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Technical Paper

Modification of the Bilateral Sagittal Split Osteotomy (BSSO) Technique: Increased Predictability, with Oblique Bone Cut in the Mandibular Basal Cortex - A Technical Note

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Abstract

Bilateral sagittal split osteotomy (BSSO) is one of the established procedures in orthognathic surgery. Although its original design has been improved over time with the aim of making this technique more predictable and reproducible. Combining several osteotomies in the ramus, angle, and body of the mandible, the BSSO technique is subject to several complications, such as those that alter the sensitivity of the inferior alveolar nerve and unwanted fractures. The literature cites that the latter can occur between 0.2 and 11.4% on each side of the osteotomy. In this group, buccal plate fracture was the most commonly found. Caution is needed when performing corticotomy on the lower edge of the mandible to minimize the risk of unwanted fracture. This technical note suggests a modification to the basal cortical osteotomy, proposing an oblique buccal-lingual cut. In our hands, this modification to the basal osteotomy has become more predictable and safer.

Keywords: *Bilateral Sagittal Split Osteotomy; Orthognathic Surgery; Mandible; Fixation; Miniplates.*

Introduction

Bilateral Sagittal Split Osteotomy (BSSO) is one of the most commonly used mandibular procedures in orthognathic surgery. Although its original design was revolutionary at the moment[1], over time, several authors have contributed to its improvement[2-7], all aiming to make this technique more predictable and safer.

Because it involves the combination of several osteotomies in the ramus, angle, and body of the mandible, the BSSO technique is subject to several complications, the most complex of which involve the sensitivity of the inferior alveolar nerve and unwanted fractures, also known as bad fractures. The literature cites that the latter can occur between 0.2 and 11.4% on each side of the osteotomy[8,9].

Steenen et al.[10] (2016) conducted a systematic review on bad split, considering age, presence of third molars, and surgical technique used, and found no representative item strongly associated with unwanted fractures. In an article by the same group, they reviewed patterns of bad fracture, and buccal plate fracture was the most commonly found[11]. Epker[3] (1977) already warned of the need for caution when performing a corticotomy on the lower edge of the mandible to minimize the risk of bad fracture, a fact recalled by Bockman et al.[12] (2015). Is they classic book, Epker, Stella and Fish[13] (1995) mentions that cutting the basal cortex until reaching the lingual portion would be decisive in making BSSO predictable.

This paper describes buccolingual osteotomy of the basal cortical bone, posteriorly from the vertical buccal corticotomy (Figures 1 and 2). Starting at the buccal portion and crossing the posterior basal cortical bone until reaching the lingual cortical bone. The basal step is not palpable, as this corticotomy is located under the pterygoid-masseteric muscle band.

Figure 1. Simulation on a polyurethane mandible of the buccolingual oblique cut showing the cut line on the mandibular basal cortex.

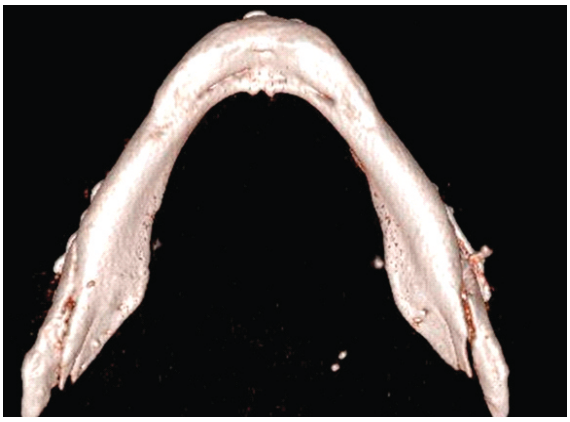

Figure 2. Note the oblique cut in the basal cortex, making the fracture more predictable.

Discussion and Conclusion

This modification was proposed and has been used as the main technical option by the author (Shinohara) since 2008. It can be performed with drills, saws, or piezoelectric inserts. An oblique cut at the lower edge of a BSSO can improve the predictability of the split and potentially reduce complications such as “inadequate splits” or nerve damage. It can guide the lingual fracture pattern, directing it more posteriorly and away from the inferior alveolar nerve (IAN). This modification aims to create a more controlled and predictable fracture, leading to a better surgical outcome.

Conflict of Interest

The authors declare no conflict of interest.

References

1. Trauner R, Obwegeser H. The surgical correction of mandibular prognathism and retrognathia with consideration of genioplasty. I. Surgical procedures to correct mandibular prognathism and reshaping of the chin. Oral Surg Oral Med Oral Pathol 1957;10(7):677-689.

2. Hunsuck EE. A modified intraoral sagittal splitting technic for correction of mandibular prognathism. J Oral Surg 1968;26(4):250-253.

3. Epker BN. Modifications in the sagittal osteotomy of the mandible. J Oral Surg 1977;35(2):157-159.

4. Bell WH, Schendel SA. Biologic basis for modification of the sagittal ramus split operation. J Oral Surg 1977;35(5):362-369.

5. Wolford LM, Bennett MA, Rafferty CG. Modification of the mandibular ramus sagittal split osteotomy. Oral Surg Oral Med Oral Pathol 1987;64(2):146-155.

6. Wolford LM, Davis Jr WM. The mandibular inferior border split: a modification in the sagittal split osteotomy. J Oral Maxillofac Surg 1990;48(1):92-94.

7. Sant'Ana E, Souza DPE, Temprano AB, Shinohara EH, Faria PEP. Lingual Short Split: A Bilateral Sagittal Split Osteotomy Technique Modification. J Craniofac Surg 2017;28(7):1852-1854.

8. Guernsey LH, DeChamplain RW. Sequelae and complications of the intraoral sagittal osteotomy

9. Akhtar S, Tuinzing DB. Unfavorable splitsin sagittal split osteotomy. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1999;87(3):267-268.

10. Steenen SA, van Wijk AJ, Becking AG. Bad splits in bilateral sagittal split osteotomy: systematic review and meta-analysis of reported risk factors. Int J Oral Maxillofac Surg 2016;45(8):971-979.

11. Steenen SA, Becking AG. Bad splits in bilateral sagittal split osteotomy: systematic review of fracture patterns. Int J Oral Maxillofac Surg 2016l;45(7):887-897.

12. Böckmann R, Meyns J, Dik E, Kessler P. The modifications of the sagittal ramus split osteotomy: a literature review. Plast Reconstr Surg Glob Open 2015;2(12):e271.

13. Epker BN, Stella JP, Fish LC. Dentofacial Deformities: Integrated Orthodontic and Surgical Correction. London: Mosby, 1995; 2nd Ed., vol. 1, page 213.