



Research Article

A CLINICAL RESEARCH TO CLASSIFY PATTERN OF OCCLUSAL CONTACTS IN DIFFERENT LATERAL POSITION USING ARTICULATING PAPER & SHIM STOCKS

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ABSTRACT:

Natural occlusion during mandibular lateral movement is clinically described as, either canine guided or group function, however in practice, it is often seen that the occlusion scheme may be somewhat intermediary & actually not corresponding to any of the groups. This way, it becomes difficult to classify & communicate the existing occlusal scheme. Hence, this study was planned to find out the frequency of tooth contacts in different lateral positions and to access whether the existing occlusion schemes like canine protection & group function can classify all occlusion schemes 100 healthy patients between the age group of 18 to 25 yrs was examined with the articulating foil in maximum intercuspation or in lateral position i.e. 0.5,1,2,3 mm. Out of the four lateral position, maximum contact was found in 0.5 mm position which decrease further mandibular lateral excursion. Canine shows consistent contact frequency throughout all the four position. Most of the contact pattern belongs to group function & few to canine guided occlusion. Canine act as a natural stress breaker. This paper depicts the nature of lateral contacts of natural dentition in a sample dentulous population in an attempt to verify the classification scheme currently followed.

Keywords: Canine protected, Group function, working side contacts, shim stocks, non-working side contact.

INTRODUCTION

The long-term stability of the posterior teeth is dependent on the anterior teeth not wearing away or moving, so it is important to establish an anterior guidance that does not interfere with either the neutral zone or the natural envelope of function through all excursive pathways¹. The collective arrangement of the teeth in function is quite important and has been subjected to a great deal of analysis. There are some concepts to recognize the manner in which teeth should & should not contact in the various functional excursive position of mandible. They are bilateral balanced occlusion, unilateral balanced occlusion, mutually protected occlusion.

Bilateral balanced occlusion is a concept that is not used as frequently today as it has been in the past. This is particularly useful in complete denture construction.



Canine protection has been defined as contact only between the maxillary and mandibular canines on the working-side. Group function has been defined as contacts between the working side opposing teeth in a segment or group.

Canine protection and group function is used for the classification of the patterns of occlusal contacts in lateral excursions in natural dentition.²⁻³ Several studies have noted the prevalence of these two types of occlusal guidance & the relationship between the occlusal contact pattern and mandibular function. The effects of this relation includes the effects of occlusal contact on mandibular movement, masticatory muscle activity, forces in the tempomandibular joints, sign & symptoms of tempomandibular disorder⁴⁻⁵.

In *The Glossary of Prosthodontic Terms*, (1994) canine protection is defined as “a form of mutually protected articulation in which the vertical and horizontal overlap of the canine teeth disengage the posterior teeth in the excursive movements of the mandible.” Whereas group function is a “multiple contact relations between the maxillary and mandibular teeth in lateral movements on the working side.” However, the occlusal contact pattern varies according to the mandibular position examined. Currently no description of occlusal contact has been defined. Lack of this mandibular position standardization could lead to inconsistent results in assessing occlusal contacts.

Hence this present study was planned to evaluate the use of canine protection & group function in classifying occlusal guidance in natural teeth.

MATERIAL AND METHODOLOGY

Hundred subjects (42 men, 58 women) aged 18 to 25 years were included in the study.. They were selected from a group of 500 undergraduate students of Dentistry.

The criteria for inclusion were as follows:

- a. Normal occlusal alignment with Angle’s class I relationship.
- b. Full dentition except for third molars.

The exclusion criteria were :-

- a. Carious teeth involving cusp.
- b. Severe attrition.
- c. Pathologic periodontal condition or temporomandibular joint
- d. History of orthodontic treatment.

Informed consent was obtained from each subject before the commencement of the investigation.
Materials Used. (Fig-1)

- a. Mouth Mirror.
- b. Explorer.



- c. Cotton Twizer.
- d. Shim stock occlusal registration strips of 12 micron thick.
- e. Stainless steel scale.
- f. Marker pen.
- g. Articulating forceps.

Fig.1 Armamentarium for study.



METHOD

Each patient was instructed to close in maximum tooth intercuspation and to slide the mandible laterally to each side, performing a working-side movement as per method reported by Singh et al.,2013 with slight modification⁶

Each subject was required to sit upright in a dental chair with the Frankfort parallel to the floor. The subject's head was not fixed. To control lateral position, marks were made on the maxillary central central incisors with marker pen at distance of 0.5, 1, 2, 3 mm respectively from the midline.

To record interocclusal contact shim stock (12 um thick) was placed on the occlusal surfaces of the right side, covering the most posterior mandibular molar. The subject was requested to close his/her mandible to the maximum intercuspation. While maintaining a constant pulling force was on the shim stock, the subject was requested to perform gliding movement to the right with the teeth in light contact, till the mandibular midline approximate the 0.5 mm mark on right central incisor. The presence or absence of occlusal contact was examined.

The teeth holding the shim stock were considered to have occlusal contact. To prevent movements with mandibular opening or movement without occlusal contact and lateral-protrusive excursion, the movement was observed closely & the subject was instructed to correct the movement. The movement was performed by the subject without any help from the examiner. When the subject could not perform the movement voluntarily, he or she was asked to practice with the use of a hand mirror. The examination was continued from the right side most posterior molar to the right-side central incisor sequentially. For examination of the molars, the shim stock was placed on both the mesial and distal sides of the occlusal surface similarly occlusal contacts were examined on 0.5,1,2,3 marking. The same procedure was performed for the 0.5,1, 2 and 3 mm on the left side. All recordings were performed by the same examiner. In the case of differing results, the existence of occlusal contact was re-examined and verified.



RESULT

In the present study, Hundred subjects (42 men, 58 women) aged 18 to 25 years were included in the study. They were selected from a group of 500 undergraduate students of Dentistry. The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 15.0 statistical Analysis Software and Chi-Square test were used to get the probability level and the values were represented to know the significance.

I. Contact frequency at right side.

The occlusal contact frequency at varying lateral positions on right side are summarized in Table 1 and also depicted in Fig. 2. Table 1 and Fig. 2 both showed that the contact frequency was highest at 0.5 mm which positively decreases with increase in lateral positions/distance at all teeth. Out of all teeth, canine showed consistent contact frequency throughout all four positions.

Whereas 1st premolar and 2nd premolar showed significant decrease in the contact frequency through lateral positions from 1 to 2 mm and 0.5 to 1 mm respectively. On comparing the contact frequency (%) among the lateral positions, χ^2 test revealed significantly ($p < 0.01$ or $p < 0.001$) different contact frequency central incisor, lateral incisor and canine showed Chi-Square test value as 0.00, 1.000, 6.09, 0.107 and 2.24, 0.524 respectively giving probability level value more than 0.001, which is non-significant. In PM 1, PM 2 and M1 showed Chi square test value as 68.80, 50.99, 15.72 respectively giving probability level value less than 0.001, which is significant tooth among the positions, the contact frequency not significant at ($p > 0.812$) M2 tooth.

Table 1: Contact frequency at different lateral positions on right side (n=100)

| Tooth | 0.5 mm (n) (%) | 1 mm (n) (%) | 2 mm (n) (%) | 3 mm (n) (%) | χ^2 value | p value | Significance |
|-------|-------------------|-----------------|-----------------|-----------------|----------------|---------|----------------------|
| CI | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0.00 | 1.000 | Not significant |
| LI | 3 (3.0) | 3 (3.0) | 0 (0.0) | 0 (0.0) | 6.09 | 0.107 | Not significant |
| C | 84 (84.0) | 86 (86.0) | 80 (80.0) | 79 (79.0) | 2.24 | 0.524 | Not significant |
| PM 1 | 88 (88.0) | 74 (74.0) | 51 (51.0) | 36 (36.0) | 68.80 | <0.001 | Highly significant |
| PM 2 | 62 (62.0) | 44 (44.0) | 28 (28.0) | 16 (16.0) | 50.99 | <0.001 | Highly significant |
| M 1 | 31 (31.0) | 20 (20.0) | 15 (15.0) | 10 (10.0) | 15.72 | 0.001 | Moderate significant |
| M 2 | 7 (7.0) | 5 (5.0) | 5 (5.0) | 4 (4.0) | 0.95 | 0.812 | Not significant |



Contact frequency at different lateral positions on right side

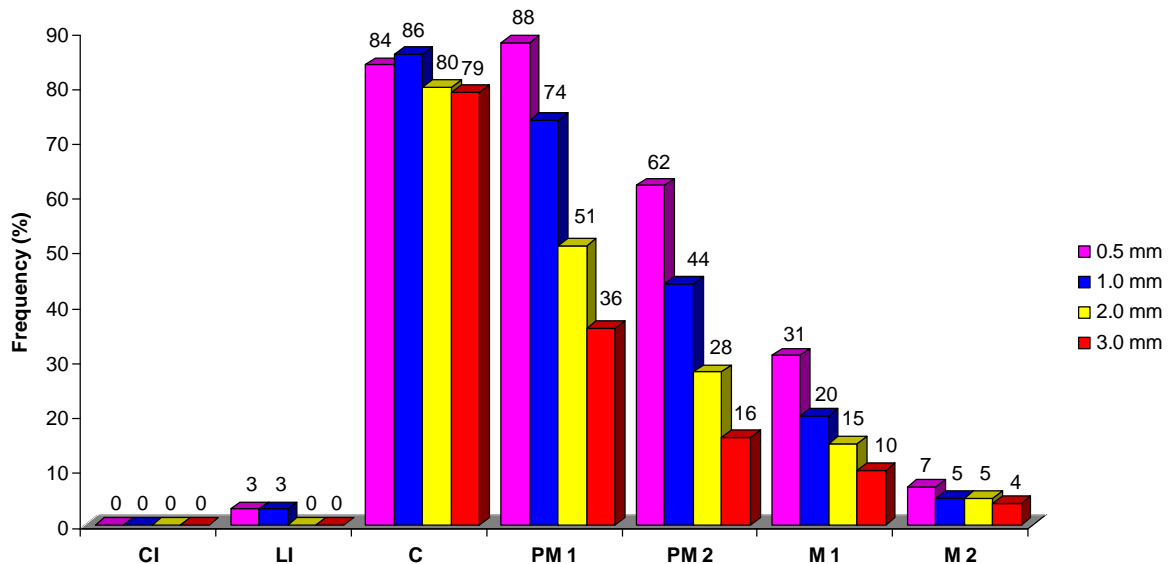


Fig. 2. Contact frequency at different lateral positions on right side.

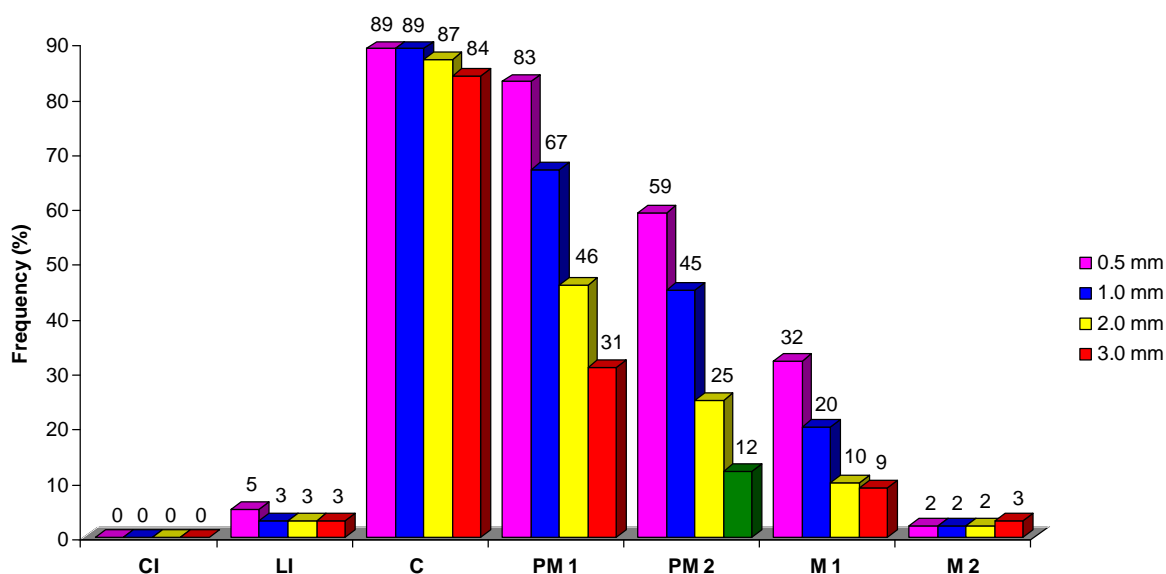
II. Contact frequency at left side

The occlusal contact frequency at varying lateral positions on left side are summarized in Table 2 and also depicted in Fig. 3. Like right side, the contact frequency at left side also decreases with increase in lateral positions/distance at all teeth. Out of all teeth, canine showed consistent contact frequency throughout all four positions.

Whereas 1st premolar and 2nd premolar showed significant decrease in the contact frequency through lateral positions from 1 to 2 mm and 0.5 to 1 mm respectively. On comparing the contact frequency (%) among the lateral positions, χ^2 test revealed significantly ($p < 0.01$ or $p < 0.001$) different contact frequency central incisor, lateral incisor and canine showed Chi-Square test value as 0.00, 1.000, 0.89, 0.828 and 1.51, 0.628 respectively giving probability level value more than 0.001, which is non-significant. In PM 1, PM 2 and M1 showed Chi square test value as 64.08 57.16, 23.61 respectively giving probability level value less than 0.001, which is significant tooth among the positions, the contact frequency not significant at ($p > 0.034$) M2 tooth.

**Table 2: Contact frequency at different lateral positions on left side (n=100)**

| Tooth | 0.5 mm (n) (%) | 1 mm (n) (%) | 2 mm (n) (%) | 3 mm (n) (%) | ² value | p value | Significance |
|-------|-------------------|-----------------|-----------------|-----------------|--------------------|---------|--------------------|
| CI | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0.00 | 1.000 | Not significant |
| LI | 5 (5.0) | 3 (3.0) | 3 (3.0) | 3 (3.0) | 0.89 | 0.828 | Not significant |
| C | 89 (89.0) | 89 (89.0) | 87 (87.0) | 84 (84.0) | 1.51 | 0.681 | Not significant |
| PM 1 | 83 (83.0) | 67 (67.0) | 46 (46.0) | 31 (31.0) | 64.08 | <0.001 | Highly significant |
| PM 2 | 59 (59.0) | 45 (45.0) | 25 (25.0) | 12 (12.0) | 57.16 | <0.001 | Highly significant |
| M 1 | 32 (32.0) | 20 (20.0) | 10 (10.0) | 9 (9.0) | 23.61 | <0.001 | Highly significant |
| M 2 | 2 (2.0) | 2 (2.0) | 2 (2.0) | 3 (3.0) | 0.34 | 0.952 | Not significant |

Contact frequency at different lateral positions on left side**Fig. 3. Contact frequency at different lateral positions on left side.**



DISCUSSION

This study demonstrated that the occlusal contact pattern during lateral movement position differs between 0.5, 1, 2, 3 and close to the maximum intercuspation. The difference in the contact patterns depended on the tooth type and on whether the contact patterns were on the working or nonworking sides. Working or non-working sides, molars showed marked differences in the contact pattern between the 3 and 0.5 mm positions, and close to the maximum intercuspation. Canine protection and group function have been used as categories for classification of the patterns of occlusal contacts in lateral excursions in natural dentition. Effect of the relationship between occlusal contact pattern and mandibular function includes occlusal contact on mandibular movement, on masticatory muscle activity, on the forces in the temporomandibular joint, and on the signs and symptoms of temporomandibular disorders.

However, the occlusal contact pattern varies according to the mandibular position examined. There is no description regarding the mandibular position when examining occlusal contacts, which may account for the inconsistencies among the findings of the previously done studies.

In many studies 3 mm lateral position or the occlusal contacts have been recorded in an edge-to-edge position from the maximum intercuspation or in an unregulated position. Because this position is rarely used during mastication except in incising food and in parafunction such as bruxism, the present study investigated the pattern of occlusal contact in regulated positions in the range of 1 to 3 mm from the maximum intercuspation. However, it is highly possible that the occlusal contact during mastication occurs only within the 1 mm lateral position, depending on the person.

Yaffe and Ehrlich⁷ suggested that occlusal gliding contact during mastication would occur in the 0.5 mm position and that the occlusal contact pattern in this position must be evaluated when investigating the role of occlusal contact on masticatory function. Therefore, in this study, occlusal contacts were examined in lateral positions from 0.5 to 3 mm, namely, the functional region to parafunctional region in the masticatory system.

SUMMARY & CONCLUSION

A lack of consistency in the examining position produces various outcomes in determining the occlusal contact pattern of an individual. It is necessary to distinguish the occlusal contact patterns between 0.5 and 3 mm lateral positions, proposed as positions close to the functional range. The term canine protection and group function have been used when describing occlusal contact patterns during lateral excursion are simple and useful concepts to outline the occlusal guidance pattern. However, much confusion and inconsistency has accompanied the interpretation of these terms. For clinical study a clear description regarding the position of mandible, including a clear and modified definition of canine guided and group function occlusal schemes is needed.



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