

## Surgical Correction of Mandibular Prognathism

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### Introduction

Prognathism is one of the common developmental deformity affecting the mandible. The problem is both cosmetic and functional. The patient is conscious of this protruding chin and oblong face. He is unable to bite with his incisors—the upper ones being behind the lowers. He also finds difficulty in mastication, there being a class III type of malocclusion where the first lower molar occludes with the upper premolars. (Fig. 1) The patient is una-

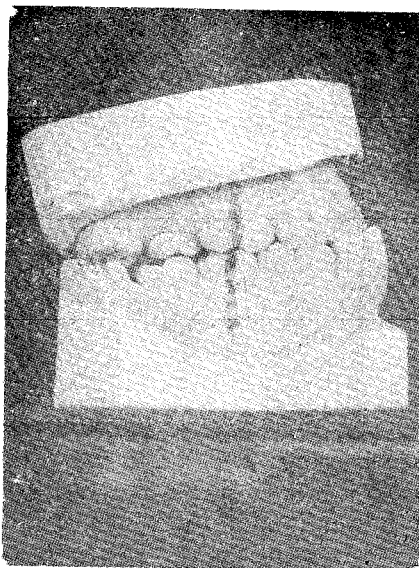


Fig. 1—Shows the malocclusion in Mandibular Prognathism

ble to correct this malocclusion even by forced retrusion of the lower jaw. The angle of the mandible is more obtuse than normal, and there is lack of sufficient space between the upper and lower molars, which in extreme cases, often result in an open bite. Unless the deformity is minimal, orthodontic treatment alone cannot restore the function or appearance in these patients. The problem being one of skeletal dysplasia, surgical correction is imperative in most of these cases.

### Surgical procedures available

Various surgical operations have been advocated for the correction of mandibular prognathism. These operations fall in to two broad groups :—

- a) Operations on the body of the mandible
- b) Operations on the ascending ramus.

#### A. Operation on the body of mandible

Blair (1915) first advocated extraoral removal of a section of bone from each side of the body of mandible and sliding back of the anterior segment into normal occlusive relationship with the maxillary teeth.

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Dingman (1944) modified the procedure by doing the operation in two stages, first intraoral and then extraoral, to save the inferior dental nerve.

Converse and Shapiro (1952) improved the above procedure still further by introducing the step—osteotomy by one stage intraoral approach and thereby increasing the area of bony contact between the fragments.

In addition to careful planning, operation on the body of mandible necessitates extraction of sound teeth and are liable to damage the inferior dental nerve. These operations are also not sound in principle because, in mandibular prognathism, the skeletal overgrowth is behind the 3rd molar teeth and the teeth bearing alveolar region of the mandible is usually in proportion with that in the maxilla. Operations on the body of the mandible might restore the malocclusion and reduce the chin protrusion but will fail to correct the wide obtuse angle of the jaw and the lack of space between the upper and lower molars.

Retromolar step-osteotomy eliminates the need of sacrificing any teeth in the dental arch but the danger to the nerve remains. It is also difficult to control the edentulous posterior fragments which tend to flex forward by the pull of muscles attached to the ramus.

### **B. Operation on the ascending ramus**

Dufourmentel (1921) advised resection of the condyles for the correction of prognathism. Kostecka (1931) popularised a blind osteotomy of the subcondylar region

by Gigli saw. Smith and Robinson (1954) improved the procedure by introducing the sigmoid notch operation, wherein a quadrangle of bone is resected from the region of the sigmoid notch and the mandible is set back into correct dental occlusion. The fragments are held in position by direct wiring. The main advantage of this operation is that it can be carried out by the preauricular approach leaving behind an inconspicuous scar. The lateral pterygoid tendon attached to the condylar fragment also help in maintaining the bony contact. Careful preoperative planning is however needed to determine the amount of bone to be resected. The wiring of the fragments and their maintainance in correct position are also difficult. In most cases, by the time the operation is completed on both sides, there is overriding of fragments, necessitating prolonged period of immobilisation. In addition, the operation being close to the T.M. Joint, subsequent joint function is likely to be interfered with.

Horizontal osteotomy of the ramus (Blair 1907) when carried out at a high level, avoids damage to the nerve and corrects malocclusion without tooth extraction. But, as in subcondylar operation, it fails to reduce the obtuse angle of the mandible so that the oblong appearance of the face persists. The area of bony contact being small, immobilisation has to be rigid and prolonged. To increase the area of bony contact, Kazanjian (1954) advocated a level cut to section the ramus obliquely. But, inspite of this improvement, continued activity of the muscles attached to the proximal fragment always tends to flex it, reducing the area of contact— and resulting

in gaging in the molar region.

Vertical osteotomy of ramus (Cladwell and Letterman, 1954) also correct malocclusion without danger to the nerve or extraction of teeth. (Fig. 2) It reduces the wide

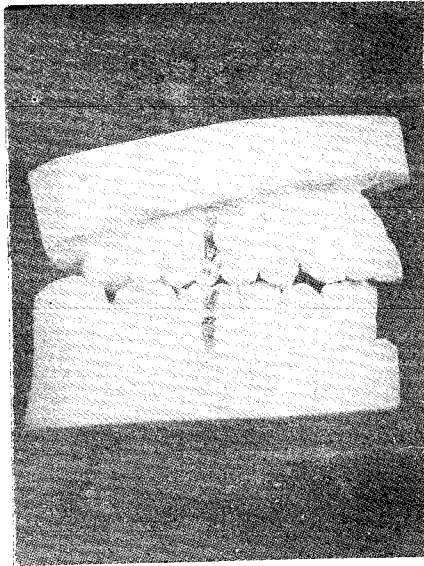


Fig. 2—Shows the correct occlusion after operation

obtuse angle and increases the space between the upper and lower molars. The wide area of bony contact, achieved by partial decortication and overlapping of the fragments, encourages sound bony union after a short period of immobilisation. The operation is simple and relatively quick, and very little pre-operative planning is needed.

#### **Vertical osteotomy of Ramus**

Through a submandibular incision full extent of the ascending ramus is exposed by subperiosteal stripping of the masseter and medial pterygoid muscles. The proposed line of osteotomy is marked out by making multiple drill holes starting from the sigmoid notch to the angle of the jaw, along a line

just behind the mandibular fragment, as judged by pre-operative X-rays. With the help of dental drills, the cortical bone is removed from the outer surface of the anterior fragment, over a vertical strip roughly corresponding to the desired amount of bony overlap with posterior fragment. (Fig. 3)

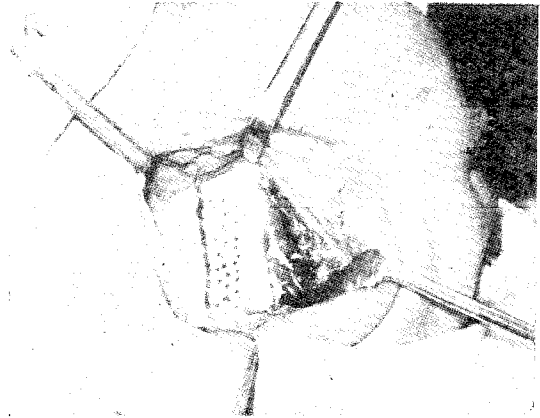


Fig. 3—Shows the line of vertical osteotomy (right) and decortication of anterior fragment of ramus

The part of the ramus posterior to the proposed line of osteotomy is also perforated by numerous drill holes. The coronoid process is divided by an oblique cut and the osteotomy completed by joining the drill holes. The same procedure is carried out on the opposite side—and the operation wounds are temporarily covered by sterile packs. (Fig. 5)

The mandible is then set back into proper dental occlusion and immobilised with the help of prefixed dental splints and wires. After a change of gloves and towels, the ramal fragments on the either sides, are immobilised by interosseous wires, in overlapped position, with the posterior fragments over-riding the anterior fragments—

and the wounds are closed. (Fig. 4&6)

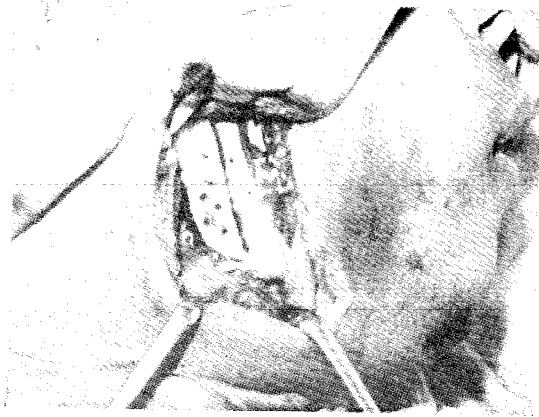


Fig. 4—Shows the overlapping of ramal fragments right and wire fixation after mandibular set-back

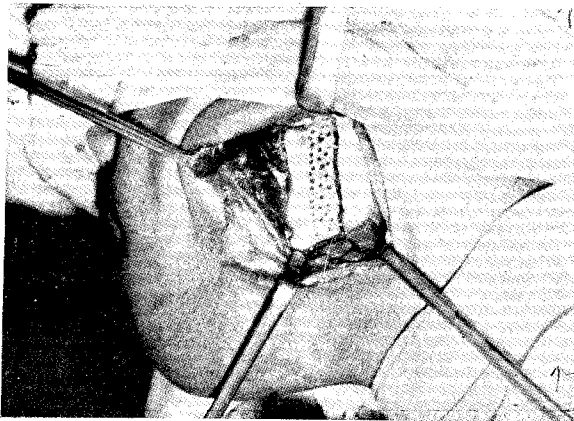


Fig. 5—Shows the line of vertical osteotomy (left) and decortication of the anterior fragment of ramus

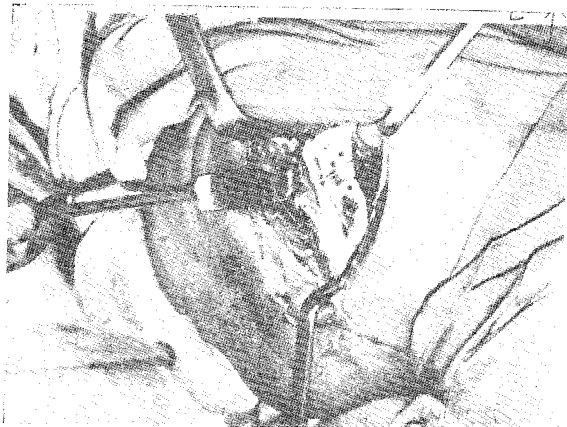


Fig. 6—Shows the overlapping of ramal fragments (left) and wire fixation after mandibular set-back



Fig.7—Preoperative appearance in case 1

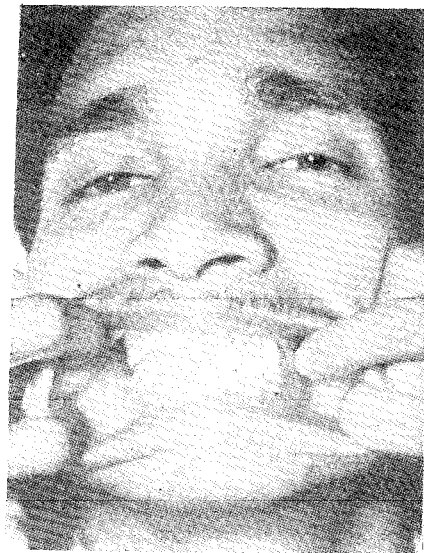


Fig. 8—Post-operative dental occlusion in case 1

Immobilisation is carried out for 4—5 weeks to achieve complete bony union of the mandible in the corrected position.

**Case Reports :**

*Case 1*

Havildar Thomas, 23 years, reported to a dental surgeon with complaints of mal-



Fig. 9—Post-operative appearance with mouth open in case 1



Fig. 11—Pre-operative appearance in case 2

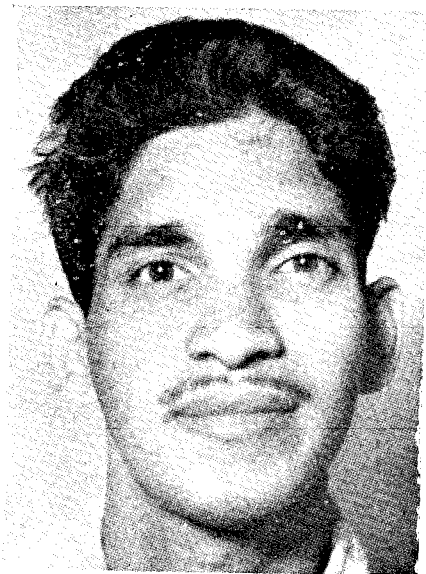


Fig. 10—Post-operative appearance with mouth closed in case 1

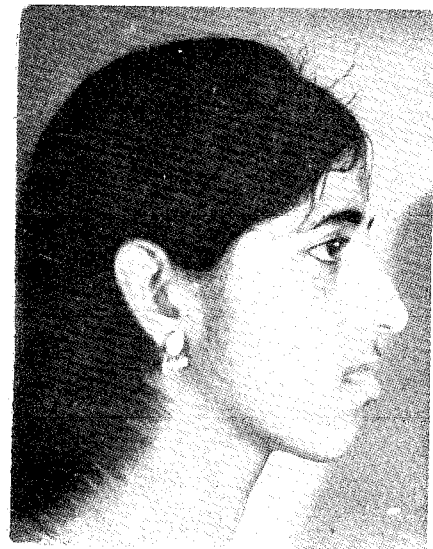


Fig. 12—Post-operative appearance in case 2

occlusion of teeth and protrusion of chin. Attempts were made to correct the malocclusion by extraction of teeth and fitting of dentures. When he came to us, his lower

incisors and canines were missing and in the upper jaw he had only two molars left on either side. The chin was protruding and his face was oblong. Vertical osteotomy of the ramus was carried out on either side with

satisfactory results. The patient was fitted with new dentures in corrected dental occlusion.

#### Case 2

Indu, aged 18 years came to us with marked dental malocclusion, protruding chin and an oblong face. Preliminary orthodontic treatment had been carried out with extraction of premolars to correct overcrowding of maxillary incisors. Vertical osteotomy of ramus was carried out on either side through submandibular incisions and the jaw immobilised for 5 weeks. The result was highly satisfactory from the cosmetic and functional point of view.

#### Summary :

1. The underlying skeletal defect and dental malocclusion in mandibular prognathism have been analysed.
2. Various surgical procedures available for its correction have been reviewed.
3. The advantage of osteotomy of ramus as compared to other procedures have been discussed.
4. The operative technique of vertical osteotomy has been described in detail with clinical photographs.
5. End results of vertical osteotomy being uniformly good the operation is recommended for wider use.

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