



CASE REPORT

Bad Split During Bilateral Sagittal Split Osteotomy of Mandible: Case Report

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Abstract

Bilateral sagittal split osteotomy (BSSO) is a well-defined process that moves the mandible in three directions of space and moves it into the correct position. BSSO has been described in the literature as a safe procedure. However, it includes some intraoperative and postoperative complications. The most common of these is the bad split. The aim of this article is to present bad splits cases and treatment methods. In our center had made 102 BSSO cases in 2012-2019 and 6 of these include bad split. 5 of these buccal plate fracture on proximal segment, one of these distal segment fracture include condylar process. All cases had managed intraoperatively with screw osteosynthesis and no need for additional precaution like rigid intermaxillary fixation or a prolonged stay. All patient were followed for 1 week, 1 month, 6 month and 1 year. None of patient had showed poor function or temporomandibular disorder postoperatively.

Even if a bad split consist of during surgery, no influence final result or postoperative course. Consequently, bad split is not avoidable all time. When treated well the chances of functional success are good.

Keywords: Orthognathic surgery, Bilateral Sagittal Split Osteotomy, Bad Split

Introduction

Orthognathic surgery is a commonly performed maxillofacial procedure with a documented safety record¹.

Bilateral sagittal split osteotomy (BSSO) of the mandible is one of the most common operative techniques used in orthognathic surgery. Since its initial description by Trauner and Obwegeser more than 50 years ago, various modifications have been advocated by Dal Pont, Hunsuck, and Epker to decrease the incidence of its complications².

Particularly in elective orthognathic surgery, it is important that surgeons inform their patients about the risk of these complications and attempt to minimize these risks³.

BSSO has included intraoperative and postoperative complications. Excessive bleeding, instrument fracture, foreign body, soft tissue injury, nerve exposure and nerve injury, dental complications and bad split are included intraoperative complications. On the other hand, sensory disturbance, temporomandibular joint disorder, bone necrosis, skeletal relaps, postoperative swelling, malocclusion, infection, psychological depression, respiratory difficulty, neck

pain, gastrointestinal disease are included postoperative complications^{4,5}.

One of the common operative complications during BSSO is a bad split. This unwanted fracture is normally located in either the distal (lingual plate) or the proximal cortical plate (buccal plate) of the mandible, and more rarely affects the coronoid process or the condylar neck⁶. The incidence of bad splits varies between 0,9 and 20%. Nevertheless, risk factors should be identified and reduced so far as possible, particularly because it is an elective operation⁷.

The role of impacted third molars in unfavorable splits is controversial. Third molar extraction decision depend on surgeon experience and choosing method, the site, angulation, relative height and root form of the third molar and its morphological relation to the neurovascular bundle. If the surgeon has large experience, extraction third molar surgery and the same time BSSO has some advantages. Removing third molar during BSSO allows better operative view and reduces the risk of injury to the inferior alveolar nerve. Besides, other time surgery may cause occur bone loss from osteotomy line. But in not well defined cases, this operation procedure not always safe and may cause occur neurosensorial injury⁸.

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On the other hand, many study say that, tooth extraction should be done at least 9 to 12 months before surgery to allow for complete socket bone fill and maturation ³.

During the osteotomy can use chisels and separators. Mensing et al. says that using chisels in separation for fragment is safer than using separators for avoid neurovascular bundle injury⁶.

Mandibular morphology has been reported to influence both the difficulty of the procedure and the risk of bad splits. Angulation in bone on the osteotomy line may cause increase the risk of this complication ⁵.

Some authors found that older age was a risk factor for bad splits. Other authors, however, reported that younger patients have an increased risk for bad splits. The higher incidence of bad splits in younger patients may be due to larger number in that age group ^{3,5,9}.

Consequently, there is no consensus in the literature as to what combination of factors predisposes to a bad split.

When bad split occur, some consequences may cause. These are mechanical instability, disturbance in body union, bone sequestration, infection, temporomandibular joint dysfunction syndrome, neurovascular damage and increase relaps risk ^{10,11}.

When bad split occurs, the first rule is careful inspection on area. For inspections, periosteum dissections are needed. As a consequences of dissection may occur intraoperative swelling and affect proximal segment. Excessive swelling withn joint an increase vertical joint space and in postoperative process can cause temporomandibular dysfunction ⁷.

Case Series

The various types of bad split may require different salvage approaches ⁷.

Case 1: A 24- years old female patient was referred our clinic by orthodontic clinic for orthognathic surgery.



Fig 1: Inferiorborderofmandiblewasattacheddistalsegment.

Corpus mandible was so concave and during medial split, inferior border of mandible was attached distal segment. After carefully inspactation, team had seen that distal segment include neurovascular bundle. Then, team decided that operation should be complete in thiscircumsentes.

Case 2: A 27- years old female patient was referred our clinic with a complain of prognathicmandible. She was found suitable for orthognathic surgery after radiographic and clinical examinations.



Fig 3: Corpus mandible was so thin. During osteotomy when using chisels proximal segmentbuccal wall was broken.

Fig 4: Broken and removed bone part.

According to operation's plan, mandible set back proccude should had been complete. Segments of bone were close thanks to this procedur. And this bone part had not connect periosteum. Team had decided prefer remove this part of bone and finish mandibular set backoperation. Besides, this decision can protect for bone part from sequestration

In this case, for mandibular set back operation, none ed brokenpart osteo syntesis.

In the literature, proximal segment repatation is easily than other bad split's types. The difficulty of proximal segment fracture reduction depends on the fractured segment size and anatomical location ⁷.

When performing BSSO, high lingula position, high osteotomy line on horizontal split, excessive force for using chisel can cause bad splits on distal segment. In this area bad splitcan be occur a vertical line of lingual cortex of mandible, distal segment can be include coronoid process and distal segment

can be include coronoid process and joint area. It has been proposed that when third molar area is thin than desiare, bad split can be occur in lingual cortex of mandible. Third molar extraction complete 9-12 month before surgery can be protect for this type of split.

Case 3: A-28 years old male patient was referred to our clinic for orthognathic surgery.

High lingula position and high osteotomy line on horizontal split, incomplete osteotomy line on assending ramus area can be cause bad split influence condyle and coronoid process region.



Fig 5: During BSSO, many area had been bad split. On the surgery, this complication had treated with three screws.

High lingula position was cause high osteotomy line on horizontal split. During osteotomy, bad split was occur condylar process. Dissection was complete this region then condyl was stabilized proximal segment with two screws. Then new horizontal osteotomy line was created. During the medial osteotomy buccal cortex of mandible was broken because of mandible corpus was so concave. It was seen that broken bone part was connected to periosteum then team had decided reunion this part with one screw.

Lingual segment fractures may be challenging to repair. Because, this part of bone is not seen easily therefore surgeon must be complete osteotomy for his experience and this area is not stabilized with ease.

Discussion

BSSRO has some intraoperative and postoperative complications. One of the most common of these is the bad split.

In our clinic, complete a total of 102 bilateral sagittal split osteotomies, these of six bad splits occurred, including five buccal plate fractures, one distal segment fractures on condylar process. All bad splits were managed intraoperatively without the need for specific additional measures, such as rigid intermaxillary fixation or a prolonged stay. All the fragments were immediately stabilized using screws osteosynthesis. All cases showed good and functional occlusion 6 months postoperatively.

Even if a bad split occurs, this has no influence on the postoperative course or the end result. All bad splits could be easily repaired by additional osteosynthesis measures resulting in enough rigid skeletal fixation, not require post operative intermaxillary fixation.

As a final remark, the occurrence of bad splits cannot always be avoided. When treated well the chances of functional success are good ².

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Source of Finance

Not applicable

Conflicting Interests

Not applicable

Authorship of Contributions

SDS wrote the article.

TB, YF and GK designed the research and performed surgery.

MFŞ is our language supervisor.

TY is collected the references and cited them.