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RESEARCH ARTICLE

CORRELATION BETWEEN CONDYLAR ASSYMETRY AND GONIAL ANGLE

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ABSTRACT

Objective: To investigate the correlation between gonial angle measurement and asymmetry of condyle and ramus.

Materials and Methods: The study sample consisted of 60 patients reported to the dept of Orthodontics, K.V.G dental college, Sullia for orthodontic treatment. The preoperative orthopantamogram of these patients were taken and divided into 3 groups based on gonial angle as average angle, high angle and low angle. Condylar, ramal, and condylar plus ramal asymmetry values were computed for all of the subjects on orthopantomograms. Data was analysed statistically by means of individual t test and one-way analysis of variance by bonferroni test.

Results: Student 't' test showed that there was no statistically significant difference ($p>0.05$) among the three groups regarding the condylar, ramal and combined lengths. The effect of gonial angle on the asymmetry measurements was investigated by variance analysis (Bonferroni test). No statistically significant difference was found between the groups ($p>0.05$).

Conclusion: From the study it was concluded that the vertical condylar, ramus and condylar plus ramus asymmetry index measurements were not affected by the gonial angle.

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INTRODUCTION

No individual is perfectly symmetrical. However, achieving complete occlusal symmetry, correct occlusion between upper and lower teeth and facial midlines is considered to be the most important goal of orthodontic treatment. Orthodontists come across many patients with varying degrees of asymmetry. A good diagnosis of symmetry of the maxillo-facial complex is very important and the basic step, particularly when differential diagnosis between dental and skeletal problems is needed. Orthopantomogram (OPG) is one of the most popular records in orthodontic diagnostic phase; it provides important bilateral dental and skeletal informations. It's a simple low radiation dosage x-ray, with magnification factors that vary from15% to 25% (Kambylafkas *et al*., 2006; Larheim and Svanaes, 1986). The asymmetry of the mandible reflects different development of the right and left sides. (Uysal *et al*., 2009) Several studies showed that early interceptive or functional therapy may lead to harmonic jaw development, particularly of the mandible (Pinto *et al*., 2001; Piancino *et al*., 2010; Kilic *et al*., 2008; Silvestrini-Biavati *et al*., 2012; Perillo *et al*., 1996) and even of the entire body posture. (Silvestrini-Biavati *et al*., 2013) It has been shown that early cross-bite treatment, starting from correction of asymmetrical condyle/ramus shapes, led to a more symmetrical dental and skeletal development (Uysal *et al*., 2009; Kilic *et al*., 2008; Ishizaki *et al*., 2010; Staudt *et al*., 2010). These topics underline the great importance of an early diagnosis of possible asymmetries or abnormal development of parts of the mandible. (Pinto *et al*., 2001; Ciavarella *et al*., 2012; Thilander and Bjerklin, 2012) The aetiology of the temporomandibular disorders (TMD) is thought to be multifactorial including such as malocclusions, muscle hyperactivity, and orthodontic treatment. (Egermark-Erikson and Ingervall, 1982; Greene and Laskin, 1988; Rugh *et al*., 1990) Condylar asymmetry is found to be associated with temporomandibular disorders. However, no study has been conducted to find a correlation between condylar asymmetry and gonial angle. This study is conducted to determine if there is any relationship between the gonial angle and pattern of growth on the asymmetry of right and left condyles in the study group concerned. The gonial angle is recognized as growth pattern indicator.

MATERIALS AND METHODS

The study was conducted using lateral cephalograms and panoramic radiographs of 60 patients aged 12-25yrs who reported to the Department of Orthodontics and Dentofacial

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Orthopedics of K.V.G Dental College and Hospitals, Sullia D.K for seeking orthodontic treatment.

In the subjects with normal occlusion, patient selection criteria were as follows:

1. Gonial angle ranging between 115^0 and 140^0
2. Mesiofacial growth pattern;
3. Excellent posterior interdigitation with normal overjet and overbite and harmonious dental midline;
4. No remarkable facial or occlusal asymmetry;
5. No developmental or acquired craniofacial or neuromuscular deformities;
6. No systemic disease;
7. No history of orthodontic treatment;
8. No signs or symptoms of TMD;
9. No missing teeth, excluding third molars;
10. No carious lesions, extensive restorations, or pathologic periodontal status.

The cephalograms and panoramic radiographs were taken under standardized conditions with patients head in natural head position by the same operator.

Among the study sample,

- 20 patients were having gonial angle ranging between 128+/- 7^0
- 20 patients were having gonial angle less than 121^0
- 20 patients were having gonial angle more than 135^0

Gonial angles were measured from the tracing of lateral cephalograms of these patients. To avoid error, the readings were measured on the same day by the same operator.

Panoramic radiographic films were traced on matte acetate paper with 3H pencil. Condylar height, ramus height and total ramus height on both the side were measured for each subject. On both the left and right sides, the most lateral points of the condyle and ramus were marked as X and Y, respectively. On each side a line (ramus tangent) was drawn passing through points X and Y and termed the A-line. Another line was drawn from the most superior points of the condylar images perpendicular to the A-line and termed the B-line. The intersection of the A and B lines was named point Z (Figure1). The distances between points X and Z were measured and recorded as condylar height (CH). Similarly, the distances between points X and Y and between points Z and Y were measured and recorded as ramus height (RH) and condylar plus ramus heights (CH _ RH), respectively (Figure 1).

The asymmetry indexes of the condyle, ramus, and condyle plus ramus were computed by the following formula developed by Habets *et al*.

Asymmetry index: $\frac{\text{Right} - \text{Left}}{\text{Right} + \text{Left}} \times 100\%$[17]

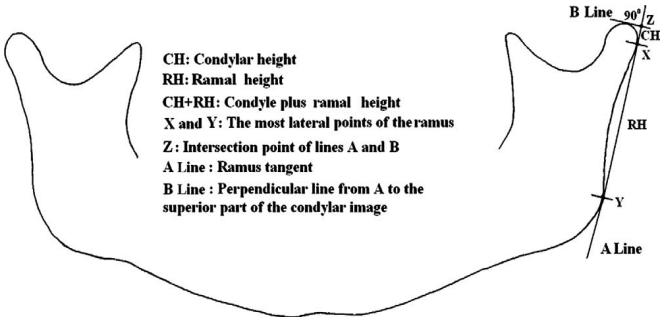

Figure 1. Measuring method according to Habe *et al.* (1988)

Statistical analysis

Independent T-Test

Average gonial angle group

		Mean	Standard Deviation	Std. Error Mean	Significance
Left condyle-right condyle	Left condyle	0.745	0.1317	0.0294	>0.05
	Right condyle	0.662	0.1495	0.0334	
Left ramus-right ramus	Left ramus	4.052	0.4185	0.0936	>0.05
	Right ramus	4.000	0.4799	0.1073	
Left total ramus height- right total ramus height	Left total ramus height	4.797	0.4841	0.1082	>0.05
	- Right total ramus height	4.663	0.5353	0.1197	

Low gonial angle group

		Mean	Std. Deviation	Std. Error Mean	Significance
Left condyle-right condyle	Left condyle	0.730	0.1418	0.0317	>0.05
	Right condyle	0.722	0.1455	0.0325	
Left ramus-right ramus	Left ramus	3.840	0.4309	0.0964	>0.05
	Right ramus	4.040	0.4285	0.0958	
Left total ramus height- right total ramus height	Left total ramus height	4.570	0.4769	0.1066	>0.05
	- Right total ramus height	4.762	0.4771	0.1067	

High gonial angle group

		Mean	Std. Deviation	Std. Error Mean	Significance
Left condyle-right condyle	Left condyle	0.720	0.1852	0.0414	>0.05
	Right condyle	0.675	0.1682	0.0376	
Left ramus-right ramus	Left ramus	4.035	0.4258	0.0952	>0.05
	Right ramus	4.070	0.4813	0.1076	
Left total ramus height-right total ramus height	Left total ramus height	4.755	0.4273	0.0956	>0.05
	- Right total ramus height	4.745	0.4489	0.1004	

Oneway anova with bonferroni test

Descriptives

		N	Mean	Std. Deviation	Std. Error	Minimum	Maximum	Significance
left condyle	average group	20	0.745	0.1317	0.0294	0.5	0.9	
	low angle group	20	0.730	0.1418	0.0317	0.4	0.9	
	high angle group	20	0.720	0.1852	0.0414	0.3	1.1	>0.05
	Total	60	0.732	0.1524	0.0197	0.3	1.1	
left ramus	average group	20	4.052	0.4185	0.0936	3.4	5.1	
	low angle group	20	3.840	0.4309	0.0964	3.2	4.7	>0.05
	high angle group	20	4.035	0.4258	0.0952	3.1	4.7	
	Total	60	3.976	0.4290	0.0554	3.1	5.1	
C+R[LFT]	average group	20	4.617	0.9784	0.2188	1.0	6.0	
	low angle group	20	4.570	0.4769	0.1066	3.8	5.6	>0.05
	high angle group	20	4.755	0.4273	0.0956	4.0	5.7	
	Total	60	4.647	0.6683	0.0863	1.0	6.0	
right condyle	average group	20	0.662	0.1495	0.0334	0.4	0.9	
	low angle group	20	0.722	0.1455	0.0325	0.5	0.9	>0.05
	high angle group	20	0.675	0.1682	0.0376	0.4	1.0	
	Total	60	0.687	0.1543	0.0199	0.4	1.0	
right ramus	average group	20	4.000	0.4799	0.1073	3.5	5.4	
	low angle group	20	4.040	0.4285	0.0958	3.3	4.8	>0.05
	high angle group	20	4.070	0.4813	0.1076	3.2	4.9	
	Total	60	4.037	0.4569	0.0590	3.2	5.4	
C+R [RT]	average group	20	4.663	0.5353	0.1197	4.1	6.2	
	low angle group	20	4.762	0.4771	0.1067	4.0	5.7	>0.05
	high angle group	20	4.745	0.4489	0.1004	4.1	5.6	
	Total	60	4.723	0.4821	0.0622	4.1	5.6	

RESULTS

Data was fed in microsoft excel and analyzed using SPSS (Statistical Package for Social Science, Ver.10.0.5) package. The independent 't' test was performed to determine whether a statistical difference exists between condylar, ramal and combined condylar and ramal length among the three groups . Analysis of variance was used to test the difference between study groups and compare the effect of gonial angle on asymmetry measurements in each of the groups. The paired 't' test was performed to determine the error of method associated with radiographic tracings and measurements. In all the above test, 'p' value of less than 0.05 was accepted as statistically significant. Student 't' test showed that there was no statistically significant difference ($p>0.05$) among the three groups regarding the condylar ,ramal and combined lengths. The mean, standard deviation and standard error of the right and left condyle, ramus and total ramus heights (in millimeters) of the study groups are presented in table I, II and III. The mean, standard deviation and range of condylar, ramus and condylar plus ramus asymmetry indexes of the study groups are presented in table IV. The effect of gonial angle on the asymmetry measurements was investigated by variance analysis (Bonferroni test). No statistically significant difference was found between the groups ($p>0.05$). The vertical condylar, ramus and condylar plus ramus asymmetry index measurements were not affected by the gonial angle. Fifteen panoramic radiographs were selected randomly from the study group and tracings and measurements were repeated after one week to determine intra-examiner error. No statistically significant difference was found between these two readings.

DISCUSSION

Bezuur *et al.* (1988, 1989) investigated the possible role of condylar asymmetry on the pathogenesis of craniomandibular disorders and suggested that the use of a screening protocol and a panoramic radiograph could be of preventive importance in daily practice. Kambylafkas *et al.* (2006) showed that panoramic radiographs could be used to assess vertical posterior mandibular asymmetries. The reproducibility of vertical measurements on panoramic radiographs is acceptable if the patients head position is standardised. In a study by Agrawal *et al*. (2015), panoramic radiograph and posteroanterior cephalogram were compared to assess mandibular asymmetry and they concluded that individually, the measurements from OPGs may not be reliable but the obtained difference between the values of the OPGs and the posteroanterior cephalograms are comparable in nature and show strong correlation and can be used to detect facial asymmetry. In the present study, all the films were taken in standardised conditions and poor quality radiographs were excluded. A study was conducted by Celik *et al.* (2015) to evaluate condylar and ramal vertical asymmetry in adult orthodontic patients with different vertical growth patterns and a clinically normal sagittal skeletal pattern using cone-beam computed tomography (CBCT) which concluded that high-angle group showed statistically significantly smaller values of RH and CH + RH on both sides and statistically insignificantly higher asymmetry index values than the low and normal-angle groups. But in our study the difference in asymmetry levels in three groups with average, low and high angle showed no statistically significant difference. This may because our study emphasized more on the gonial angle measurements and not on the type of growth pattern and also due to the ethnicity changes.

Conclusion

From the present study it was concluded that the vertical condylar, ramus and condylar plus ramus asymmetry index measurements were not affected by the gonial angle.

REFERENCES

Agrawal A, Bagga DK, Agrawal P. and Bhutani RK. 2015. An evaluation of panoramic radiograph to assess mandibular

asymmetry as compared to posteroanterior cephalogram. *APOS Trends in Orthodontics*, 5(5):197.

Bezuur JN, Habets LLMH. and Hansson TL. 1988. The recognition of craniomandibular disorders; a comparison between clinical, tomographical and dental panoramic radiographical findings in thirty one subjects. *J Oral Rehabil.*, 15:549-54.

Bezuur JN, Habets LLMH. and Hansson TL. 1989. The recognition of craniomandibular disorders; an evaluation of the most reliable signs and symptoms when screening for CMD. *J Oral Rehabil*., 16:367-372.

Bracco P. 2010. Slow or rapid palatal expansion for early treatment of unilateral posterior crossbite? Evaluation of the reverse chewing cycles correction. *Prog Orthod*., 11:138‑44.

Celik S, Celikoglu M, Buyuk SK, Sekerci AE. 2015. Mandibular vertical asymmetry in adult orthodontic patients with different vertical growth patterns: A cone beam computed tomography study. *The Angle Orthodontist*., 86(2):271-7.

Ciavarella D, Monsurrò A, Padricelli G, Battista G, Laino L. and Perillo L. 2012. Unilateral posterior crossbite in adolescents: Surface electromyographic evaluation. *Eur J Paediatr Dent*., 13:25‑8.

Egermark-Erikson, I. and Ingervall, B. 1982. Anomalies of occlusion predisposing to occlusal interference in children. *Angle Orthodontist*, 52, 293.

Greene, C.S. and Laskin, D.M. 1988. Long term status of TMJ clicking in patients with myofascial pain and disfunction. *Journal of the American Dental Association*, 117, 461.

Habets LL, Bezuur JN, Naeiji M. and Hansson TL. 1988. The Orthopantomogram, an aid in diagnosis of temporomandibular joint problems. II. The vertical symmetry. *J Oral Rehabil.*, 15:465–471

Ishizaki K, Suzuki K, Mito T, Tanaka EM, Sato S. 2010. Morphologic, functional, and occlusal characterization of mandibular lateral displacement malocclusion. *Am J Orthod Dentofacial Orthop*., 137:454‑5.e1‑9

Kambylafkas P, Murdock E, Gilda E, Tallents RH. and Kyrkanides S. 2006. Validity of panoramic radiographs for measuring mandibularasymmetry. *Angle Orthod*., 76: 38893.

Kilic N, Kiki A. and Oktay H. 2008. Condylar asymmetry in unilateral posterior crossbite patients. *Am J Orthod Dentofacial Orthop*., 133:382‑7.

Larheim TA. and Svanaes DB. 1986. Reproducibility of rotational panoramic radiography: Mandibular linear dimensions and angles. *Am J Orthod Dentofacial Orthop*., 90:45‑51.

Perillo L, Johnston LE Jr. and Ferro A. 1996. Permanence of skeletal changes after function regulator (FR‑2) treatment of patients with retrusive Class II malocclusions. *Am J Orthod Dentofacial Orthop*., 109:132‑9.

Piancino MG, Talpone F, Vallelonga T, Frongia G, Debernardi CL, Pinto AS, Buschang PH, Throckmorton GS. and Chen P. 2001. Morphological and positional asymmetries of young children with functional unilateral posterior crossbite. *Am J Orthod Dentofacial Orthop*., 120:513‑20.

Rugh, J.D., Stohler, C.S. and Carlson, D.L. 1990. Treatment of temporomandibular disorders in children: summary statement and recommendations. American Academy of Pediatric Dentistry, V University of Texas Health Science Center at San Antonio. *Journal of the American Dental Association*, 120, 265.

Silvestrini‑Biavati A, Alberti G, Silvestrini‑Biavati F, Signori A, Castaldo A. and Migliorati M. 2012. Early functional treatment in class II division 1 subjects with mandibular retrognathia using Fränkel II appliance. A prospective controlled study. *Eur J Paediatr Dent*., 13:301‑6.

Silvestrini‑Biavati A, Migliorati M, Demarziani E, Tecco S, Silvestrini‑Biavati P, Polimeni A, *et al*. 2013. Clinical association between teeth malocclusions, wrong posture and ocular convergence disorders: An epidemiological investigation on primary school children. *BMC Pediatr*., 13:12.

Staudt CB. and Kiliaridis S. 2010. Association between mandibular asymmetry and occlusal asymmetry in young adult males with class III malocclusion. *Acta Odontol Scand*., 68:131‑40.

Thilander B. and Bjerklin K. 2012. Posterior crossbite and temporomandibular disorders (TMDs): Need for orthodontic treatment? *Eur J Orthod*., 34:667‑73.

Uysal T, Sisman Y, Kurt G. and Ramoglu SI. 2009. Condylar and ramal vertical asymmetry in unilateral and bilateral posterior crossbite patients and a normal occlusion sample. *Am J Orthod Dentofacial Orthop*., 136:37‑43.

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