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Surgical Treatment of Mandibular Prognathism.

By

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During the year of 1949, 36 cases of mandibular prognathism were operated on at Dept. XII of Ullevål Hospital. Including these 36 cases, the total number of cases operated on at this department amounts to 340 cases.

The influx of patients with mandibular prognathism is still very large. We are thus constantly confronted with the problems concerning the surgical treatment of this condition and are bending every effort to improve our methods. Having treated more than 300 cases, we have naturally gained considerable experience in the field of surgical correction of this condition. When confronted with a new case the first problem which arises is whether or not the patient will benefit sufficiently to warrant corrective surgery. Patients are occasionally referred to our department with a diagnosis of mandibular prognathism where the analysis of the face and the study models show that the anomaly actually is situated in the upper jaw. The deformity may be due to underdevelopment of the premaxilla, or to a high narrow palate or, more rarely, to impacted teeth. In such cases there is often hyperplasia of the lower jaw, though the profile may be harmonious. Evaluation of the patient's profile and the study models will decide whether the case should be operated on or not. The occlusion must be compared with that obtainable by surgical correction, and consideration should be given to the possibility that the chin may be too small if the lower jaw is set back to the most desirable occlusal position. This, however, may be corrected by transplanting a

piece of bone to the frontal portion of the mandible. There may be indication for setting the mandible back a distance which corresponds to what is considered the actual prognathism and establishing good esthetics by accentuating the maxillary denture labially to support the upper lip. This may at times prove advantageous in cases of cleft palate. In the current literature on sur-

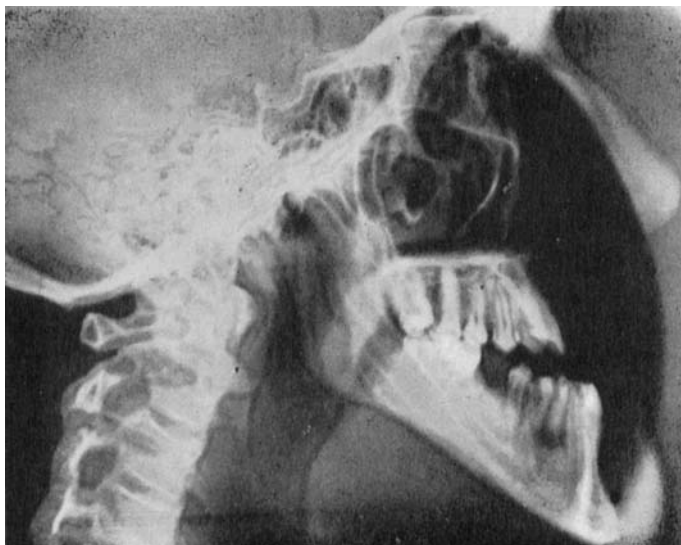


Fig. 1. Prognathism with a pronounced obtuse angle of the mandible and an open bite. The osteotomy should be performed on the body of the mandible.

gical treatment of prognathism some authors recommend osteotomy of the rami while others recommend excision of a section of the body of the mandible. Both methods have their advantages and disadvantages. While we previously performed the osteotomy routinely on the ramus we now analyze the patient's profile and the study models to determine which of the two methods is the more advantageous. A highly obtuse mandibular angle, which is a not infrequent occurrence in mandibular prognathism, is an indication for sectioning of the body of the mandible. A far better cosmetic result is obtained by this procedure than by osteotomy of the ramus. The latter procedure leaves an obtuse angle, in which case an open bite may easily occur. Also, the distance from the mouth to the tip of the chin may remain too long without sufficient improvement in appearance. In our opinion sectioning

of the body of the mandible should be performed in the sixth-year molar region, *i. e.*, just in front of the anterior margin of the masseter muscle following extraction of the first molars. In one of our cases one of the first molars was extracted on the day of operation. Communication between the osteotomy wound and the oral cavity was thus established, but penicillin treatment was instituted and the postoperative course was uneventful.

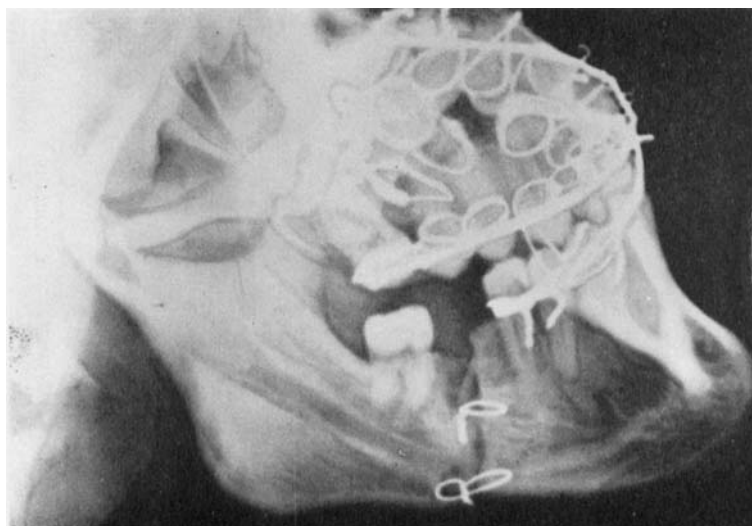


Fig. 2. Osteotomy has been performed in the six-year molar area. The inferior alveolar nerve and artery have been dissected free. Two metal sutures on each side. The labial arch bar in the lower jaw was later replaced by a cap splint.

We perform the sectioning of the body of the mandible in endotracheal anesthesia in one operation. The amount of bone to be removed is estimated on the basis of lateral roentgenogram studies. The outline of the mandible may be traced on a sheet of paper and the desired form may be estimated by "resecting on the paper". The actual resection in our cases has been performed subperiostally. A keystone section of bone is removed in order to reduce the obtuse angle of the jaw, the base line of the trapezoidal section following the alveolar ridge. For cutting through the bone we use a dental fissure bur no. 5 or 6 with a chisel-shaped tip. First, the alveolar ridge and the body are sectioned through-and-through down to the mandibular canal and removed. From this point down to the inferior border of the mandible only the buccal

cortex is sectioned. Cortex is then sectioned along the inferior border of the mandible and the buccal cortical lamella is removed after it has been carefully loosened with a chisel. The mandibular nerve and artery are then lifted out of the canal buccally where-

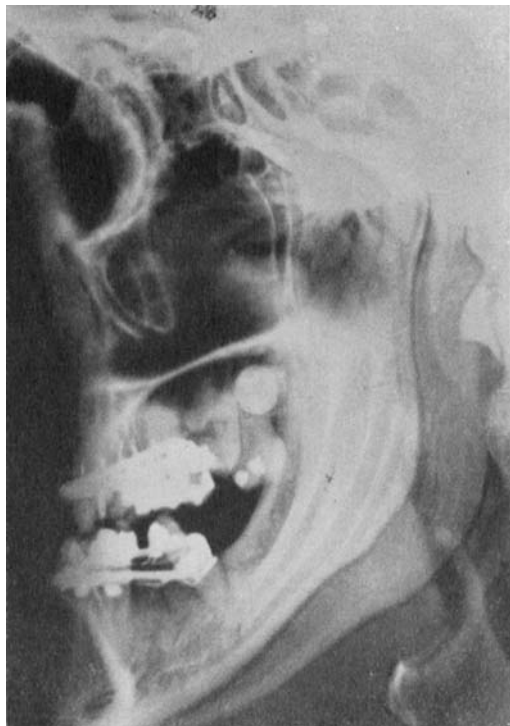


Fig. 3. Prognathism where the evaluation of the study models indicated that postoperatively one should have a closing of the bite in the molar area in order to obtain occlusion. This may partly be attained by laying the osteotomy plane at a slant distosuperiorly—mesioinferiorly, or by resection on the ramus.

after the remaining portion of the lingual lamella is removed. By this technique the vessels are preserved and only minor injury is inflicted on the nerve with but moderate and shortstanding loss of sensation. The fragments are wired in apposition and otherwise immobilized by means of a cap splint. The latter is cast in three separate sections and cemented prior to the operation. The anterior fragment is immobilized by means of intermaxillary fixation with rubber bands. Plaster casts for connecting bars are made the next day, and the three cap splints are joined rigidly with

screws as soon as the locks have been prepared by the technician. In this connection it may be mentioned that open bite malocclusion should not be treated by osteotomy of the ramus. Even if surgical wiring and prolonged immobilization are used, the mus-



Fig. 4. Same case as no. 3 after osteotomy and resection on the ramus.

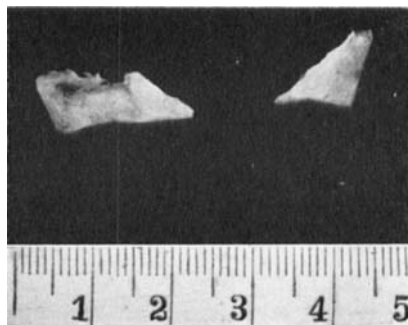


Fig. 5. The resected parts of the rami.

cular traction is apt to cause opening of the bite when immobilization is discontinued.

In most cases we now use silver cap splints by which a far better immobilization is secured. Previously we used a stainless steel labial arch bar (0.5 by 1.0 mm) which was wired to the teeth. The shape of the lower front teeth makes adequate fixation of the bar by metal ligatures rather difficult and, due to the considerable muscular traction which often occurs postoperatively, it frequently

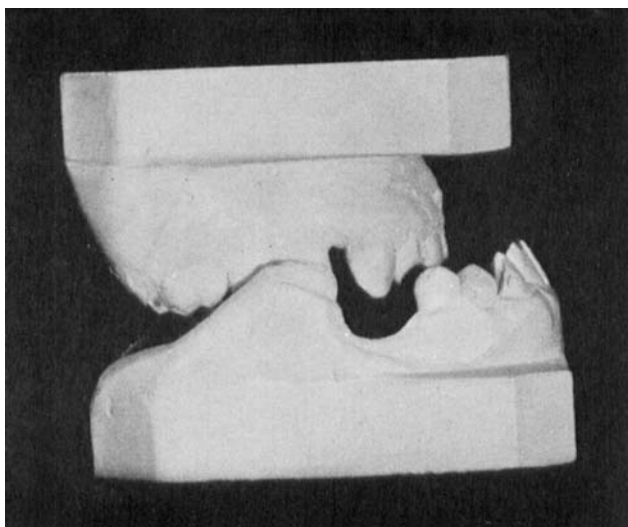


Fig. 6. Preoperative models of a case of prognathism. Notice the relation of the upper and lower six-years molars. By osteotomy on the ramus and set-back to occlusion on the first molars a raising of the bite will follow, resulting in diastema between the fragments of the ramus.

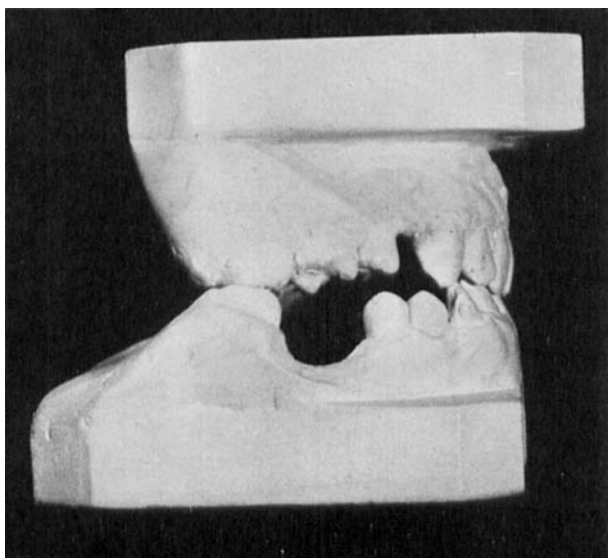


Fig. 7. Same case as no. 6 with postoperative raising of the bite.

happened that the arch bar came loose and had to be refastened. Also, drifting of the front teeth often occurred, and in rare instances I have seen decalcification of the enamel corresponding to the arch bar in cases where prolonged immobilization was necessary. Cap splints on the other hand usually cause but slight irritation

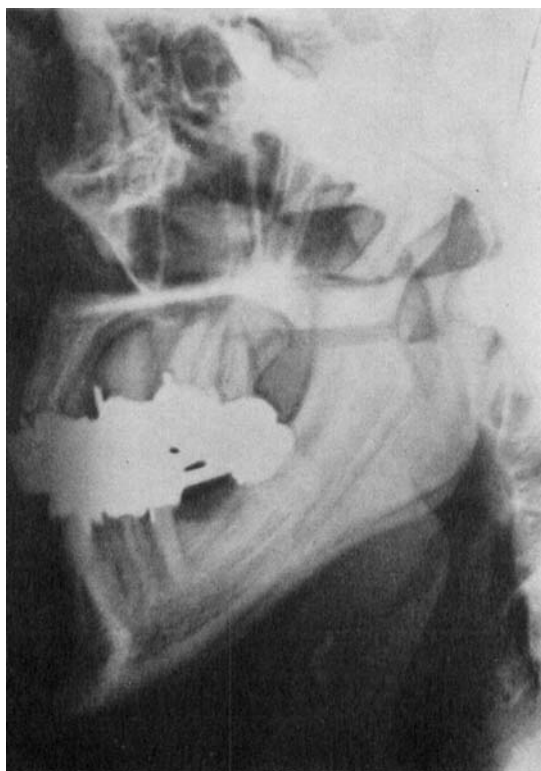


Fig. 8. Prognathism operated on the ramus. There is a raising of the bite in the molar area and diastema between the fragments. Immobilization by means of cap splints in the upper and lower jaws.

of the gums. A narrow hyperemic zone, however, may be seen along the gingival margin. This is a result of imperfect gingival adaptation of the splint because it cannot be constructed so as to enter into any undercuts. We now never fit caps on the upper and lower third molars. The grinding of these teeth are usually performed during the operation. Otherwise we always do the occlusal grinding during the operation using heatless carborundum stones. The cap splints now available, however, are so thin occlusally that

they do not interfere much with the occlusal grinding. Malocclusion is often the main indication for surgical reposition. In quite a few cases there may be only a total of four teeth in occlusion. This obviously affects the mastication and digestion as well. Even if reposition is made for cosmetic reasons, due consideration must

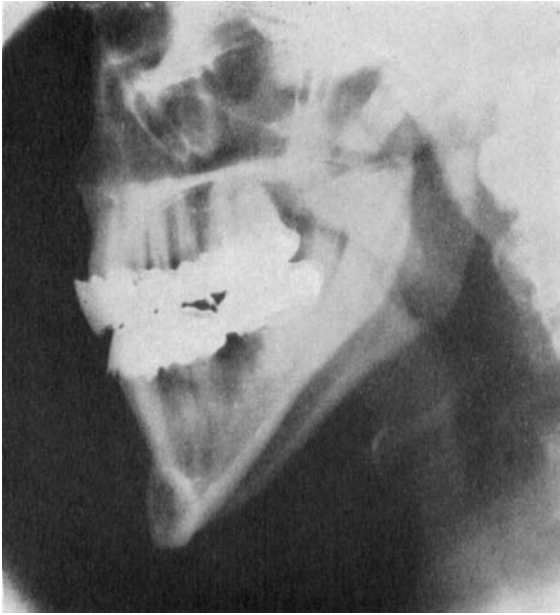


Fig. 9. Operated prognathism with bite raising and diastema between the fragments. Diastema has permitted a considerable forward and upward displacement of the upper fragments. Picture taken November 22, 1949.

be given to the occlusion. The sudden alteration in the masticatory stress and strain upon the teeth and the changes in the periodontal tissues and in the masticatory apparatus on the whole, which ensue following this alteration, are factors which must not be disregarded. The surgical treatment of mandibular prognathism should therefore be conducted in close collaboration with a dentist, preferably with an orthodontist.

When osteotomy of the ramus is used we have adopted a technique of surgical exposure of the ramus and performance of the osteotomy under direct vision. After the osteotomy the jaw is set back in the desirable position and corrective occlusal grinding is carried out. The mandible is then immobilized by means of an

adequate number of tie wires and rubber bands. The wires often stretch a little and the additional fixation with rubber bands has thus proved very satisfactory for counteracting the muscular traction. When the jaw has been securely immobilized, the operative fields are re-entered and the bone fragments checked for correct setback position. There are the following possibilities: First, the

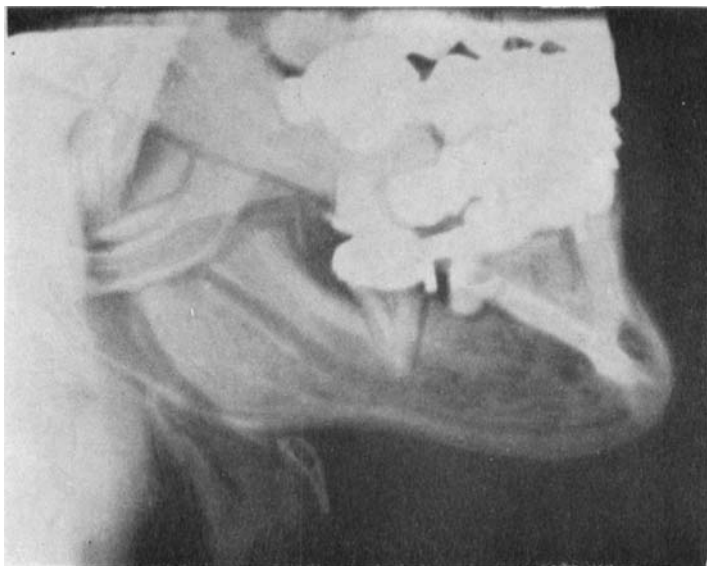


Fig. 10. Same case as no. 9. X-ray check-up done January 25, 1950. There is further forward and upward displacement of the upper fragment, which has been dislocated by 90°. With good contact between the fragments this forward displacement had not been possible.

original vertical dimension may have been maintained and the fragments are in good apposition. As a rule, however, there will be some forward-upward displacement of the upper fragments due to the pull of the temporal muscles. Another possibility as frequently observed in our practice is a closing of the bite as a result of the setback. This implies that the ramus becomes too long with a lateral displacement and overlapping of the fragments. This may result in some distortion of the face. Where fractures in general are concerned the rule applies that the more pronounced the primary dislocation the more marked the secondary dislocation on account of the muscular traction. Furthermore, it must be assumed that bony union may be impaired or delayed in the case

of imperfect apposition of the fragments. For this reason we now remove a small wedge-shaped portion of the ramus on each side in order to eliminate such dislocation and to make the height of the ramus harmonize with the new occlusion. Because we were not previously aware of this fact we often reduced the fragments

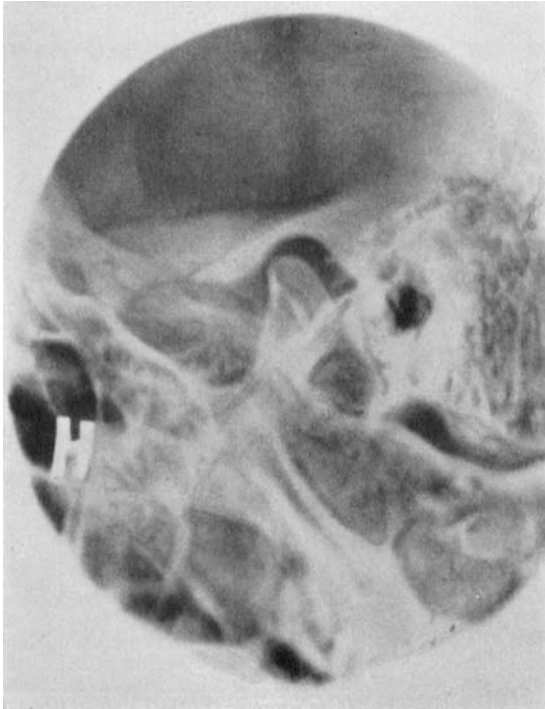


Fig. 11. X-ray of the right mandibular joint from the same case as no. 9, October 1, 1949.

by means of an elevator. This naturally resulted in a corresponding raising of the bite in the molar region. The third possibility is rising of the bite as a result of the setback of the jaw. Under such circumstances there is a diastema between the fragments, because the ramus is too short for the new occlusion, interfering with the bite relationship in the posterior mouth. Thus, extraction of $8+$ and $+8$ or $8-$ and -8 may be necessary in order to achieve the necessary closing of the bite in the molar region. A diastema of a few millimeters may lead to divers complications, such as impaired or delayed bony union or severe dislocation of the upper

fragments as a result of the muscular traction. The roentgenogram shows a case in which the upper fragments had rotated 90 degrees anteriorly, the condyles being dislodged from the mandibular fossae. Dislocation of the condyles may have a most serious effect on the mandibular joints. On a follow-up examination in 1949, another of our cases which was operated on in November 1944 presented clinical as well as roentgenographic evidence of arthrosis

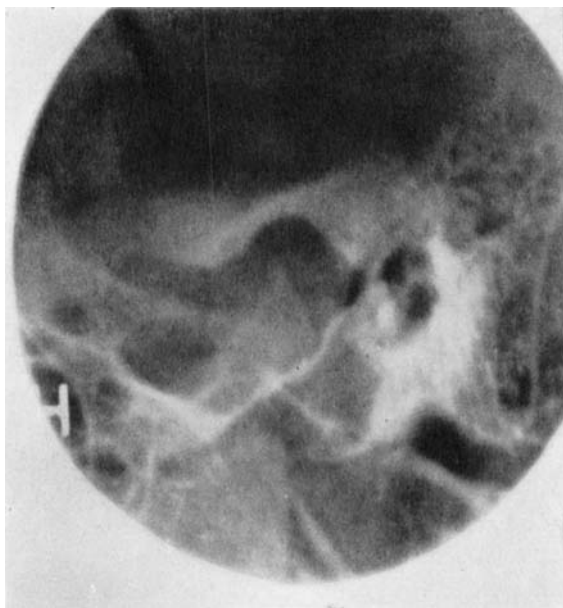


Fig. 12. Same mandibular joint X-rayed January 25, 1950. Apart from the decalcification a considerable dislocation of the condyle, which has been pulled out of the fossa, may be seen. Furthermore, changes in the outline of the condyle are seen.

of the temporomandibular joints. For the prevention of joint complications the elimination of the muscular traction and the establishment of perfect apposition of the fragments must be considered highly important. Furthermore, it would doubtless facilitate bony union as well. The ramus has a very thick cortex and sparse trabecular bone and does not therefore afford favourable conditions for callus formation. We have not found a satisfactory solution of this problem. For some time we used surgical wiring in the region of the anterior margin of the ramus, but have, at least temporarily, abandoned this procedure because of the rather difficult technique involved.

Salivary fistulas are another complication which sometimes occurs. Our present technique involves blunt dissection of the parotid gland, and some injury of the glandular tissue cannot therefore be avoided. We have tried to judge the severity of the injury inflicted upon the gland by determining the amount of salivary amylase excreted in the urine. Determinations are made prior to the operation and on one or several occasions postoperatively. A moderate postoperative increase of the amylase level has been noted in all cases. We are not at this stage able to state an opinion as to whether or not such determinations may have any practical value.

Summary.

Three hundred and forty cases of mandibular prognathism have been operated on at the Department of Oral Surgery, Ullevål Hospital, Oslo up to January 1, 1950.

The author gives a short survey of experiences gained in this field at Ullevål Hospital during the last year. In cases with a highly obtuse mandibular angle he recommends excision of a section of the body of the mandible. The *osteotomy* is performed in endotracheal anesthesia in one operation. Care should be taken to prevent injury of the mandibular artery and nerve. When dental conditions so permit, immobilization should be effected by means of *cap splints*. When osteotomy of the ramus is used the author recommends surgical exposure of the ascending ramus and performance of the osteotomy under direct vision.

Factors responsible for a too long or a too short ramus in relation to the altered occlusion effected by the operation, and measures which should be taken to prevent these complications, are discussed. The author points out the deleterious effect on the function of the temporomandibular joints which may result from dislocation of the upper fragments.

Zusammenfassung.

Chirurgische Behandlung der Progenie.

Auf der Kieferstation des Ullevål Krankenhauses in Oslo wurden bis zum 1. Januar 1950 dreihundertvierzig Fälle mit Progenie operiert.

Der Verfasser gibt hier eine kurze Zusammenfassung über die Erfahrungen, die während des letzten Jahres auf diesem Gebiete an dem Ullevål Krankenhaus gemacht worden sind. Bei Fällen mit besonders stumpfen Kieferwinkeln empfiehlt er einen Teil des Kieferknochens herauszusägen. Die Osteotomie soll unter endotrachealer Narkose durchgeführt werden. Bei der Operation muss darauf geachtet werden, dass die Unterkieferartäre und der Nerv nicht verletzt werden. Wenn das Gebiss des Patienten es erlaubt, sollte eine gegossene Schiene über die Zahnreihen gelegt werden, um die Kiefer temporär zu fixieren. Bei Osteotomie des Ramus empfiehlt der Verfasser den Ramus durch einen chirurgischen Eingriff freizulegen und die Operation direkt vorzunehmen.

In dem Artikel erwähnt der Verfasser auch die Faktoren, welche veranlassen, dass sich der Ramus während der Operation als zu lang oder zu kurz erweist, und führt einige Massnahmen zur Verhütung dieser Komplikationen an. Er weist besonders auf die Funktionsstörungen des Kiefergelenkes hin, welche durch die kranial-ventrale Dislokation des oberen Fragments entstehen können.

Résumé.

Traitement chirurgical de la prognathie inférieure.

Jusqu'au 1^{er} janvier 1950 trois cent quarante cas de prognathie inférieure ont été opérés à l'hôpital d'Ullevål à Oslo.

L'auteur nous donne un bref résumé de l'expérience qu'on a acquis à l'hôpital pendant la dernière année dans ce domaine. Pour le traitement des cas avec un angle particulièrement obtus de la mâchoire, l'auteur recommande de découper une partie de l'os maxillaire. L'ostéotomie est exécutée avec une narcose respiratoire. Pendant l'opération il faut se garder de ne pas blesser l'artère et le nerf de la mâchoire inférieure. Si la condition des dents du client le permet, l'auteur propose de placer des brides fondues sur les dents, pour fixer les mâchoires temporairement. Si l'on fait usage de l'ostéotomie de la branche montante l'auteur recommande de dégager la branche par une intervention chirurgicale et de faire l'opération directement.

Dans cet article l'auteur mentionne aussi les facteurs auxquels il attribue la raison de ce que la branche montante se montre trop

longue ou trop courte pendant l'opération et il fait mention de mesures pour prévenir ces complications. Il indique surtout les perturbations dans les fonctions de jointure de la mâchoire, qui peuvent se produire à cause de la dislocation craniale-ventrale du fragment supérieur.

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