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Research Article

Role of CBCT in the Success of BSSO in Patients with Thin Ramus

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Abstract

Introduction: BSSO is one of the most common surgeries performed in the correction of dentofacial deformities. This procedure is planned usually using OPG and lateral cephalogram. The mesio distal width of the ramus of the mandible is better visualised in all three dimensions in a CBCT. This study aims at studying the efficacy of CBCT especially in class 3 skeletal malocclusion patients and analysing if it is really a worthy addition to pre surgical planning.

Materials and Methods: 20 class 3 skeletal malocclusion patients posted for BSSO surgery were selected and CBCT of their mandibles were analysed in the mandibular ramus region and along the mandibular canal along with routine OPG and lateral cephalogram and the BSSO surgery was modified for each patient, taking into account the exact width of the ramus and the positioning of the mandibular canal of the particular patient.

Results: Of the 20 patients 7 had abnormally thin ramus. All the surgeries however went as planned and no intraoperative complications were faced.

Conclusion: CBCT is a valuable addition to pre surgical imaging and surgical planning especially in class 3 skeletal malocclusion cases with thin ramus undergoing SSO.

Keywords: *CBCT; BSSO; Mandibular Prognathism; Ortho Gnathic Surgery; Surgical Planning; Mandibular Osteotomy; Ramus Assessment; Class 3 Malocclusion; Facial Asymmetry; Aesthetic Surgery*

Abbreviations

CBCT: Cone Beam Computed Tomography; BSSO: Bilateral Sagittal Split Osteotomy

Introduction

Bilateral sagittal split osteotomy is one of the most commonly performed surgeries in the correction of dento-facial deformities. This procedure allows the surgeon to achieve mild to moderate advancement or set-back of the mandible. Most commonly used imaging tools for Orthognathic surgical planning are the Orthopantomogram and lateral cephalogram. Even extensive cephalometric and model analysis doesn't give us complete information about the mesio distal size of the ramus of mandible at different heights. This is an important anatomical variation among individuals especially those with class 3 skeletal malocclusion who tend to have elongated mandibles resulting

in thin mandibular ramus. This poses significant risk while a sagittal split cut is placed and the ramus is split during the Bilateral Sagittal Split Osteotomy procedure. The advent of Cone Beam Computed Tomography has made it much easier to see the exact mesio distal length of the ramus in the axial plane so that the cuts can be planned to suit the specific patient in question thereby significantly reducing the risk of unfavourable cuts and the need for any unplanned intraoperative modifications.

Materials and Methods

20 patients with mandibular prognathism [class 3 skeletal malocclusion] who were posted for Bilateral Sagittal Split osteotomy procedure were selected and their Cone Beam Computed Tomography was taken. Along with conventional radiographic pre-surgical planning, cephalometric analysis and model surgeries, the CBCT images were also analysed in all three planes, especially in the mandibular ramus area and along the course of the mandibular canal and the modified osteotomy cuts were selected to suit the particular patient's mandibular anatomy.

Results

Of the 20 patients 7 patients had abnormally thin ramus mesio distally. A 3-dimensional measurement of the ramus was done while planning the surgery and the measurements were noted down along with the other cephalometric values. Of the 20 patients, none encountered any complications intraoperatively such as a bad split or a fracture of the ramus. The cuts were placed in the pre-planned sites and at the pre-planned exact measurements and were executed with ease and no intra-operative last minute modifications were required. The mandibular canal and nerve were neither encountered nor disturbed in any of these patients. Healing was uneventful and none of them reported any post operative neurological disturbances either.

Discussion

The first mandibular osteotomy was done in the year 1849 by Hullihen, a case of surgical correction of a protruded mandibular segment [1]. From then on a wide range of modifications of the cuts have been proposed and are being used to correct mandibular skeletal abnormalities. Although the rate of complications occurring in BSSO surgery intraoperatively is low at the level of only 8.2% [2], a surgeon must do everything under their control to try and prevent even that from happening. The buccolingual thickness of the ramus at the level of the lingula greatly influences the risk of bad split Intraoperatively [3]. CBCT is the best imaging tool to study the anatomy of the mandibular canal [4]. Inadvertent manipulation of the mandibular nerve intraoperatively significantly increases the risk of developing postoperative neuro-sensory disturbances [5]. Studies have proven that the visualisation of the mandibular canal using CBCT is significantly better as compared to 2-dimensional radiographs [6]. 3D printed precise models of the mandible can be also made with CBCT scans which can be used for model surgery and pre surgical planning [7].

Conclusion

The successful completion of all the BSSO surgeries planned with CBCT by us without any intraoperative complications is consistent with existing literature regarding the same and establishes that CBCT evaluation is a valuable additional tool in the planning of SSO surgeries.

For the purpose of studying the anatomy of the bone, especially in small regions like the maxillo mandibular complex, CBCT even proves to be of great value. With the rising numbers of CBCT scan centres, we hope the cost of scanning also will reduce considerably in the near future.

Conflicts of Interest

None.

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