Condylar and disc positions after intraoral vertical ramus osteotomy with and without a Le Fort I osteotomy

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Abstract

The purpose of this study is to examine the changes in temporomandibular joint (TMJ) morphology and clinical symptoms after intraoral vertical ramus osteotomy (IVRO) with and without a Le Fort I osteotomy.

Of 50 Japanese patients with diagnosed mandibular prognathism with mandibular asymmetry and bimaxillary asymmetry, 25 underwent IVRO and 25 underwent IVRO in combination with a Le Fort I osteotomy. The TMJ symptoms and joint morphology, including disc tissue, were assessed preoperatively and postoperatively by magnetic resonance imaging and axial cephalogram.

Improvement was seen in just 50% of joints with anterior disc displacement that received IVRO and 52% of joints that received IVRO with Le Fort I osteotomy. Fewer or no TMJ symptoms were reported postoperatively in 97% of the joints that received IVRO and in 90.0% of joints that received IVRO with Le Fort I osteotomy. There were significant differences between preoperative and postoperative condylar position changes and horizontal changes in the condylar long axis on both sides in the two groups. There were no significant differences between improved anterior displaced disc (ADD) and unimproved ADD in condylar position change and the angle of the condylar long axis, although distinctive postoperative condylar sag was seen. These results suggest that IVRO with or without Le Fort I osteotomy could improve the ADD and TMJ symptoms along with condylar position and angle change. However, it is difficult to predict the amount of improvement of the ADD.

Introduction

The intraoral vertical ramus osteotomy (IVRO) has become a common procedure,[1] performed on patients with temporomandibular dysfunction with or without jaw deformity. This is based on the inherent displacement of the condyle, moving it away from the disc and posterior attachment, and decompressing the temporomandibular joint (TMJ) apparatus[1,5-8].

Hall et al.[7] reported that the disk was reduced by 72% in the joint after a modified condulotomy. Werther et al.[14] reported that the disc was reduced by condylotomy in 79% of disc displacement joints, without providing a description of skeletal pattern and occlusion. Our previous study illustrated that IVRO could improve the disc-condyle relationship in patients with jaw deformities[10]. However, it remained unclear whether there was a difference between IVRO alone and IVRO with Le Fort I osteotomy in the improvement of anterior disc displacement (ADD). The relationship between condylar position change and improvement of ADD was still unclear.

The purpose of this study was to examine the changes in TMJ morphology and clinical symptoms after IVRO with and without a Le Fort I osteotomy, and to assess the relationship between condylar position change and improvement of ADD.

Patients and Methods

Patients

The 50 Japanese adults (8 men and 42 women) in this study presented with jaw deformities diagnosed as mandibular prognathism with mandibular asymmetry, mandibular prognathism with bimaxillary asymmetry, and bimaxillary asymmetry. At the time of orthognathic surgery, the patients ranged in age from 15 to 38 years, with a mean age of 24.8 years (standard deviation, 5.8 years).

Surgery

Of the 50 patients in this study, 25 patients (5 men and 20 women) with a mean age of 25.9 years (standard deviation, 6.3 years) underwent IVRO without fixation for correction of their mandibular deformities. The medial pterygoid muscle was stripped in a vertical plane the amount of the desired setback of the distal segment. The muscle posterior to the stripped area was partially maintained. The other 25 patients (3 men and 22 women) with a mean age of 23.6 years (standard deviation, 5.0 years) underwent IVRO and a Le Fort I osteotomy. Two PLLA L-type mini-plates (10×22×1.5 mm with 4 screws (2×8 mm), Fixorb®-MX; Takiron Co., Osaka, Japan) and two straight PLLA plates (28×4.5×1.5 mm with 4 screws (2×8 mm), Fixorb®-MX; Takiron Co.) were used to fix the maxilla. After approximately 1 week of intermaxillary fixation, elastic was placed to maintain the ideal occlusion. All patients received orthodontic treatment before and after surgery. All subjects were assessed with magnetic resonance imaging (MRI) 1 month before surgery and 6 months after surgery. Objective TMJ symptoms were recorded and evaluated. Preoperative TMJ symptoms most frequently reported were abnormal sound (clicking and crepitus) and slight pain when opening the mouth; none of the patients reported trismus. 21 of 25 patients (38 of 50 joints) in IVRO group and 20 of 25 patients (30 of 50 joints) in IVRO with Le Fort I osteotomy group had TMJ symptoms preoperatively.

Frontal cephalogram analysis

In the frontal cephalogram, the angle between the ANS-Menton line and the line perpendicular to the bilateral zygomatic frontal suture line was defined as the Mx-Md midline angle. A positive value of this Mx-Md midline angle represents mandibular deviation to the left and a negative value represents mandibular deviation to the right. The Mx-Md midline angles of all cases were then given a positive value so that all consecutive measurements could be attributed to either the deviation or the non-deviation side (Fig. 1).

Axial cephalogram assessment

Axial cephalograms were used to assess the horizontal condylar long axis. The focus-to-film distance was 130 cm, the ear rod-to-film distance was set at 15 cm, the tube voltage was 80 kV, and the tube current was 50 mA. The images of the apex in the ear rods were connected with a line. Two more lines were then drawn through the lateral and medial poles of both condyles. The angles between these two lines and the ear rod connecting line defined the horizontal condylar angles. The change in the angle of the condylar long axis was evaluated from the difference between preoperative and postoperative values (Fig. 2).

Magnetic resonance imaging assessment

A detailed MRI assessment of each pair of TMJs was performed by a 1.5-Tesla MRI system (Signa Scanner, General Electric Medical Systems, Milwaukee, WI, USA), using bilateral 3-inch dual surface coils with the jaw first in the closed, resting position and then at its maximally open position. An initial axial localizer was introduced to obtain exact midcondylar sections perpendicular and parallel to the long axis of each condyle. Images of the bilateral orthogonal sagittal planes and coronal planes of the TMJs in the closed jaw position were acquired first with a repetition pulse (T_R) of 2000 msec, echo times (T_Es) of 20 msec, a 3-mm image slice thickness, and a field of view of 10 cm. Then images of the bilateral sagittal planes of the TMJs in the open mouth position were obtained with a T_R of 1000 msec and T_Es of 20 msec.

Images of the midcondylar slices perpendicular and parallel to the long axis of each condyle were entered into a computer (PC9821Xa13, NEC, Tokyo, Japan) with a scanner (GT9500, Epson, Tokyo, Japan) and the coordinates of the highest point of the condyle were determined with Scion Image software (Scion Corporation, Frederick, MD, USA).

In the sagittal images, the distance between the lowest point of the articular eminence and the squamotympanic fissure was measured and that line was named “X”. The distance from line X to the highest point of the glenoid fossa was measured and that line was named “Y”, and the distance from line X to the highest point of the condyle was measured and that line was named “b”. The distance between the lowest point of the articular eminence and the highest of the condyle parallel to line X was measured and that line was named “a”. The coordinate of the highest point of condyle was expressed as (a/X, b/Y). The condylar position change was evaluated from the changes in the coordinates (postoperative value - preoperative value).

The angle between the condylar long axis and the Frankfurt horizontal (FH) plane was measured in the coronal images. The change in the angle of the condylar long axis was evaluated from the difference between preoperative and postoperative values (Fig. 2).

In the sagittal plane images, the center point was determined to be the midpoint of the antero-posterior length of the condyle on the line between the lowest point of the articular eminence and the squamotympanic fissure. The lowest point of the articular eminence was considered to be 0° and the squamotympanic fissure became 180°.

Definitions

All joint discs were classified according to following definitions, as shown in our previous report[13].

Anterior displacement: the entire disc is antero-inferior to the most anterior point on the contour of the condyle.

Anterior type: the center of the intermediate zone is between 0° and 90° and the most posterior point of the posterior band is postero-superior to the most anterior point on the contour of the condyle and less than 180°.

Fully-covered type: the most anterior point of the anterior band is less than 0° and the most posterior point of the posterior band is greater than 180°.

Posterior type: the most anterior point of the anterior band is more than 0° and the most posterior point of the posterior band is greater than 180° (Fig. 3).

Anterior type, fully-covered type and posterior type were defined as variants of normal in skeletal Class III[13].

Statistical analysis

Data were compared between groups with the Mann Whitney's U-test and between pre and postoperative value with Wilcoxon signed-ranks test using the Stat View™ version 4.5 software program (Abacus Concepts, Inc., Berkeley, CA, USA). The frequencies of data were compared within groups using the chi-square test and the Stat View software program. The differences were considered significant at $p<0.05$.

Results

Condylar position and angle

Postoperatively, the highest point of the condyle was significantly more inferior than its preoperative position, in the joints in the deviation side that received IVRO ($P=0.0014$ in Y coordinate). In the non-deviation side joints in the IVRO group, the postoperative condylar position was significantly more anterior-inferior than the preoperative position ($P<0.0001$ for the X coordinate, $P=0.0138$ for the Y coordinate). There was no significant difference between the preoperative and postoperative angles of the condylar long axis on coronal images of both sides after IVRO. However, the postoperative angle of the condylar long axis on the axial cephalogram was smaller than the preoperative ones on both sides after IVRO ($P=0.0001$ for the deviation side, $P=0.0018$ for the non-deviation side).

Postoperative condylar position was significantly more anterior-inferior than its preoperative position, in the joints on the deviation side that received IVRO with Le Fort I osteotomy ($P=0.0019$ for the X coordinate, $P=0.0001$ for the Y coordinate). In the joints on the non-deviation side that received IVRO with Le Fort I osteotomy, the postoperative condylar position was significantly more inferior than its preoperative position ($P<0.0001$ for the Y coordinate). There was no significant difference between the preoperative and postoperative angles of the condylar long axis on coronal images of both sides after IVRO with Le Fort I osteotomy. However, the postoperative angle of the condylar long axis on an axial cephalogram was smaller than the preoperative ones on both sides after IVRO with Le Fort I osteotomy ($P=0.0002$ for the deviation side, $P<0.0001$ for the non-deviation side).

There were no significant differences between the IVRO group and the IVRO with Le Fort I osteotomy group, in bilateral preoperative and postoperative condylar positions in the X and Y coordinates, in bilateral preoperative and postoperative angles of the condylar long axis on frontal images, and in the preoperative angle of the condylar long axis on the deviation side on axial cephalograms. However, the postoperative angle of the condylar long axis on axial cephalograms in the non-deviation side in the IVRO group was significantly larger than that in the IVRO with Le Fort I group ($P=0.0397$) (Table 1).

Among the changes in the X coordinates (postoperative value - preoperative value), there was significant difference between the deviation side and the non-deviation side in both groups ($P=0.006$ for the IVRO group, $P=0.006$ for the IVRO with Le Fort I group); however, there were no significant differences in the change in the coordinates, the angle on coronal images, and the angle on axial cephalograms between the IVRO group and the IVRO with Le Fort I osteotomy group (Table 2).

Anterior disc displacement with and without reduction

Joints preoperatively classified as anterior type, fully-covered type, or posterior type showed no postoperative changes in the IVRO group.

On the deviation side in IVRO cases, 3 of the 6 joints with preoperative anterior disc displacement with reduction (ADDwR) improved to the postoperative classification of anterior type. The other 3 joints showed no postoperative change. One of the 6 joints with preoperative anterior disc without reduction (ADDwoR) improved to the postoperative classification of anterior type. One joint improved to the ADDwR. The other 4 joints showed no postoperative change.

On the non-deviation side in IVRO cases, all of the 4 joints with preoperative ADDwR improved to the postoperative classification of anterior type. One of the 6 joints with preoperative anterior disc without reduction (ADDwoR) improved to the postoperative classification of anterior type. One joint improved to the ADDwR. The other 4 joints showed no postoperative change.

Of the IVRO cases, 7 of the 10 (70%) joints with ADDwR and 4 of the 12 (33.3%) joints with ADDwoR improved, so 11 of the 22 (50.0%) joints improved. Four of the 13 (30.8%) patients with ADD joints improved postoperatively (Tables 3 and 5).

Joints preoperatively classified as anterior type, fully-covered type, or posterior type showed no postoperative changes in the IVRO with Le Fort I osteotomy group.

On the deviation side in the IVRO with Le Fort I osteotomy cases, 3 of the 6 joints with preoperative anterior disc displacement with reduction (ADDwR) improved to the postoperative classification of anterior type. The other 3 joints showed no postoperative change. Three of the 15 joints with preoperative anterior disc without reduction (ADDwoR) improved to the postoperative classification of anterior type. Four joints improved to the ADDwR. The other 8 joints showed no postoperative change.

On the nondeviation side in the IVRO with Le Fort I osteotomy cases, all of the 3 joints with preoperative ADDwR improved to the postoperative classification of anterior type. One joint with ADDwoR showed no postoperative change.

Of the IVRO with Le Fort I osteotomy cases, 6 of the 9 (66.7%) joints with ADDwR and 7 of the 16 (43.8%) joints with ADDwoR improved, so 13 of the 25 (52.0%) joints improved. Five of the 20 (25%) patients with ADD joints improved postoperatively (Tables 4 and 5).

Temporomandibular joint symptoms

Symptoms were improved by surgery in 90.5% of patients who underwent only IVRO and in 90.0% of patients who underwent IVRO with a Le Fort I osteotomy; however, no statistically significant difference was found between the two procedures. From the view of the number of joints, 37 of the 38 (97.0%) preoperative symptomatic joints improved after IVRO and 27 of the 30 (90.0%) preoperative symptomatic joints improved after IVRO with Le Fort I osteotomy. Nineteen of the 21 patients with preoperative symptoms (90.5%) in the IVRO group had no postoperative symptoms and 18 of the 20 patients with preoperative symptoms (90%) in the IVRO with Le Fort I osteotomy group had no postoperative symptoms (Table 6).

The relation improvement of anterior disc displacement to condylar position, angle, and setback amount

The joints with preoperative ADD were divided into two groups: postoperative improvement and no postoperative improvement. Improvement included the changes from ADDwoR to ADDwR, from ADDwR to anterior type, and from ADDwoR to anterior type. The differences in condylar position change (X, Y coordinates) and the angle of the condylar long axis (on coronal images and axial cephalograms) were examined statistically. However, there were no significant differences between the improved group and the unimproved group.

The mean setback amounts were 2.4 mm (standard deviation, 3.3 mm) on the deviation side and 4.0 mm (standard deviation, 3.8 mm) on the non-deviation side in the IVRO group and 1.4 mm (standard deviation, 2.7 mm) on the deviation side and 3.2 mm (standard deviation, 3.6 mm) on the non-deviation side in the IVRO with Le Fort I osteotomy group. The relationship between the setback amount and the condylar position change (X, Y coordinates) was examined with simple regression analysis. However, no significant difference was shown.

Discussion

Signs and symptoms of TMJ dysfunction have previously been studied in patients with dentofacial deformities[3,4,,9,16,17]. In our previous study, the incidence of disc displacement was 18.2% in the class III symmetry group and 56.8% in the class III asymmetry group[13]. These results suggest that asymmetry increases the occurrence of TMJ dysfunction with ADD. The incidence ratio of ADD on the deviation side was higher than on the non-deviation side. Therefore, in this study, the deviation and non-deviation sides were determined on the basis of the Mx-Md midline. However, ADD may not always induce TMJ symptoms. Many patients with jaw deformities have ADD without TMJ symptoms. The joints and their disc tissue may adapt to the individual skeletal morphology in these cases. Such adaptation complicates the assessment of disc position relative to normal in individual patients.

In this study, improvement in preoperative ADDwR and ADDwoR was found, although changes in preoperative normal joint discs (anterior type, fully-covered type, or posterior type) were not found. The IVRO could improve ADD for a short post-surgical period. However, sagittal split ramus osteotomy (SSRO) could not improve ADD in mandibular setback cases, as shown in our previous study[10]. Therefore, application of IVRO might be preferable.

We hypothesized that IVRO induces larger condylar sag than SSRO, which could improve ADD. However, in this study, there were no significant differences between the improved ADD and the unimproved ADD in condylar position change and the angle of the condylar long axis, although distinct postoperative condylar sag was seen. There was no significant correlation between setback amount and condylar position change. This study was assessed with images taken 6 months after surgery, so it is unclear how temporary condylar sag immediately after surgery occurred. It might be impossible to predict improvement of the ADD accurately. In contrast, there was no difference in the improvement effect in ADD between IVRO alone and IVRO with Le Fort I osteotomy.

Regarding to stability of bone fragments, in another study, we reported that condylar sag occurred just immediately after surgery so that the condyle could change from inferio-anterior position to superior-posterior position with relapse of proximal segment, after bony adhesion and reattachment of medial pterygoid muscle. However, the difference was very small, and so would not be a problem clinically[12].

On the other hand, TMJ symptoms also could be improved at a high rate following both IVRO and IVRO with Le Fort I osteotomy. In fact, in some joints, TMJ symptoms could be improved but ADD could not. This suggested that postoperative condylar sag was recognized in most cases and that it reduced the loading on the TMJ. However, condylar sag was not associated with improvement of ADD statistically, although sag might be one of several factors that improved ADD. In our previous report[10], 50% of the highest point of condyle after IVRO and 33.3% of that after SSRO had changed to be more antero-inferior than the preoperative position. However, SSRO could not improve ADD. The subjects who underwent SSRO in that study all had mandibular prognathism without asymmetry so that bony interference between segments could not occur. Therefore, if SSRO had been used in asymmetry cases, the results of our previous study might have been different. Conversely, the incidence ratio of bony interference is low in cases of asymmetry, so the IVRO procedure is favorable for asymmetry cases. Le Fort I osteotomy and IVRO are frequently used for correction of occlusal cant and maxillary malposition of patients with bimaxillary asymmetry. The selection of mandibular osteotomy was determined not only by TMJ symptoms, but also by bony interference between segments.

Westesson et al.[15] found that the mean horizontal condylar angle was most acute in joints with normal superior disc position (mean, 21.2°) and was less acute in joints with disk displacement (29.7° for disk displacement without reduction) and/or with degenerative joint disease (36.5°). Fernandez Sanroman et al.[2] found that the mean horizontal condylar angle in the class II group was significantly larger than that in the control group, and that the larger condylar angle can be an etiological factor for disc displacement and degenerative joint disease. Our previous study also showed a mean horizontal condylar angle for the class III symmetry group of 12.0° on the right and 11.8° on the left[13]. From these reports, if the skeletal pattern is different, TMJ morphology, including the condylar long axis, is also different. In short, a change in occlusion and skeleton may induce a change in the condylar long axis. Furthermore, IVRO could decrease temporomandibular dysfunction and improve ADD with or without reduction, so that it could be assumed that this change in the condylar long axis is physiological. A surgically induced increase in the condylar long axis is correlated with an increase in the side range and incisor path angle[11]. However, surgical orthodontic treatment does not significantly change the chewing pattern. These results suggest that the change in the condylar long axis is very important for the postoperative chewing path and that the preoperative angle of the condylar long axis is not always adequate postoperatively.

In conclusion, these results suggest that IVRO with or without Le Fort I osteotomy may effectively make a postoperative anterior-inferior position change and a horizontal change in the condylar long axis, and improve ADD and TMJ symptoms. However, it is difficult to predict the degree of improvement in ADD.

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Legends

Table 1. Changes in the highest condylar point and condylar long axis.

Table 2. Difference between preoperative and postoperative highest condylar points.

Table 3. Changes in disc tissue seen in sagittal images in IVRO.

Table 4. Changes in disc tissue seen in coronal images in IVRO with Le Fort I osteotomy.

Table 5. The rate of improvement of anterior disc displacement seen in sagittal images.

Table 6. The rate of improvement of temporomandibular joint symptoms.

Figure 1. Measurements of frotal cephalogram

Figure 2. Measurements of axial cephalograms and measurements in sagittal and coronal magnetic resonance images. a) the angle of the condylar long axis in the horizontal plane; b) the coordinate of the condyle expressed as (x/X, y/Y) in the sagittal plane; c) the angle of the condylar long axis in the coronal plane.

Figure 3. The classification of disc positions as seen in sagittal images. a) anterior displacement; b) anterior type; c) fully-covered type; d) posterior type.

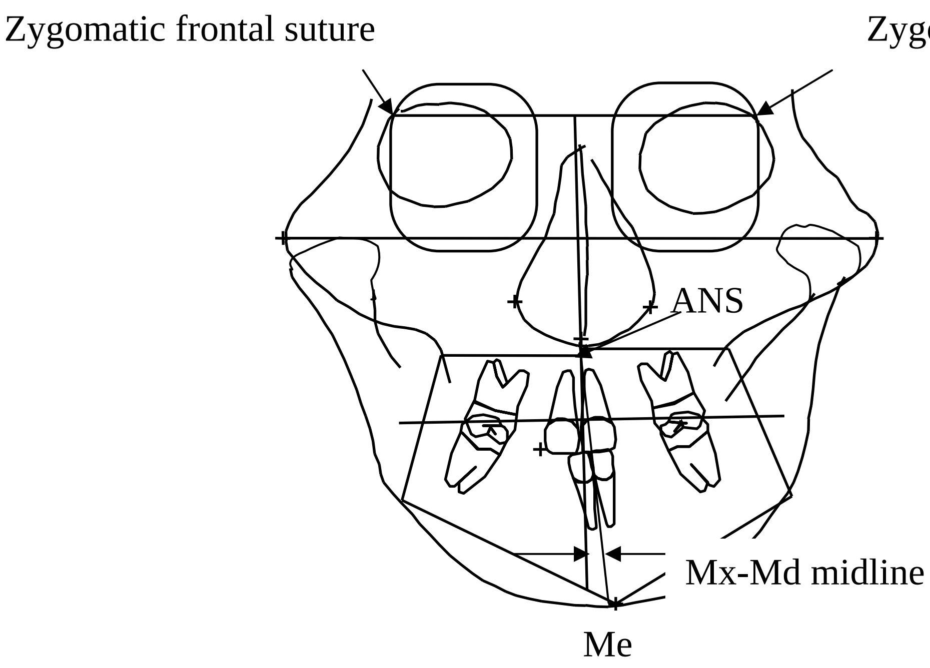

Zygomatic frontal suture
Zygomatic frontal suture
ANS
Mx-Md midline
Me

Fig. 1

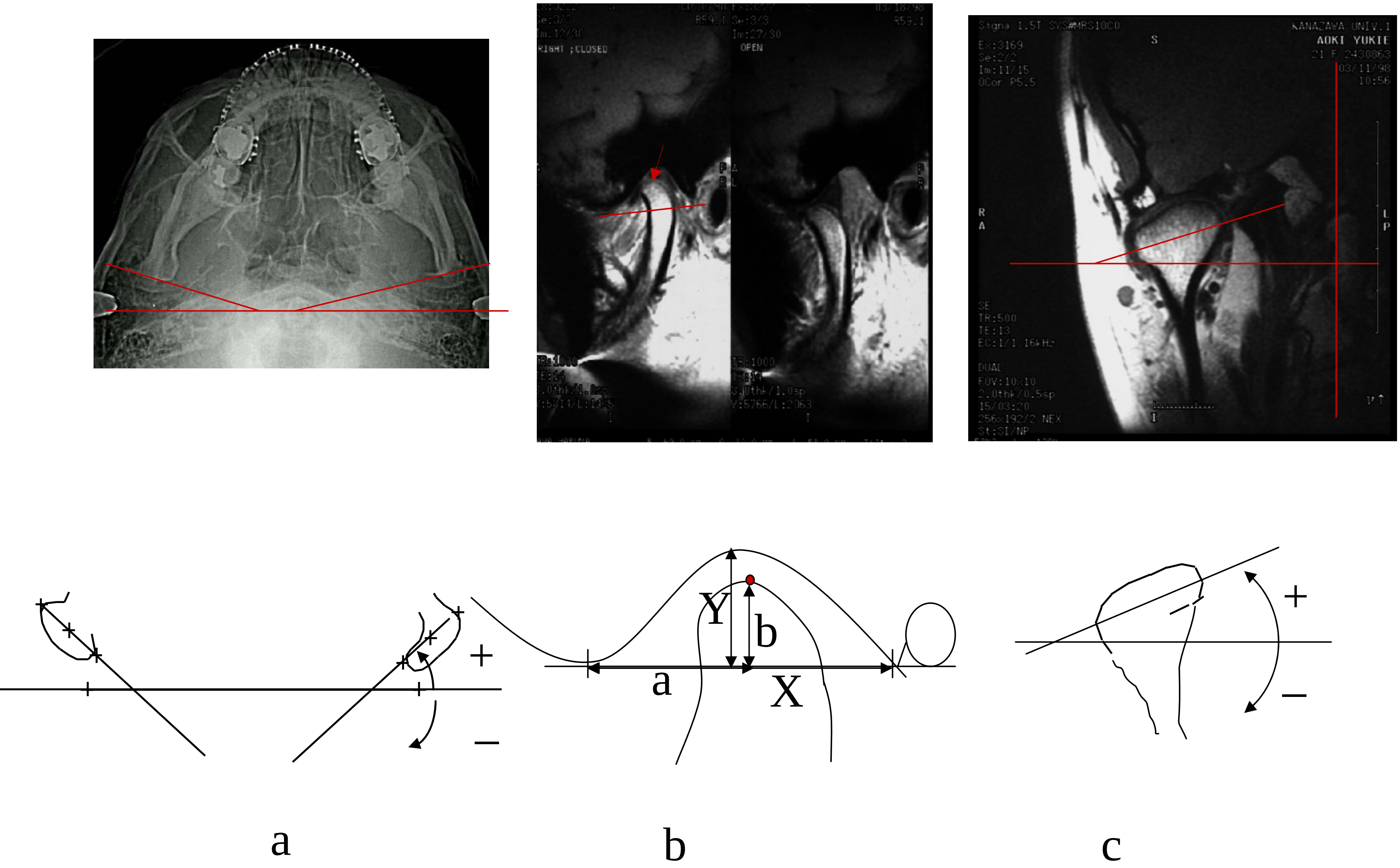
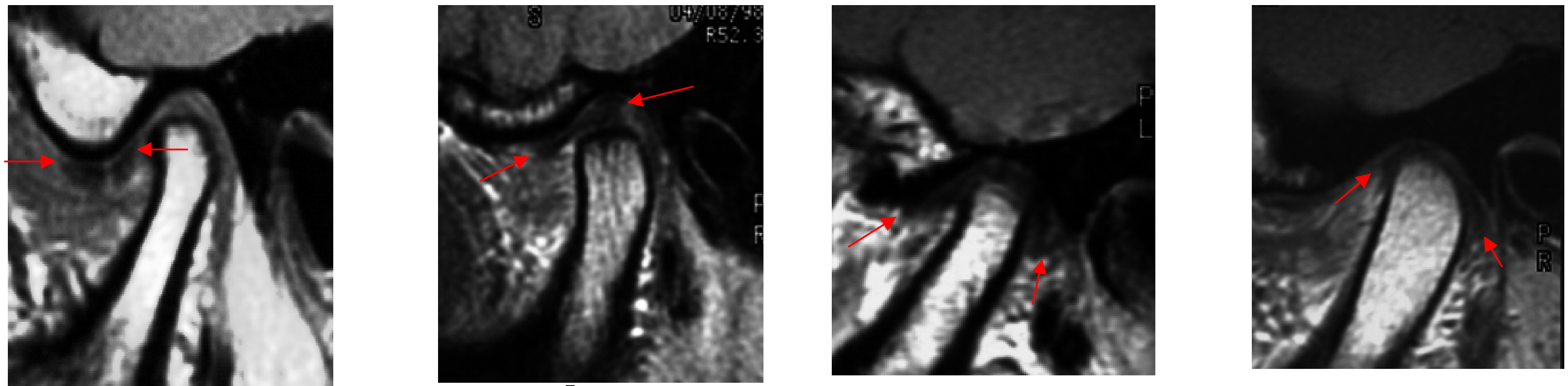


Fig. 2



a b c d

Fig. 3

IVRO		Condylar point in sagittal image X-coordinate Average	SD	Y-coordinate Average	SD	The angle of condylar long axis in coronal image (degree) Average	SD	in axial image (degree) Average	SD
Deviation side (n=25)	Preoperation	0.56	0.07	0.63	0.13	10.20	9.87	15.71	7.90
	Postoperation	0.54	0.07	0.52	0.38	9.71	10.81	7.88	6.03
	P-value	NS		0.0014		NS		0.0001	
Non-deviation side (n=25)	Preoperation	0.60	0.05	0.63	0.13	8.63	10.79	15.68	7.29
	Postoperation	0.50	0.14	0.50	0.17	8.41	11.89	9.42	7.31
	P-value	<0.0001		0.0138		NS		0.0018	

IVRO+Le Fort I		Condylar point in sagittal image X-coordinate Average	SD	Y-coordinate Average	SD	The angle of condylar long axis in coronal image (degree) Average	SD	in axial image (degree) Average	SD
Deviation side (n=25)	Preoperation	0.58	0.07	0.67	0.13	13.84	8.92	15.75	9.46
	Postoperation	0.54	0.07	0.55	0.14	12.38	8.36	10.10	7.34
	P-value	0.0119		0.0001		NS		0.0002	
Non-deviation side (n=25)	Preoperation	0.58	0.05	0.70	0.13	14.84	9.80	14.37	5.66
	Postoperation	0.56	0.07	0.54	0.16	14.06	8.81	6.53	4.93
	P-value	NS		<0.0001		NS		<0.0001	

Table 1.

		Difference between pre and post			
		X-coordinate		Y-coordinate	
		Average	SD	Average	SD
IVRO	Deviation side (n=25)	0.02	0.07	0.11	0.42
	Non-deviation side (n=25)	0.10	0.11	0.13	0.21
	P-value	0.006		NS	
IVRO+Le Fort I	Deviation side (n=25)	0.04	0.07	0.12	0.13
	Non-deviation side (n=25)	0.02	0.08	0.16	0.13
	P-value	0.006		NS	

Table 2.

IVRO		Preoperation		Postoperation
Deviation side (n=25)	Anterior displacement	with reduction (AW)	6joints	3joints: AW, 3joints: Anterior type
		without reduction (AWO)	6joints	4joints: AWO, 1joint: AW, 1joint: Anterior type
	Normal			
		Anterior type	10joints	10joints: Anterior type (no change)
		Fully-coverd type	1joint	1joint: Fully-covered type (no change)
		Posterior type	2joints	2joints: Posterior type (no change)

		Preoperation		Postoperation
Non-deviation side (n=25)	Anterior displacement	with reduction (AW)	4joints	4joints: Anterior type
		without reduction (AWO)	6joints	4joints: AWO, 1joint: AW, 1joint: Anterior type
	Normal			
		Anterior type	9joints	9joints: Anterior type (no change)
		Fully-coverd type	3joints	3joint: Fully-covered type (no change)
		Posterior type	3joints	3joints: Posterior type (no change)

Table 3.

IVRO+Le Fort I		Preoperation		Postoperation
Deviation side (n=25)	Anterior displacement	with reduction (AW)	6joints	3joints: AW, 3joints: Anterior type
		without reduction (AWO)	15joints	8joints: AWO, 4joint: AW, 3joint: Anterior type
	Normal			
		Anterior type	3joints	3joints: Anterior type (no change)
		Fully-coverd type	0	0
		Posterior type	1joint	1joint: Posterior type (no change)

		Preoperation		Postoperation
Non-deviation side (n=25)	Anterior displacement	with reduction (AW)	3joints	3joints: Anterior type
		without reduction (AWO)	1joint	1joint: AWO (no change)
	Normal			
		Anterior type	15joints	15joints: Anterior type (no change)
		Fully-coverd type	1joint	1joint: Fully-covered type (no change)
		Posterior type	5joints	5joints: Posterior type (no change)

Table 4.

Procedure	Number (Patients)	Patients with ADD preoperatively	Patients improved postoperatively	Rate of improvement (%)
IVRO	25	13	4	30.8
IVRO+LeFort I	25	20	5	25.0
Procedure	**Number (joints)**	**Joints with ADD preoperatively**	**Joints improved postoperatively**	**Rate of improvement (%)**
IVRO	50	22	11	50.0
IVRO+LeFort I	50	25	13	52.0

Table 5.

Procedure	Number (Patients)	Symptomatic patients preoperatively	Patients improved postoperatively	Rate of improvement (%)
IVRO	25	21	19	90.5
IVRO+LeFort I	25	20	18	90.0

Procedure	Number (joints)	Symptomatic joints preoperatively	Joints improved postoperatively	Rate of improvement (%)
IVRO	50	38	37	97.0
IVRO+LeFort I	50	30	27	90.0

Table 6.