The Difference of Occlusal Cant and Favored Chewing Side in Subjects with Complete Dentition

(Perbedaan Kemiringan Dataran Oklusal dan Kecenderungan Sisi Pengunyahan pada Subjek dengan Gigi Lengkap)

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Abstract

The examination of static and dynamic occlusal relationship are important in orthodontic diagnosis. Thus, this study aims to analysis the difference of occlusal cant and favored chewing side. This is cross-sectional study of 70 healthy dental students Universitas Sumatera Utara with complete dentition and have no orthodontics treatment history. The position of tongue spatula across on occlusal of both first bicuspids to assess the existence and degree of the canting occlusal based on extra-oral photograph. The occlusal cant positive if it coincided to inter pupil as transversal references and sectioned with facial midline as a vertical reference more than 3º. A modified direct method- visual observation was done to assess the favored chewing side. A chi-square test with p level 0.05 in evaluation of the null hypothesis that states there was a difference of occlusal cant and favored chewing side in those subjects. From 36 subjects with cant occlusal positive, there were 26 subjects with and 10 subjects without favored chewing side. Then, from 34 subjects with cant occlusal negative, there were 14 subjects with and 20 subjects without favored chewing side. There was a significant difference (p=0.017) between occlusal cant and favored chewing side. Subjects with complete teeth showed that favored chewing side tendency of 3,714 more often had an occlusal cant positive compared to favored chewing side negative. In conclusion, the significant difference of occlusal cant and favored chewing side in subjects with complete dentition can be considered as a preliminary study in order to understand the complexity of development of mandibular asymmetry.

Key words: facial, mastication, occlusal cant, symmetry

Abstrak

Pemeriksaan hubungan oklusal statis dan dinamis penting dalam diagnosis ortodonti. Oleh karena itu, penelitian ini bertujuan untuk menganalisis perbedaan kemiringan dataran oklusal dan kecenderungan sisi pengunyahan. Ini adalah studi observasional dengan pendekatan potong lintang terhadap 70 sampel yang merupakan mahasiswa dan mahasiswi Fakultas Kedokteran Gigi Universitas Sumatera Utara yang sehat fisik dengan gigi lengkap dan tidak memiliki riwayat perawatan ortodonti. Posisi spatula lidah di oklusal kedua premolar pertama untuk menilai kemiringan dataran oklusal berdasarkan foto ekstra-oral. Dataran oklusal miring apabila dataran oklusal bertepatan dengan dataran inter-pupil sebagai referensi transversal berpotongan dengan garis tengah wajah sebagai referensi vertikal lebih dari 3º. Modifikasi metode langsung-observasi visual dilakukan untuk menilai keadaan kecenderungan sisi pengunyahan. Uji *chi-square* dengan p level 0,05 dalam evaluasi hipotesis nol yang menyatakan terdapat perbedaan kemiringan dataran oklusal dan kecenderungan sisi pengunyahan. Dari 36 subjek dengan dataran oklusal yang miring, terdapat 26 subjek dengan kecenderungan mengunyah satu sisi dan 10 subjek tidak ada kecenderungan. Kemudian, dari 34 subjek yang tidak menunjukkan kemiringan dataran oklusal memperlihatkan 14 subjek dengan kecenderungan mengunyah satu sisi dan 20 subjek tidak memiliki kecenderungan. Ada perbedaan yang signifikan (p = 0,017) antara kemiringan dataran oklusal dan kecenderungan sisi pengunyahan. Pada subjek dengan gigi lengkap menunjukkan bahwa kecenderungan mengunyah satu sisi sebesar 3,714 lebih sering memiliki dataran oklusal yang miring dibandingkan dengan mengunyah dua sisi. Kesimpulannya, perbedaan signifikan antara dataran oklusal dan kecenderungan sisi pengunyahan pada subjek dengan gigi lengkap dapat dianggap sebagai studi pendahuluan untuk memahami kompleksitas perkembangan asimetri mandibula.

Kata kunci: wajah, mastikasi, kemiringan oklusal. simetri

INTRODUCTION

Previous studies reported that facial asymmetry issues as one of the psychological and emotional indicators, including correlation of appealing, sexual expectation, character, and falsity perceptions and responses. This condition is common while silent and smiling. The examination of static and dynamic occlusal relationship concerned about occlusal cant in relation to masticatory movements as one of fundamental in different dentoskeletal frames of orthodontic treatment.[1,2] It can be observed both in the frontal plane and obliquely, whenever the lips are relaxed but most clearly in the smile. Then, dental professionals and laypersons can quantify the magnitude of disharmony in canting of the occlusal plane as one of common guidelines for optimizing dentofacial esthetics.[2,6] The significant different levels of vertical length of mandibular condyle and ramus between right and left side present canting occlusal plane. A significant occlusal plane canting originated from pathology condition such as condylar hyperplasia, osteochondroma, and osteoma. The occlusal stability after treatment due to developmental asymmetry concerned about occlusal plane canting.[4,7]

Occlusal cant that is associated with facial asymmetry in the vertical plane involved the difference in both quadrants.[4] The threshold of 4° was recognized as negatively occlusal cant among orthodontists, general dentists and laypersons whilst previous studies mention that occlusal canting is not perceived by laypersons unless it exceeds 2º or 3º (Cit. Peck& Peck, 1995).[2] A comprehensive and systematic diagnostic approach also require in a thorough facial analysis while smiling.[2,4,7] The assessment of cant occlusal plane can provide information about the meaningful implication in planning and predicting the direction of mandibular growth and craniofacial surgery outcome.[7-9]

Nowadays, misleading record of the canting occlusal plane frontally affects the facial esthetic, phonetics along with mastication function if there is no stability in occlusion, which results subsequently leads to alveolar bone resorption.[6,10] Examination of etiologic factors occlusal cant, classification of occlusal canting, and the advantageous of alternative treatment choices is essential to achieve satisfactory treatment. The occlusal plane helps in making aesthetics in the anterior. Meanwhile, the posterior of occlusal plane affects phonetics, which creates a milling surface in between the buccinators and tongue muscle, which positions the food bolus and holds it during chewing.[10]

Chewing side preference and laterality showed weak correlation in primary, mixed, and permanent dentition.[11] There were also no correlation between condylar asymmetry based on panoramic radiography analysis and chewing preference in TMD patients.[12] Since proper occlusal cant analysis provides some benefits in orthodontic treatment modality, the goal of this study to analysis the difference of occlusal cant and favored chewing side in complete dentition subjects.

MATERIALS AND METHODS

There were seventy young adults who registered as active dental faculty students in Universitas Sumatera Utara participated in this cross-sectional study. The inclusion criteria as followed: Fully completed permanent teeth, except the third molar and had no orthodontic treatment history. Health Research Ethical Committee of the Medical faculty Universitas Sumatera Utara approved this study (No. 512/DATE/KEPK/FK USU-RSUP HAM/2019).

Evaluation of occlusal cant by positioning the tongue spatula across on occlusal of both first bicuspids to assess the existence and degree of the canting occlusal based on extra-oral photograph. The extra-oral photography using a frontal photo with a mirrorless digital camera (Fujifilm X-A5, XC15-45mm F5.6 OIS PZ) in 1 meter. To photograph the occlusal cant, both the inter-pupillary line of the subject and the top of the camera view finder should be positioned horizontally and are analyzed with software program (Corel Draw X8). If the occlusal cant (red line) that coincided to inter pupil (yellow line) as transversal references and sectioned with facial midline as a vertical reference more than 3º, it was noticed as occlusal cant positive (Figure.1). [6,13]

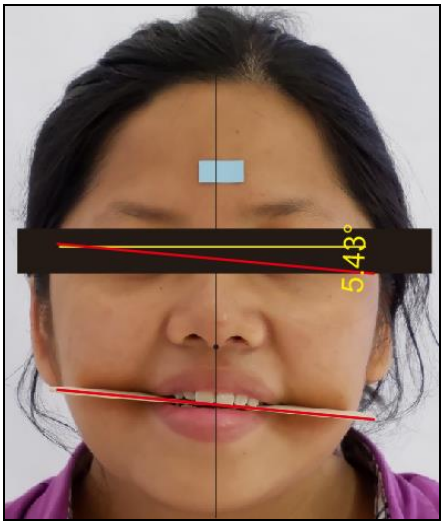

Figure 1. Frontal view photograph

The favored chewing side test used McDonnel's method modification in direct method – visual spot-chewing which following this: The patients were instructed to chew a 45 g piece of sugar-free gum (Xylitol free) with the posterior teeth. Instruct the patient to chew the gum in a 15-s time interval and recording the gum's position (right or left) and carried out seven times consecutively with 5s as time interval among procedures. Favored chewing side is positive if the predominantly mastication on the same side of the jaw (cit. McDonnel, 2004).[14,15]

Cohen's κ was used to determine the validity and reliability of occlusal cant analysis and favored chewing side evaluation. There was low agreement for inter-rater measurements (κ=0.387). Since there was no significant difference (p>0.05), the statistical analysis was done with chi-square test with p level 0.05 in evaluation of the null hypothesis that states there was a difference of occlusal cant and favored chewing side in those subjects.

RESULTS

There was total 70 subjects who were age range 20,87±2.04-year-old with consist 25 male (35,7%) and 45 female (65.3%) subjects. There were 26 subjects with and 10 subjects without favored chewing side from 36 subjects with cant occlusal positive. Then, there were 14 subjects with and 20 subjects without favored chewing side from 34 subjects with cant occlusal negative. There was a significant difference (p=0.017) between occlusal cant and favored chewing side. Subjects with complete teeth showed that favored chewing side tendency of 3.714 more often had an occlusal cant positive compared to favored chewing side negative (Table 1).

Table 1. Difference of Occlusal Cant and Favored Chewing Side

Canting Occlusal Plane	Favored Chewing Side				*P*	*Prevalence Odds Ratio*
	Positive		Negative			
	N	***%***	***n***	***%***		
Positive	26	65	10	33.3	0.017*	3.714
Negative	14	35	20	66.7		

* $p < 0.05$: significant difference

DISCUSSION

Clinically significant facial asymmetry requires comprehensive analysis, including masticatory function that related to favored chewing side. The examination and recording of favored chewing side is valuable in routine dental examination and treatment planning. It was also reported as one of detrimental effect in temporomandibular disorder (TMD) of the corresponding side in cross-sectional study from 76 subjects with healthy dentition.[16] The favored chewing side can lead to dental caries and harmful effect on the temporomandibular joint while mastication occurs mainly on the same side of the jaw. [12,15,16] As previous studies, the malfunction and malformation of condylar path combined with habitual chewing on the symptomatic side refers to nonspecific symptom-based disorder in temporomandibular joint and based on jaw biodynamic data of chronic TMD subjects.[17,18]

This study used 3° as occlusal cant indicator due to acceptable occlusal cant to lay persons, general dentists, and orthodontists is 2° although 4° is the threshold for detection of occlusal cant.[2] Then, angle of 2.15°–2.908° on a digital photograph is acceptable in the digital photograph (cit. Ferrario, 1994). [4]

This study emphasized the emergence of occlusal cant that related vertically in facial asymmetry and favored chewing side that related to non-syndromic TMD. Based on the table 1, there was a significant difference (p=0.017) between occlusal cant from frontal analysis based on photograph and favored chewing side based on direct method in complete dentition subjects. Subjects with complete teeth showed that favored chewing side tendency of 3,714 more often had an occlusal cant positive compared to favored chewing side negative. This study was similar to previous study that suggested about favored chewing side is a suchlike bite pressure in laterally asymmetry and area contact occlusal at centric occlusion, except for handedness, has been controlled by central nervous system in complete erupted teeth subjects.[19] Thus, mastication process related to functional esthetic occlusal plane and practicable for orthodontist.

In evaluation favored chewing side, detecting the adaption of the occlusal plane to the existence of vertebral maturation, age, and sagittal haw discrepancy, is an intrinsic factor. The complexity of functional and esthetic function in occlusal cant lead the clinician to be more alert with condylar growth and development that was influenced by genetic pattern, psychological factor, bolus type, predicts facial attractiveness that is a reliable indicator of developmental asymmetry.[6] Favored chewing side is a warning to detect the adaption of the occlusal plane in bite force that occurs with vertebral maturation, age, and occlusal characteristic of facial asymmetry, especially related to third lower facial.[11,19]

Although this study did not consider the presence of TMD and the weak validity and reliability for inter-rater study, this study limited to dental faculty student between 18 to 25 years old. Then, the quality of direct-method–visual spot-chewing was recorded by a single calibrated examiner in determining occlusal cant and favored chewing side evaluation. It can be concluded that the combination of occlusal cant analysis and favored chewing side evaluation should be considered in further study to understand the complexity of facial symmetry development including sagittal jaw discrepancy, dynamic occlusion examination, and the other TMJ factors are variables in the further studies.

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CONFLICT OF INTEREST
The authors declare no conflict of interest in this study

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