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Centric Discrepancy Associated with TM Disorders in Young Adults

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ABSTRACT

The relationship of discrepancy between centric relation (retruded contact position) and centric occlusion (maximal intercuspation) to TM Disorders is still obscure. The purpose of this prospective study is to determine which types of centric discrepancy are closely associated with TM Disorders. 220 dental students (181 males, 39 females) were evaluated by dividing into three groups; A (CO = CR), B (centric sliding ≦ 2 mm), C (centric sliding > 2 mm) by manipulating the mandible via Dawson's methods to check the degree of sliding from CR to CO. Each student was evaluated three times by one author to be finally categorized. The following parameters were examined; (I) Questionaires which contain pain, dysfunction, vas (visual analogue scale), trauma history and bruxism history. (II) Clinical examinations which contain deflection on opening, mmo (maximal mouth opening), TMJs sounds and signs of bruxism. Analysis of data showed Gr. B (10.64%) was less susceptible to getting stuck of jaw or lock openly than Gr. A (38.64%) and Gr. C (29.09%), ($P < 0.01$) in self-reported questionaire (B 2-B 4). Among them, most of the subjects were suffered from pain mildly and had subjective sensation of getting stuck of the jaws on closing or opening sometimes. More TMJs sounds were in group A. (48%) and Gr. C (55%) than in Gr. B (31%), ($P < 0.05$). This study showed that the students with gross sliding in centric (> 2 mm) or those with only limited sliding (Gr. A) had more examinated TMJs sounds than the so-called normal groups of population (Posselt 1952).

Key words; Centric Discrepancy, Slide in Centric, TM Disorders.

The etiology of tempormanidibular disorders is presently considered as being multifactorial, which including both local or peripheral and central factors[5]. The most often-mentioned local factors are the so-called occlusal interferences, which is strongly

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advocated by some authors[4,22], while others disregard their role[9,14]. Among these, sliding between retruded contact position(CR) and maximal intercuspation(CO) is considered the most possible causative factors in TM Disorders[4,22,23]. While recent reviews show that occlusal factors including sliding in centric are not generally accepted as the major causative factors[2.9,21.26.27] as previously stated[4,22], but the issue is still controvertial. The purpose of this study is to study the relationship between centric discrepancy and TM Disorders in young adults.

MATERIALS AND METHODS

Subjects;

Two hundered and fifty-five dental students jointed this study. They were assessed for TM Disorders through a self-administrated questionaires and clinical examinations. This population was chosen because, on the basis of studies of TM Disorders patients[3,23,24] this age group appeared to consistute a high-risk population, and the population was readily available. Subjects drop out or incomplete records caused a loss of thirty-five subjects, leaving a group study of 220 that included 181 men(82%) and 39 women(18%).

Questionaire;

The questionaire consisited of seven categories (table 1) which included (A) Pain/Discomfort; (B) Dysfuntion; (C) Level of Pain-Visual analogue Scale; (D) Trauma History; (E) Bruxism/Clenching Habits; (F) Stress; (G) Arthritis-related problems.

The self-administered questionaires requested description of pain and dysfuntion according to severity and frequency of attack, which were rated on an interval scale as No(0); Mild(1); Moderate(2) and Severe(3) or Never(0); Sometimes(1); Often(2); Almost all the times(3).

Clinical Examination and Categorization

All subjects were examined by only one author (CZ WU) for the clinical signs and categorization according to the following criteria. TMJ dysfunction was evaluated according to mandibular movement and joints sounds. Maximal range of mouth opening was measured in the sagittal plane to the neariest milllimeter (*) and the deflection of mouth opening was also assessed.

Joint sounds were recorded as to location and quality through light bimanual palpation of TMJs during full range of jaw movement. Intraorally, wear facet and soft tissue ridging on cheek and the lateral border of tongue were also noted.

According to the magnitude of discrepancy between retruded contact position and maximal intercuspation, all subjects were categorized into three groups by using Dawson's bilateral manual method[4] to manipulate the mandible into RCP and then ask the subject to bite into the position of ICP. The magnitude of discrepancy was assessed visually with the aids of a millimeter rule(*) at the saggital plane. All subjects were evaluate three times to confirm their final categorization. Different categorization of the same subject resulted in discarding the subject from this investigation. The categorization of three groups are; Group A; CO=CR, Group C; CR to CO sliding in centric >2 mm, Group B; between the two extreme, i. e; 0 to 2 mm from CR to CO.

(* The Trubyte Autorule By Dentsply.)

Frequency counts were made on the col-

Table 1 Questionaire for TM Disorders*

(A) PAIN/DISCOMFORT	NO (0)	MILD (1)	MODERATE (2)	SEVERE (3)
1. Do You have pain in front of the ear?	-----	-----	-----	-----
2. Do you have pain in the face, cheeks?	-----	-----	-----	-----
3. Do you have pain in the temple area?	-----	-----	-----	-----
4. Do you have pain on the muscle of neck and shoulder area?	-----		-----	-----
5. Does it hurt when you open wide or yawn?	-----	-----	-----	-----
6. Does it hurt when you chew?	———	-----	-----	-----
7. Does it hurt when you are not chewing or using the jaws?	-----	———	-----	-----

(B) DYSFUNCTION	NEVER (0)	SOME-TIMES (1)	OFTEN (2)	ALMOST ALL THE TIMES (3)
1. Does your jaw make noise so that it bothers you or others?	-----	-----	-----	-----
2. Do you unable to open your mouth as far as you can?	-----	-----	-----	-----
3. Does your jaw get stuck so that you can not open freely?	-----	-----	-----	-----
4. Does your jaw ever lock openly, so you cannot close it?	-----	-----	-----	-----
5. Are you aware of an uncomfortable bite?	-----	-----	-----	-----
6. Do you find any problems with your chewing and swallowing?	-----	-----	-----	-----
7. Do you find any problems with speech, singing or other oral uses?	-----	-----	-----	-----

* See Ref. 25.

lected data, T-test, Chi-Square Test and correlation coefficient were used to determine the significant associations between variables, The levels of significance given in each table designated the likelihood of false rejection of the null hypotheses.

Table 2. Frequency Dirtribution of Three Categories

	Group A	Groups B	Groups C	
Male	33(18%)	99(55%)	49(27%)	181
Female	11(28%)	22(57%)	6(15%)	39
Total	44(20%)	59(55%)	55(25%)	220

RESULTS

The categorization of discrepancy between CO and CR was tabulated (table 2). The percentage of each group was as follow; Gr. A; 20%, Gr. B; 55%, Gr. C; 25%. It was comparable with the data of Posselt[16] and Pullinger[17,18]. The so-called normal range group was larger (85% vs.

Table 3. Frequency Distribution of Pain and Dysfunction

Item	Group A	Group B	Group C	Chi-Square	P Value
A 1	7	7	6	4.2955	0.1151
A 2	8	9	8	4.4348	0.1072
A 3	7	25	17	1.7566	0.5813
A 4	14	34	13	0.8351	0.6647
A 5	8	15	12	2.9929	0.2227
A 6	6	16	5	0.6947	0.7120
A 7	0	2	0	0.6514	0.5582
Total	44	121	55		
B 1	21	77	30	3.7551	0.1513
B 2	9	8	8	6.8758	0.0315*
B 3	17	13	16	18.1484	0.0003**
B 4	10	5	15	21.0526	0.0001**
B 5	11	37	12	0.5938	0.7476
B 6	2	3	1	0.7476	0.6938
B 7	2	6	4	0.4807	0.7895
Total	44	121	55		

* $P<0.05$; * * $P<0.01$

Table 4. Frequency Distribution of Questionaire B(2-4) in Percentage

	Gr.A				Gr.B				Gr.C			
frequence	0	1	2	3	0	1	2	3	0	1	2	3
B 2	79%	17%	2%	2%	93%	7%	-	-	85%	11%	-	4%
B 3	61%	33%	4%	2%	89%	10%	1%	-	77%	25%	4%	-
B 4	77%	16%	7%	-	95%	4%	1%	-	72%	2%	4%	-

15%)than that of the other two extreme grooups. We used this categorization to compare the other variables between groups.

Questionaire; Table 3

The frequencies of reported symptoms derived from questionaire (A)and (B) were tabulated in Table 3. It was found that there was no significant difference of self-reported pain in (A) among groups. (table 3). In dysfunction items (B), it did have significant difference ($P<0.01$)among three groups in the aspect of

Table 5. Frequency Distribution of Trauma History

	Group A	Group B	Group C
Trauma incidence	11	35	15

Chi-Square = 1.2569 P = 0.2614

Table 6. Incidene and P value of bruxism habits

	Group A	Group B	Group C	Chi-square	P
Symptom after awaken	6	12	3	0.0065	0.9969
Incidence of self- awareness of bruxism	11	35	15	2.5099	0.2849
Clenching habits	44	121	55	3.8719	0.1400

Table 7. Visual Analogue Scale

	Group A	Group B	Group C
Male	0.64	5.52	5.74
Female	0.61	2.92	7.54

Chi-square=1.0260 P= 0.6047

Table 8. Acive Range of Mouth Opening

	Group A	Group B	Group C
Male	51.0 ±4.8*	50.0 ±4.6	50.3 ±4.7
Female	44.0 ±3.7	44.0 ±3.9	47.0 ±3.9

* in Milimeter

Table 9. Frequency Distribution of Maximal Mouth Opening

	Group A	Group B	Group C
<40 mm	1 (3)	3 (4)	2 (0)
40 mm-50 mm	11 (4)	37(12)	21 (4)
>50 mm	21 (6)	59 (6)	26 (2)

* parenthese indicated female subjects

Table. 10. Frequency distribution of joint sounds in clinical examination

	Group A	Group B	Group C
with joint sounds	21 (18%)	37 (31%)	25 (45%)
without joint sounds	23 (52%)	84 (69%)	30 (55%)

Chi-Square=6.790 df=2 P=0.0329

Table 11. Frequency Distribution of soft tissue ridging

	Group A	Group B	Group C
Total Incidence Number	20	42	22

Chi-Square=2.0224 P=0.3655

limited mouth opening. Gr. A and Gr.C had higher frequence of self-reportd on getting stuck of jaws on opening or closingly than Gr. B. And most of them only happened sometimes(table 4). As for the remaining items on questionaire (B), there were no significant difference in difficulty of swallowing and speaking and discomfort in mastication among three groups.

From the Table 5 and 6,we could not find any significant difference among three groups in the trauma history, self-reported bruxism/clenching habits. We could not find any difference of visual analogue scale among three groups (Table 7) too.

Clinical Examination; (Table. 8. 9. 10. 11)

The maximal active range of mouth opening was measured (Table 9). Restricted mouth opening was rare;Only 6 males and 7 females could not open the jaws more than 40 mm (Table.8) The mean value of each group of subjects was 50 mm in the male and 45 mm in the female groups. There did have difference in the range of mouth opening between male and female subjects, but there was no difference of

active range of mouth opening among three groups.

From Table 10, we found a significant difference of joints sounds among three groups ($P < 0.05$). It meant that Gr. B (31%) had less joint sounds on clinical examination than that of Gr. A(48%) and Gr. C(45%).

On screening the signs of bruxism we could not find any difference among groups. Table 11.

DISCUSSION

The result of the categorization of sliding from RCP to CO was similar to that of Posselt[16] and Pullinger[17,18].The reasons of small discrepancy resided in (a) Different scale used; One used 0.5 mm as demarcation[15] while others used 1 mm as the boderline[17,18,23]. (b) Wether to deprogram the musle before manipulating the mandible or not. (c) Age distribution of subjects being tested. Some authors investigated the teenager groups[6], (20).While others sampled the subjects of young adults[15,17,18,23]. (d) How to manipulate the mandible passively. As we know there were three commonly used methods to guide the condyle heads into retruded contact position. In words, all were based on their concept of where the centric relation was. When centric relation was defined by McCollum, chinpoint guidance become popular; the use of this method was declining along with the proponents for "RUM" position (rearmost uppermost and midmost condyle position). The three-finger method advocated by Thomas, position the condyle anterially and superially. The biteral method introduced by Dawson[4] guided the condyle into the most superior position within the glenoid fossa.

According to the study of Hobo[11], Dawson's bilateral method of mandibular manipulation was the most accurate reproduction among three methods tested. It was claimed to be reproducible within 0.02 mm area. Besides, the Dawson's method we applied was performed three times by only one author to avoid intraexaminer bias. Only when three times had the same categorization did we include the subjects into our investigation.

Adaptive ability was said to be one of the major factor governing the suscepti-bility to micro or macro-trauma. Joints were claimed to have the ability to cope with the impact externally or internally via proper alignment of cindyle-disk-fossa relationship[4]. So under this concept, certain occlusomorphologic conditions might require less adaptation in the TMJs.

When the condyle is in the optimal position, a 0.2-0.3 mm space exists between the condyles and the fossa as stated by Dawson[0(4)] and Ramfjord[22], and confirmed three-dimensionally by Hobo[12]. This space seemed to be essential to health maintainence of the tempormandibular joints. This space essentially could be considered a buffer. Without this buffer where the condyle received constant pressure, the articular disk might not withstand direct forces and results in damage such as anterior disk displacement or disk perforation.

Symmetric slide within limit (< 1 mm) might be protective of TMJs, ensuing that the position of condyle at the point of ICP loading was anterior to the border position[2]. This was in agreement with the conclusion of Gibbs[7], who found that there was a small reflex reduction in jaw elevator muscle activity in RCP and that a small RCP to ICP slide was therefore protective of TMJ.

Too large slide for example, > 2 mm from

RCP to ICP might be the sequelae of post-traumatic manifestation of joints. This combined with the joints with no laxity such as CO=CR group in this study manifestated itself the high prevalence of the TMJs sounds (Table 5). It was also confirmed by Pullinger[17,18], which stated the greatest prevalence of clicking in subjects with no sliding and in subjects with asymetric slide less than I mm,and by Egermark-Eriksson[28] who stated the association between unstable occlusion and TMJ sounds.

Questionaire was used as one of the major tool in assesing the prevalence and severity of TM Disorders[1,10,17,18], The results of this study indicated the high prevalence of subjective self-reported of jaws got stuck on opening or closing movement including locking episodes among the groups of limited slide (Gr. A) and overt gross slide (Gr. C). The results were not the same as others[17,18,20], who did not find significant difference between groups with various degree of sliding from RCP to ICP. This difference resided in the criteria used to evalute the subjects. As we know, some of the epidemiologic studies exhibited methodologic limitation such as (a) lack of a specific diagnostic criteria. (b) small or self-selected sample,and (c) lack of developmental age-specific data[8,19]. Besides, the task of collecting the data of TM disorders population longitudinally was the most difficult one.

The apparent discordance between patient's self-reported questionaire and the clinical examination findings may result from a variety of factors. One source might included patient's varying level of concern for and awareness of holding sensation. The second factor could include the transient nature of the symptoms themselves. For example, a patient could report jaw pain on awakening but not experience it later in the days when the reports was given. This is also confirmed in this study (Table 4). Most of thr prevalence on self-reported pain was happened mildly, and the subjects who suffered from dysfunction such as jaws got stuck on opening or closing only sometimes. A third possible source of discordance may related to the method of data collection. Questionaire or questions may not be framed for understanding by patients, and clinical examination procedures may vary from one occasion to another or from one examiner to another[13].

SUMMARY AND CONCLUSION

Occlusal factors may selectively influence the development of TM Disorders. But because the effect occur unevenly over long periods of time, the precise relationship have been elusive. Certain occlusomorphologic conditions may require less adaptation in the TMJs. Finding in this study suggests that CO anterior to RCP (CR) may be a protective way of TMJs especially there is a limited "free space" for joint to movement.

From this study we can conclude;

1.Young adult with CO=CR or subjects with gross sliding between CO to CR have more TMJs sounds than the so-called normal groups.

2.There is a trend for the normal group (Gr.B) with less subjective complaint of episodes of the jaws getting stuck on opening and on closing movement than the CO=CR Gr.or the group of gross sliding between CR to CO(>2 mm).

3.Data gain from questionaire should be cautiously interpretated and more definite refinment of questionaire is to be designed.

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年輕人的中心差異與顳顎障礙相關性

吳慶榕　周孫隆

中心關係(後退接觸位)與中心咬合(咬頭嵌合位)之間的差異是否與顳顎障礙有關目前仍未有定論。有人認爲二者合一最理想，但也有人視此差異性爲顳顎障礙的原因。本實驗目的在探討不同程度中心差異與顳顎障礙的相關性。

本研究將牙科學生 220 人(男：181 人；女：39 人)以道生氏(DAWSON'S)雙手操作下顎法，觀察中心關係與中心咬合間滑動程度，將受測者分成三組：A：CO = CR, B：CR 與 CO 間滑動< 2 mm, C：中心差異>2 mm。每一受測者均由同一人操作下顎三次才決定其分類。根據分類探討其與下列因素的相關性(I)問卷：含疼痛(髁關節、頰部、太陽穴、頸肩部、張口、靜止痛)機能障礙(關節音、張口困難、張口卡阻感、閉口卡阻感、咬合不適、吞嚥困難、下顎運用)及視覺疼痛指標，受傷病史、磨牙習慣。(II)臨床檢查：開口偏離、最大開口度、關節音、磨牙徵兆。結果顯示：中心差異小(0～2 mm)學生比其它二組學生(中心差異幾乎不滑動及滑動程度>2 mm)較不易有張口困難($0.01<P<0.05$)張口卡阻感($P<0.01$)閉口卡阻感($P<0.01$)及檢查時較不會產生關節音($0.01<P<0.05$)。其發生頻率絕大部份分布在輕微疼痛或偶而產生的卡阻感上。

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