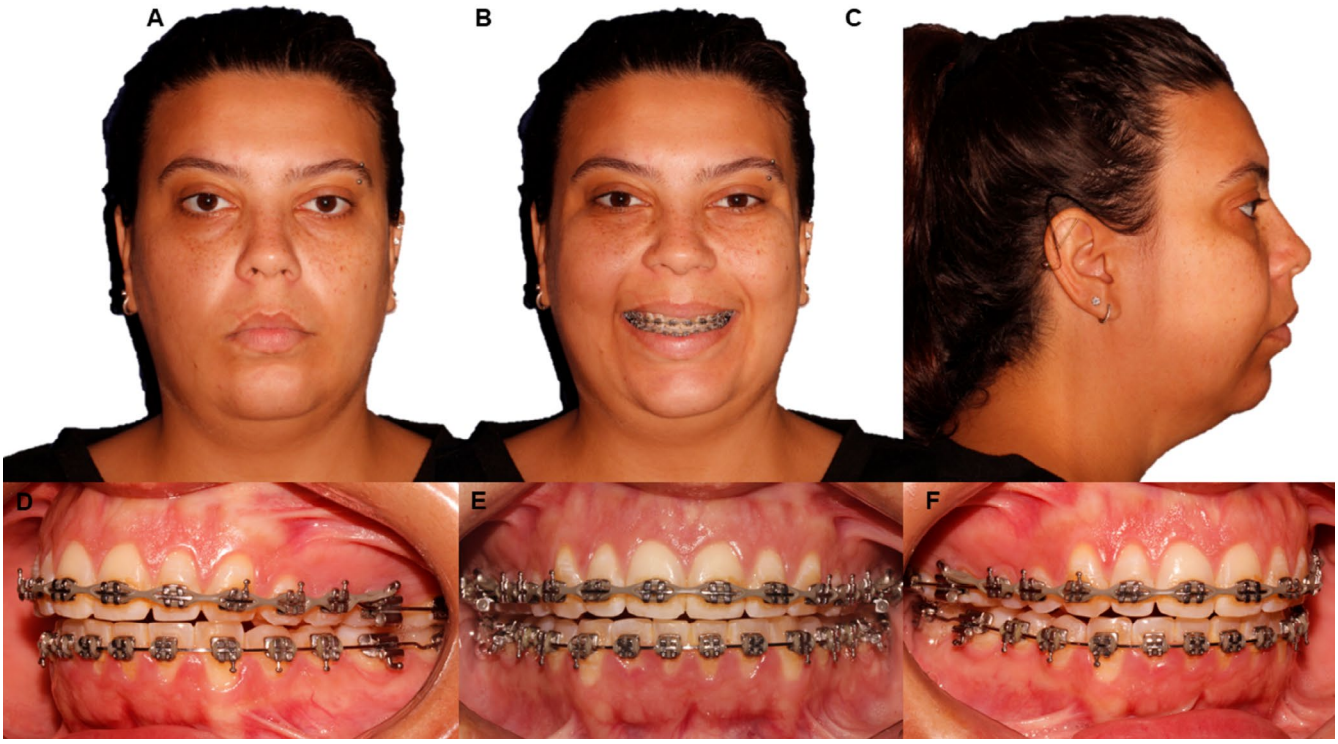

FIGURE 1 | Preoperative facial analysis and occlusion. (A) Frontal profile. (B) Frontal profile smiling. (C) Lateral profile. (D) ¾ Left occlusion. (E) Frontal occlusion. (F) ¾ Right occlusion.

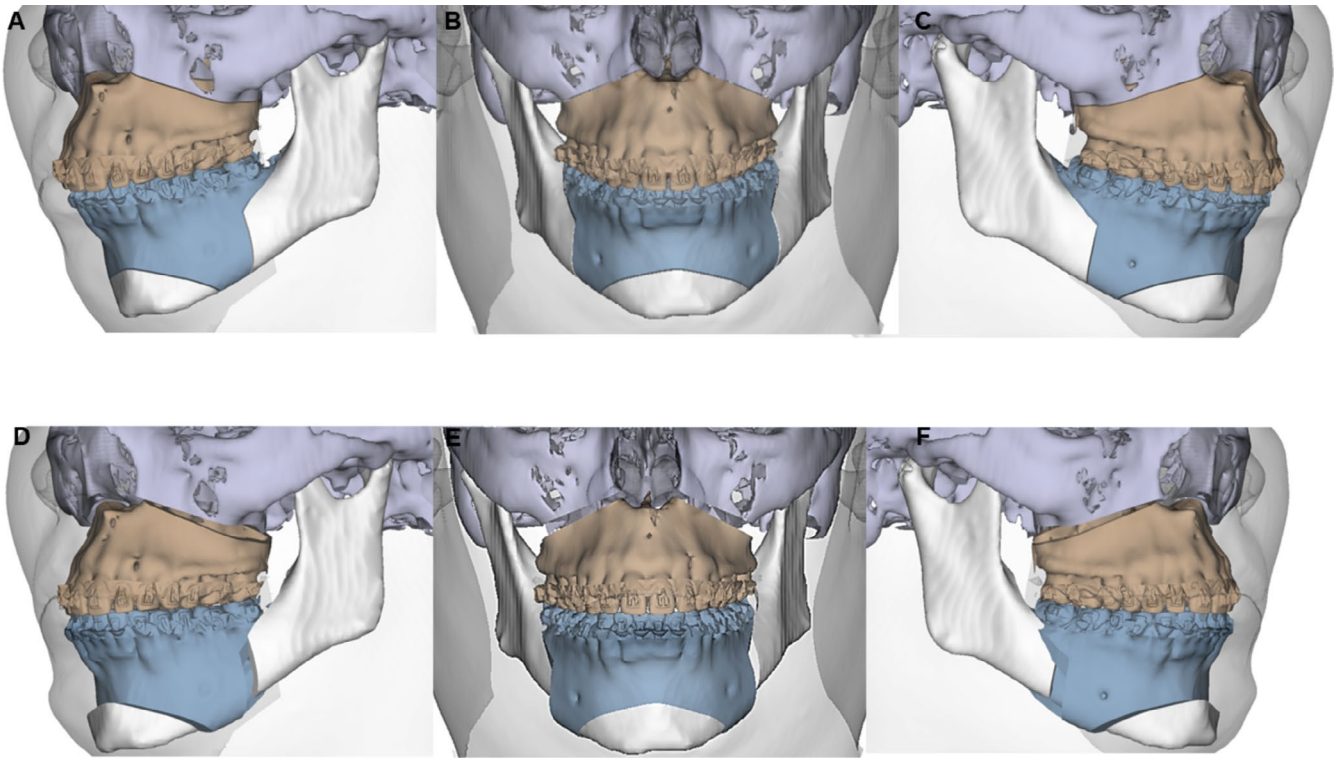

FIGURE 2 | Virtual surgical planning. (A) ¾ Preoperative left profile. (B) Preoperative frontal profile. (C) ¾ Preoperative right profile. (D) ¾ Postoperative left profile. (E) Postoperative frontal profile. (F) ¾ Postoperative right profile.

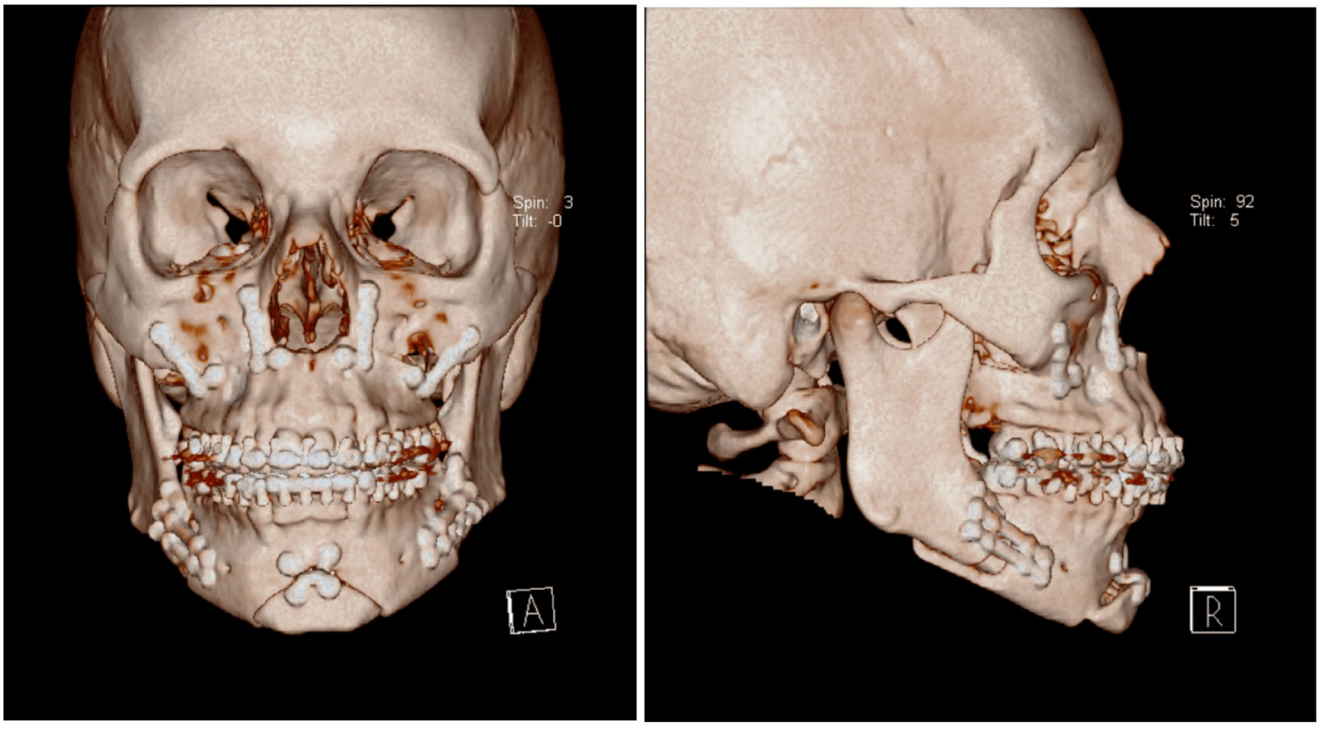

FIGURE 3 | Postoperative CT scan in frontal and lateral profile evidencing the final result.

mobilisation. Standardised postoperative photographs were obtained.

At 3 months postoperatively, further improvement in mandibular mobility was observed, with an interincisal distance exceeding 40 mm. The patient reported no pain or discomfort, no obstructive sleep apnea episodes, and had no dietary restrictions.

By 5 months postoperatively, interincisal opening had increased to 51 mm. Postoperative orthodontic treatment with braces was

completed approximately 6 months after surgery. Sequential postoperative photographs at 1-year follow-up were taken (Figure 4).

3 | Discussion

Patient recovery may be improved by minimising surgical trauma using a short split sagittal osteotomy. Phillips et al. demonstrated that less invasive orthognathic procedures are associated with reduced postoperative pain and faster functional recovery, aligning with the objectives of the SSO technique [7]. Posnick highlighted that optimising surgical outcomes enhances patient quality of life, suggesting that less invasive approaches may increase patient satisfaction [8].

Posnick emphasised that precise osteotomy design in segmental maxillary surgeries reduces complications [9]. This principle may also apply to the SSSO, as it minimises bone stress and trauma. Additionally, a low and short medial osteotomy modification has been shown to effectively reduce segmental interference, partly due to decreased protrusion of the posterior distal bone fragments [4, 10]. Several studies have reported a reduced risk of unfavourable splits with these techniques [11, 12].

The short split sagittal osteotomy (SSSO) potentially reduces inferior alveolar nerve injury by employing a shorter osteotomy line, thereby minimising nerve exposure. Westermark demonstrated that modified mandibular osteotomies with reduced extents resulted in fewer neurosensory deficits compared to the standard BSSO [13]. This supports the theoretical advantage of the SSSO in further decreasing nerve trauma.

Wolford introduced a mandibular inferior border split modification to enhance surgical precision and reduce nerve-related complications, consistent with the SSSO approach [14]. Posnick emphasised meticulous osteotomy planning to avoid nerve injury, reinforcing this potential benefit [9]. Susarla reported that all patients undergoing SSOs with a low medial horizontal osteotomy achieved bilateral functional sensory recovery of the inferior alveolar nerve by 1 year postoperatively [11]. Moreover, most patients reportedly achieve full functional sensory recovery within 6 months after surgery [15]. Initial lingual nerve dysfunction observed in this case aligns with reports in the literature for traditional [12].

Stability is a key concern for the SSO due to its reduced bone contact area. Haas proposed a stability hierarchy in orthognathic surgery, noting that BSSO with rigid fixation provides reliable outcomes, though relapse rates vary depending on movement type [16]. Stoelinga and Rubens demonstrated that miniplate fixation preserves skeletal stability following BSSO, a finding supported by Scheerlinck, who suggested that a shorter split osteotomy can also maintain stability with adequate fixation [17–19].

Elghany's study comparing the 'Posnick Osteotomy' with traditional SSO corroborates these observations, reporting shorter operative times and reduced incidence of unfavourable fractures [12, 13, 20]. Additionally, this approach offers improved visualisation of the inferior alveolar nerve and minimises medial dissection [20].

Our observations are consistent with prior reports suggesting potential advantages of the SSSO [11–13, 20]. More recently, Saygi et al. conducted a split-mouth randomised trial showing fewer early neurosensory disturbances with the low and short medial cut, while long-term outcomes were similar [21].

FIGURE 4 | 1-year postoperative result. (A) Frontal profile. (B) Frontal profile smiling. (C) Lateral profile. (D) ¾ Left occlusion. (E) Frontal occlusion. (F) ¾ Right occlusion.

These findings support the safety of the SSSO and align with the present case. However, most available evidence still comes from small or single-center studies, limiting definitive conclusions. Robust prospective clinical trials are still lacking, which restricts the ability to establish definitive conclusions regarding long-term stability and complication rates.

Although the SSSO demonstrated favourable outcomes in this case, it should not be regarded as a universal substitute for the classical BSSO. Its main advantages lie in minimising surgical trauma, reducing the risk of neurosensory deficits, and shortening operative time. However, its applicability may be restricted in complex mandibular movements, as the technique offers less intraoperative flexibility and limited possibilities for large or multidirectional advancements. Therefore, careful case selection is essential, and the SSSO should be considered primarily for patients requiring less complex mandibular corrections, where its benefits can be maximised without compromising surgical goals.

4 | Conclusions

The SSSO offers a simplified technique with reduced morbidity and shorter operative time compared with the classical BSSO. However, its use may be limited in complex mandibular movements, as intraoperative flexibility is reduced. Both techniques can yield predictable results when carefully selected. Larger prospective and multicenter trials are needed to clarify the long-term stability and comparative effectiveness of the SSSO.

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Consent

Written informed consent was obtained from the patient.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that supports the findings of this study are available from the corresponding author upon reasonable request.

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