



Original article

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POSITION OF THE CONDYLE AFTER PROGENIA SURGERY

SUMMARY

In progenesis surgery it is very important that condyle retains its preoperative position in the fossa. Condylar displacement with axial rotation has an important role in idiopathic condylar resorptions after sagittal osteotomy. The paper addresses condylar position after progenesis operations in 24 patients. Axial x-rays of the mandible were taken in all patients. Fragment immobilisation was done with mini-plates. In 7 cases, those were straight-plates and in 17 cases bent-plates were used. Condylar displacement in relation to the preoperative position was noted in only 3 patients with rigid fixation (all straight-plate cases). Though the study group was small, the results indicate that axial x-ray of the mandible can be a useful tool in condylar position assessment after progenesis surgery.

Key words: progenesis, surgery, condyle displacement, mini-plates

INTRODUCTION

The routine approach in progenesis surgery is bilateral sagittal osteotomy of the mandible by Obwegeser-Dal Pont. In this intervention, it is of utmost importance that the condyle remains in the fossa in its exact preoperative position; it is especially important in rigid fixation. Condylar movement after sagittal osteotomy is an important cause of postoperative complications and it can have an impact on the function of the temporomandibular joint. A simple sagittal movement of the condyle can be usually corrected by postoperative occlusion adjustment. However, condylar movement with axial rotation cannot be repaired by occlusion adjustment and, consequently, there is a higher risk of temporomandibular dysfunction. These rotational changes have an important role in idiopathic condylar resorptions after sagittal osteotomy. Detection of these changes by conventional radiograms, computerized tomography or magnetic resonance imaging sometimes cannot pinpoint their exact nature.

Ueki et al. (1) have established submental vertical projection with anatomic markers at the skull base independent of the facial bones for condyle displacement.

MATERIAL AND METHODS

Before and after surgery, axial radiograms of the mandible were taken, with patient's chin resting on the film and central x-ray beam perpendicular to the film, entering at the pate of the head and exiting at the middle of mandibula. (*Figure 1*)

The study group consisted of 24 patients with genuine progenesis. In all of them sagittal osteotomy of the mandible was done (the method of Obwegeser-Dal Pont). They underwent straight mini-plate fixation with four screws. Out of the total number, in 7 patients, straight plates were used (disregarding axial rotation) and in 17 bent plates. In the bent-plate group, there was a small gap between the bone fragments. Postoperative elastic intermaxillary fixation was preserved for two weeks.

Figure 1. Axial x-ray of the mandible: patient's position



Maximal mouth opening (MMO) was determined preoperatively, and six months postoperatively, we measured the distance between the incisors. Visual analog scale (VAS) was used to evaluate chewing pain in all patients pre- and postoperatively (0: no pain; 100: intolerable pain). Temporomandibular dysfunction (TMD) was observed based on the clicking sound during movement preoperatively and six months after the operation. We also observed the angle of the longer condylar axis with the line connecting the inception of the carotid channel at the skull base.

RESULTS

The patients were divided into two study groups. (Table 1)

Table 1. Patient distribution related to the fixation method

Patient number	Straight-plate fixation	Bent-plate fixation
24	7	17

The first group (7 out of 24 patients) underwent sagittal osteotomy and straight-plate fixation of bone fragments was utilized. The second

group (17 out of 24 patients) underwent the same operation and bent-plate fixation of bone fragments.

Figure 2 presents axial x-ray of the mandible before surgery.

Figure 2. Axial x-ray of the mandible: preoperatively



Figure 3 presents the analysis of the axial x-ray of the mandible (the same patient) and in Figure 4, there is the scheme for the planning and measurements of the angles and lines of the figure 3 x-ray.

Figure 3. Analysis of the axial x-ray of the mandible (same patient)

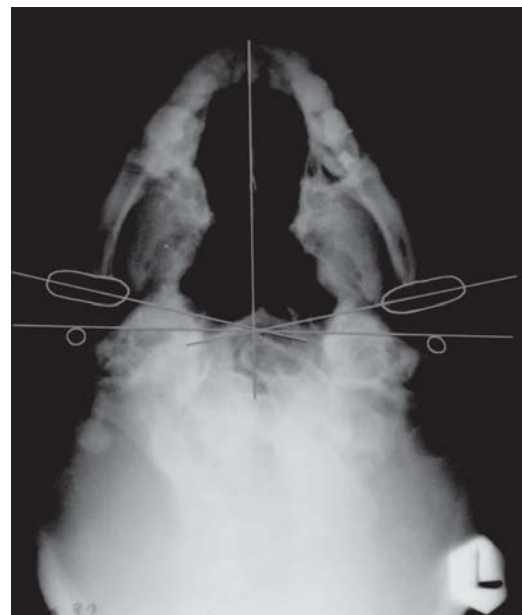
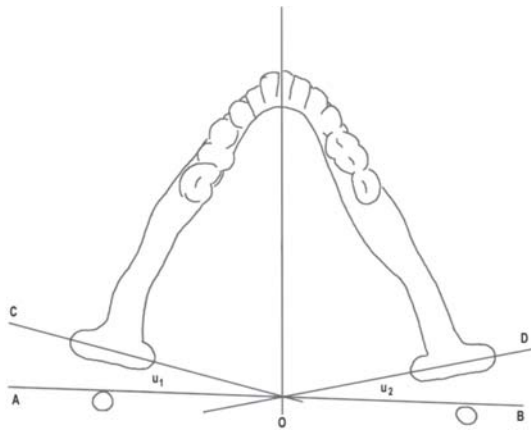


Figure 4. Scheme for the planning and measurements of the angles and lines of the x-ray from Figure 3.



Line AOB connects both carotid channels at the skull base. Lines CO and DO represent the longer condylar axis. Angles between these lines are U1 and U2; the angles should not be changed significantly after surgery, ie. they should not be increased for more than 2 degrees in order to preserve the relation of the condyle to the fossa.

Figures 5 and 6 delineate straight-plate and bent-plate placement after sagittal osteotomy, respectively.

Figure 5. Straight-plate placement after sagittal osteotomy

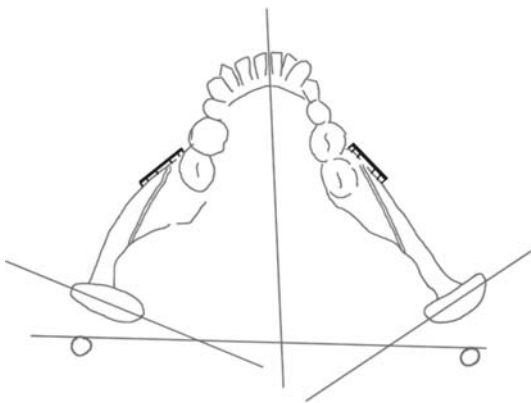
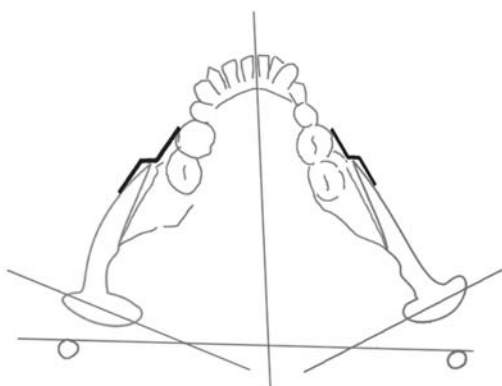


Figure 6. Bent-plate placement after sagittal osteotomy



Though the gap which had existed between proximal and distal bone segments reduced the contact between osteotomied surfaces, bent-plates provided adequate rigidity for fragment fusion. After six months, the gap was filled with osseous tissue.

Figure 7 demonstrates patient occlusion before surgery with brackets in place over the upper and lower teeth. In addition to progenesis, there is facial assymetry too.

Figure 7. Occlusion preoperatively



Figure 8 presents the occlusion in the same patient after operation, where symmetry was achieved, too.

Figure 8. Occlusion postoperatively (same patient)



Figures 9 and 10 present the facial appearance of the patient preoperatively (with progenesis and assymetry) and postoperatively (where symmetry was obtained).

Figure 9. Preoperative appearance



Figure 10. Postoperative appearance (the same patient)



Out of the patients from the first group (Table 1) with straight plates (7 in total), 5 had temporomandibular joint dysfunction (TMD) before surgery. The

symptoms were alleviated in 3 out of 5 patients after surgery.

Table 2. Preoperative and postoperative TMD status in the bent-plate group

PATIENTS	MMO		VAS (0-100)		TMD	
	PRE-OPERATIVELY	6 MONTHS AFTER	PRE-OPERATIVELY	6 MONTHS AFTER	PRE-OPERATIVELY	6 MONTHS AFTER
1	47	43	10	5	Click	N
2	51	47	0	0	Click	N
3	55	50	0	0	Click	N
4	58	45	0	0	Click	N
5	50	47	0	0	Click	N
6	55	50	0	0	N	N
7	52	45	0	0	Click	Click
8	55	55	5	5	Click	N
9	45	50	15	5	Click	N
10	42	44	0	0	Click	N
11	41	37	0	0	Click	Click
12	50	50	10	5	N	N
13	61	60	0	0	Click	N
14	38	38	0	0	N	N
15	48	45	0	5	Click	N
16	45	45	0	0	Click	N
17	46	40	0	0	Click	N
AVERAGE	49,35	46,52	1,47	1,17	12:14 = 85,71% symptoms resolved	

In the second group, out of 17 patients in total, 14 had TMD.

Table 3. Preoperative and postoperative TMD status in the straight-plate group

PATIENTS	MMO		VAS (0-100)		TMD	
	PRE-OPERATIVELY	6 MONTHS AFTER	PRE-OPERATIVELY	6 MONTHS AFTER	PRE-OPERATIVELY	6 MONTHS AFTER
1	39	39	20	10	Click	N
2	30	30	30	20	Click	Click
3	39	39	10	5	N	N
4	35	30	10	5	Click	Click
5	40	40	0	0	Click	Click
6	40	40	0	0	Click	Click
7	48	44	0	0	N	N
AVERAGE	38,71	37,42	7,00	5,71	1:5 = 20,00% symptoms resolved	

TMD resolved in 13 out of 14 patients 6 months after the operation.

Postoperatively, TMDs significantly differed among the groups. TMD and click symptom were significantly reduced in patients with bent-plate fixation (Table 2) compared to those with straight-plate fixation of bone fragments (Table 3).

Regarding the factors of maximal mouth opening (MMO) and visual analog scale, significant deviations were not observed pre- and postoperatively.

DISCUSSION

In this paper, condylar dislocation after progenia surgery was addressed. Kundert and Hadjfranghelou (2) noted back in 1980 that condylar dislocation after sagittal osteotomy depends on the type of fixation of proximal and distal segments. Karabouta and Maartis (3) found that among 280 patients undergoing surgery without rigid fixation, 40.8% had TMD preoperatively. After sagittal osteotomy this percentage was reduced to 11.1%, including the development of new symptoms in 3.7% of the cases. Rigid fixation of the mandible after surgical intervention may or may not result in a higher proportion of TMDs in comparison with wire fixation (non-rigid fixation). Timmis et al. (4) found a significant reduction in the percentage of masticatory dysfunction with screw fixation in 28

cases who underwent sagittal osteotomy. Hackney et al. (5) noted no major change in TMD status in 15 patients in spite of the fact that condylar position had changed after sagittal osteotomy with rigid fixation. Feinerman and Piecuch (6) reported that muscular pain and click in the temporomandibular joint improved with rigid fixation and worsened with non-rigid fixation. Nevertheless, the subjects and methodology of these studies were diverse, precluding any direct comparison with our results. Our study compared two fixation methods using the same fixation materials (mono-cortical mini-plates). The relation between TMDs and condylar angle could be assessed objectively.

These results demonstrate that in patients whose bone fragments were fixated with bent plates, there is a high percentage (85.71%) of preoperative TMD symptom removal, confirming other authors' findings. Bent plates enable condylar preoperative position inside the fossa when axial rotation is avoided.

The study indicated that the frequency of TMDs with bent-plate fixation is reduced compared with straight-plate procedures. The results suggested that the fixation method is an important determinant of final outcome. Though the investigated group of patients was small, the results obtained demonstrate that axial x-rays of the mandible can be a useful tool in the assessment of condylar position in progenia surgery.

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POZICIJA KONDILA NAKON OPERACIJE PROGENIJE

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SAŽETAK

Kod operacija progenije vrlo je važno da kondil ostane u fosi u istom položaju kao i pre operacije. Kondilarno pomeranje sa aksijalnom rotacijom ima značajnu ulogu u idiopatskim kondilarnim resorpcijama posle sagitalne osteotomije. U radu je praćena pozicija kondila nakon operacija progenije kod 24 pacijenta. Aksijalni snimci donje vilice urađeni su kod svih pacijenata. Imobilizacija fragmenata rađena je mini-pločicama. Kod 7 pacijenata pločice su bile prave, a kod 17 pacijenata postavljene su savijene mini-pločice. Pomeranje kondila u odnosu na preoperativnu poziciju uočeno je kod samo 3 pacijenta sa rigidnom fiksacijom, i to pravom mini-pločicom. Mada je ispitivana grupa pacijenata bila mala, rezultati pokazuju da aksijalni snimci donje vilice mogu biti od koristi u procenjivanju pozicije kondila kod operacije progenije.

Ključne reči: progenija, hirurgija, pomeranje kondila, mini-pločice