

## Mandibular Body Step Osteotomy-Revisited

Uday Sagar Sandepogu\*, R. V. Kishore Kumar, Sridhar Reddy Kanubaddy

Dept of Oral and Maxillofacial Surgery, Narayana Dental College and Hospital, Nellore, Andhra Pradesh, India

\*Corresponding author: Uday Sagar Sandepogu | Received: 22.02.2019 | Accepted: 06.03.2019 | Published: 30.03.2019  
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### Abstract

### Case Report

The step osteotomy has been used to treat mandibular prognathism, retrognathism, apertognathia and asymmetry. A patient presented with a mandibular excess with posterior edentulous space. After presurgical orthodontic treatment, mandibular body osteotomy was performed in the missing first molar region. The step osteotomy may also be used to treat mild to moderate mandibular asymmetry. By extracting a tooth on the, one may rotate the anterior fragment toward that side as in the prognathic patient and the on the contralateral side, the mandible is advanced or rotated.

**Keywords:** Mandibular prognathism, step body osteotomy, retrognathism, posterior edentulous space.

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### INTRODUCTION

Dentofacial deformity in the lower third of the face resulting from excess mandibular growth is not as common as mandibular deficiency. The cause of mandibular excess is disparate vertical and horizontal growth in the lower third of the face as compared with upper face. Various mandibular body osteotomies for the correction of mandibular prognathism are v, y, inverted y, rectangular and body step osteotomies.

The step osteotomy has been used to treat mandibular prognathism, retrognathism, apertognathia and asymmetry. The first report of the step osteotomy was given by Pichler in Vienna in 1918. The mandibular step osteotomy is extremely suitable for those patients in whom premature extraction of teeth has led to edentulous spaces in the dental arch posterior to the canines or in cases of congenitally missing teeth[1].

By performing bilateral step osteotomy cuts in the body of the mandible, the lower jaw is divided into three separate independently movable pieces. The anterior fragment can be retruded to treat prognathism, advanced to treat retrognathism, rotated to treat transverse discrepancy, and moved vertically or tilted to treat open bites. Here, we present a case of mandibular prognathism in which we successfully performed mandibular body step osteotomy with minimal injury to the inferior alveolar neurovascular bundle.

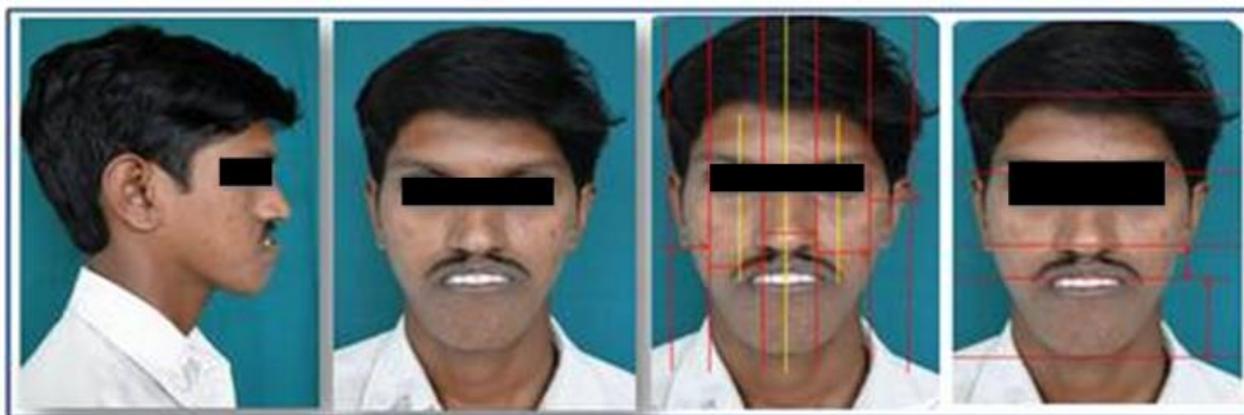
### CASE REPORT

A 27 year old male patient reported to the department of oral and maxillofacial surgery, narayana dental college and hospital nellore, with a chief complaint of forwardly placed lower jaw. On examination he presented with following characteristics (fig no 1)

1. Concave profile
2. Acute nasolabial angle with Protrusive lower lip
3. Shallow mentolabial sulcus
4. Dolicocephalic and leptoprosopic facial form
5. Consonant type of smile, teeth exposure of full incisor during speech and 4mm gingiva on smile
5. Increased lower anterior facial height and temporomandibular joint pain that was recurrent & nonspecific.

Intraoral examination revealed (fig no 2)

1. Class III malocclusion
2. Overjet and overbite were 1mm respectively
3. Also midline incongruent – maxilla shifted to right by 2mm
4. The maxillary and mandibular arch forms were u-shaped
5. Average sized Tongue
6. Oral hygiene - satisfactory
7. Absence of periodontal Periodontal problems
8. Absence of periodontal Periodontal problems
8. Temporomandibular joint pain that was recurrent & nonspecific
8. Missing bilateral mandibular first molars.



**Fig-1: Extra oral facial evaluation**



**Fig-2: Intra oral examination**

Later, patient was evaluated with regular radiological investigations followed by cephalometric analysis (table no 1) which revealed prognathic mandible with increased corpus length and increased

lower anterior facial height. Patient underwent presurgical orthodontics for a period of 9 months to level, align and to coordinate the arches to attain adequate space available for the osteotomy.

**Table-1: Cephalometric values of patient**

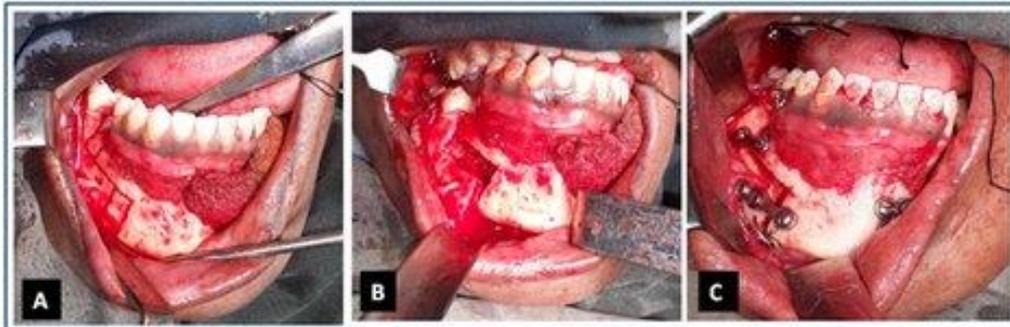
	Male	Female	general inference	Pt values	Inference
N-A-Pg	3.9°±6.4°	2.6°±5.1°	Positive - convex profile. Negative - concave profile	- 14°	Concave
N-B	-5.3±6.7	-6.9±4.3	Describes the position of apical base of mandible irt nasion	+12 mm	Prognathic mandible
ANS-Gn	68.6±3.8	61.3±3.3	Gives lower third face height	83 mm	Increased LAFH
Go-Pg	83.7±4.6	74.3±5.8	Gives mandibular body length	98 mm	Increased Corpus Length
A-B	-1.1±2.0	-0.4±2.5	Gives us relationship between max & mand apical base irt occlusal plane	14mm	Class III pattern

At the end of the orthodontic treatment, the patient's condition was re-evaluated with the use of cephalograms and study models. Due to preexisting missing molars mandibular body osteotomy was planned rather than bilateral sagittal split osteotomy. A setback of 6 mm via bilateral Z or step body osteotomies was planned.

**Surgical procedure**

Under general anaesthesia, vestibular incision was made from bilaterally along the labial and buccal vestibules followed by mucoperiosteal flap reflection by

taking care not to respect the mental nerve. The lines of osteotomy were scribed with fissure bur as per the preoperative analysis performed for the setback. The osteotomy was done under the visual protection of the nerve. The horizontal line of osteotomy lies at 3-5mm above the foramen to give adequate space to protect neurovascular bundle. Osteotomies are performed (Fig no 4) at the sites of the two vertical cuts, and the anterior fragment of the mandible is subsequently retruded. After bringing the sectioned fragments into the preoperatively determined occlusal relation, the segments are rigidly fixed by miniplates.



**Fig-4: Intra operative A: Osteotomy markings C: Vertical osteotomies and horizontal osteotomy F: Fixation with miniplates**

**Table-2: Post-operative Cephalometric values of patient**

	Male	Female	Pre Treatment	Mid Treatment	Post Surgery
N-A-Pg	3.9°±6.4°	2.6°±5.1°	14°	-16°	-8°
N-B	-5.3±6.7	-6.9±4.3	+12 mm	+8mm	+3mm
ANS-Gn	68.6±3.8	61.3±3.3	83mm	78mm	75mm
Go-Pg	83.7±4.6	74.3±5.8	98 mm	96mm	86mm
A-B	-1.1±2.0	-0.4±2.5	14 mm	-13mm	-2mm

Post operatively clinical and cephalometric evaluation showed acceptable results. Patient presented with improved facial aesthetics and was satisfied with his appearance and self-esteem. Post operatively patient

presented with same left temporomandibular joint and ear pain for which he was referred to department of ENT surgery, diagnosed with breached tympanic membrane and later managed for the same.



**Fig-5: A-Post operative lateral profile showing the corrected prognathic mandible, B- post operative cephalogram**



**Fig-6: A, B, C - post surgical occlusion**

**DISCUSSION**

A mandibular body osteotomy should be considered when the correction for mandibular excess is small. Radiographic examination of the potential osteotomy sites is very important for evaluating Tooth-root angulation, Position of the mental foramen, Mandibular canal Bony architecture.

Indications for mandibular body osteotomy are Mandibular prognathism with edentulous spaces in posterior dental arch provided with dental normal occlusion in the posterior molar region. Step body osteotomy is planned in presence of non-restorable teeth in the lower arch where osteotomy is planned around their extraction site. Step osteotomy is combined with pre surgical and post-surgical orthodontics to

attain better alignment of the dentition or to close diastemas. The step osteotomy should not be performed in cases with a steep mandibular plane angle as it will further create a oddly shaped mandible and if the occlusal analysis of a case showed a total mandibular advancement or total mandibular set back are more advantageous.

Certain advantages of step osteotomy were listed in the literature are the accuracy of cutting is ensured due to its excellent visibility, the osteotomy avoids the pterygomasseteric sling preventing hematoma and edema, as the muscles of mastication are left totally undisturbed the chances of relapse is less when compared with ramus procedures and is more flexible than total mandibular procedures since it allows a wide range of movement of the anterior and posterior fragments [1].

This variant of body osteotomy has its own disadvantages that includes teeth has to be sacrificed to provide space for osteotomy, approximation of mental nerve thus sensory disturbances of the lower lip are possible, risk of encroaching too closely to the apical foramina of the teeth in the area of the horizontal bone cut leading to disruption of the periapical circulation may lead to dental pulp necrosis. In cases where the anterior fragment of the mandible is advanced by the step osteotomy, a bone graft is needed to fill the defects created by the advancement. key point to be considered in step body osteotomy is to protect the nerve during osteotomy and prevent parathesia of inferior alveolar nerve in the mental region [2].

Possible complications with regard to step body osteotomy were sensory disturbance, crestal bone loss, loss of anterior teeth vitality, adjacent teeth damage during osteotomy, relapse, infection, post-operative occlusion[3].

Fordyce's and wedgewood reported with bilateral mental nerve anesthesia as an early feature of all cases of which 13% cases with long-term paresthesia [4]. Kent and hinds in their study of anterior alveolar surgery mentioned loss of 1-5 mm of crestal bone 1 year after surgery [5].

## CONCLUSION

The step body osteotomy is a versatile procedure with wide range of applications. It is indicated in cases of mandibular prognathism, deficiency, mandibular asymmetry, and open bite. This variant of body osteotomy is considered as apt patients with posterior edentulous spaces. inspite of its application in prognathic mandible factors like mental foramen location, root lengths at the planned osteotomy , tooth root angulation, chances of paresthesia of lower lip and pulpal necrosis are to be considered.

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