Clinical Evaluation of Occlusal Contact Patterns in Various Lateral Mandibular Movements and Prevalence of Canine Protection and Group Function

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ABSTRACT

Background and aims: Diagnosis and treatment of occlusal disharmonies require an understanding of occluding tooth contacts. This study observed the occlusal contact patterns on the teeth during lateral mandibular movements. The percentage of each occlusal contact pattern was determined. **Materials and methods:** 100 female subjects, aged 18-29 years, were examined for the occlusal contact patterns in lateral mandibular movements 0.5mm, 1mm, 2mm, and 3mm using 12µm shim stock on working and balancing side. **Results**: In all lateral positions, working side contact on canine was found to be consistent. The frequency increased from 0.5 mm to 3 mm position on the canine, and the frequency decreased from 0.5 mm to 3 mm on premolars and molars. The nonworking side contact was prevalent mainly on the first and second molars. Further, the contact on the second molar predominated, especially in the 0.5 mm position. In our study, most contact patterns (96.0%) were group function. **Conclusion:** Most of the working side contacts observed was in group function. Canine protection was rare. Many variables account for this difference in observation in recording tooth contacts and they need be considered when occlusal examination procedures are performed.

KEYWORDS: Canine Guided Occlusion, Group Function, Shim Stock, Occlusal Contact Pattern

INTRODUCTION

Dental occlusion has been an essential part of all dental treatment. Providing occlusion that facilitates efficient masticatory function with least damage to the surrounding structures is essential. The problem of occlusion pattern for prosthetic rehabilitation is a continuous topic of discussion in the literature. Often clinicians are in a dilemma as to which occlusal scheme is better for a specific patient.

Most commonly evaluated occlusal schemes are (1) group function (2) canine protected occlusion (3) balanced occlusion. Several studies have noted the prevalence of group function and canine guidance that have conflicting findings among them because of variations in the definitions and systems to describe and classify occlusal contact patterns.[1]

Gary C. Anderson et al, investigated intra-examiner and inter-examiner reliability obtained in identifying contacting teeth in the intercuspal position. 337 antagonist occlusal pairs in 24 young adults were examined using Shim stock and an articulating film by two examiners. Simple proportion of agreement and, when needed the Kappa statistical test that corrects for chance agreement were used for comparing the results. They concluded that Shim stock displayed better reliability than articulating film and appeared suitable for clinical measurement of occlusal contacts in intercuspal position.[2]

A. Yaffe, and J. Ehrlich, determined the amount and nature of contact with natural teeth in working movement through the entire range from the intercuspal to the edge-to-edge position. Seventy-two individuals 19 to 35 years of age, each examined independently by two investigators, were included in this study. They stated that lateral glide movement is a complex movement in which the nature of tooth contact is altering in location, direction, and a number of teeth participating. Consequently, the restoration of an occlusion in agreement with a given concept does not always apply to all patients.[3]

T. Ogawa et al, examined the nonworking- side contact

How to cite this article:
Greeshma Vani.Y, Sahu S, Motwani BK, Dani A, Singh S, Shuchi Kulkarni, Sajjanar J. Clinical Evaluation of Occlusal Contact Patterns in Various Lateral Mandibular Movements and Prevalence of Canine Protection and Group Function. Int J Oral Health Med Res 2017;3(6):17-20.

pattern in various mandibular lateral positions and determined whether the frequency of non-working-side contacts differs with the working-side contact pattern. 86 young adults were examined for occlusal contacts using shim stock in different lateral positions: 0.5, 1, 2 and 3 mm from the maximum intercuspation (MI), where the 0.5, 1 and 2 mm positions were defined as lateral positions close to the MI and the 3 mm position as an edge-to-edge position. No significant differences between the two occlusal schemes for the 2 and 3 mm positions was observed. They concluded that the non-working-side contact pattern varied with the mandibular position. Based on these results they suggested that clinical examination should include occlusal contact patterns both in a position close to the MI and in an edge-to-edge position, i.e. in functional and parafunctional ranges. Likewise, data from occlusal contact research should include a standardized definition of mandibular position.[1]

Singh A et al, planned a studied the frequency of tooth contacts in different lateral positions and assessed whether existing occlusal schemes like canine protection and group function could classify all occlusal guidance in the natural dentition. 100 systematically healthy undergraduate students between the age group of 18 to 25 years were selected and Occlusal contacts were examined using shim stock in various lateral positions, 0.5, 1, 2, and 3 mm from the maximum intercuspation. The Frequency of tooth contacts in different lateral positions was examined and Chi- Square test were used for statistical analysis. Based on the results of this study, it does not seem appropriate to describe and classify the patterns of occlusal contact using only existing classification system. They concluded that a clear description regarding the position of mandible should be included in definition for research as well as clinical situations and an attempt was made by them to classify eccentric occlusal contact at different lateral positions to get consistent result for future research.[4]

Diagnosis and treatment plan of occlusal disharmonies require an understanding of the occluding tooth contacts. The objective of the study was to evaluate the patterns of occlusal contact in various mandibular lateral positions and to note the prevalence of canine guided and group function occlusion in Rajnandgaon population.

MATERIALS AND METHODS

100 female subjects, aged 18-29 years, were examined for the occlusal contact patterns in lateral mandibular movements 0.5mm, 1mm, 2mm, and 3mm using shim stock 12µm on working and balancing side.

Materials and Instruments (Figure.1)

- Stainless steel scale
- Miller forceps
- Shim stock occlusal registration strips of 12 micron thickness [Arti-Fol metallic articulating film—Dr. Jeau Baugh KG, Germany].
- Marker pen.
- Cheek retractor

Figure - 1.Diagnostic Instruments

Methodology: Each subject was asked to sit upright in a dental chair with the Frankfurt horizontal plane parallel to the floor. The interocclusal contacts were recorded using shim stock (12 µm thick) in four lateral positions on either sides; 0.5, 1, 2, and 3 mm from the maximum intercuspation.

Markings were made on the maxillary central incisors using a marker pen to the right of the mandibular midline. The shim stock was placed on the occlusal surface of the most posterior right mandibular molar, and the subject was requested to close her mandible to the maximum intercuspation. A constant pulling force is maintained on the shim stock and the subject was requested to perform a habitual gliding movement to the right with the teeth in light contact. When the subject's mandible was moved 0.5 mm right from the intercuspal position, the presence or absence of an occlusal contact was examined (Figure .2a)

The teeth holding the shim stock were considered to have occlusal contact. To prevent the movement with mandibular opening and without any occlusal contact and lateral, protrusive excursion, the movement was observed, and the subject was instructed to correct the movement. The shim stock was placed on both mesial and distal sites of the occlusal surface and molar examination was done. The same procedure was performed in the 1 mm, 2 mm, 3 mm right position and 0.5, 1, 2, 3 mm left positions (Figure 2a, b, c, d). In all lateral positions, working side contact on canine was found to be consistent. The frequency of contact decreased gradually from the canine to the first molar as the mandible deviated more laterally. The change of contact frequency according to the lateral position varied with tooth type. The frequency increased from the 0.5 mm to the 3 mm position on the canine, and in contrast, the frequency decreased from the 0.5 mm to the 3 mm on premolars and molars. The nonworking side contact was prevalent mainly on the first and second molars, the contact on the second molar predominated, especially in the 0.5 mm position. The prevalence of nonworking side contacts decreased with increasing deviation of the mandible from the 0.5 mm to the 3 mm position. This

finding was the same as the contact pattern in the working side premolars and molars.

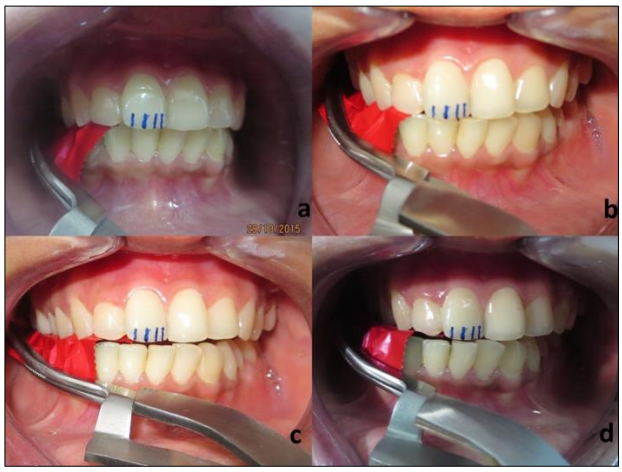


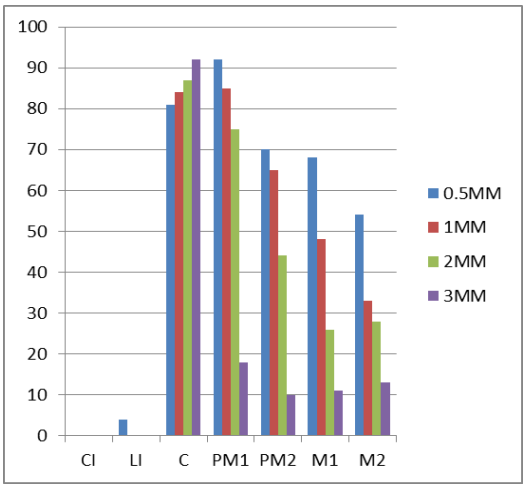
Figure 2. showing various lateral mandibular movement positions (a) 0.5mm lateral to the midline of the teeth (b) 1.0 mm lateral to the midline (c) 2.0mm lateral to the midline (d) 3.0 mm lateral to the midline.

RESULTS

In present study percentage of contact patterns were determined. Table 1 and bar diagram 1 shows the contact frequency in all lateral positions with working side contact on canine was found to be consistent. The

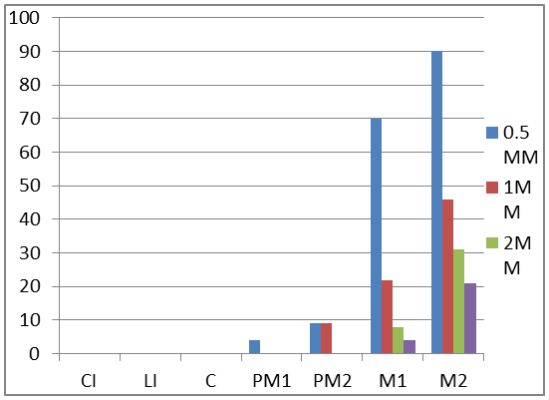
	Working Side				Non Working Side			
Tooth	0.5mm	1mm	0.5mm	1mm	0.5mm	1mm	0.5mm	1mm
Central Incisor	0	0	0	0	0	0	0	0
Lateral Incisor	4	0	4	0	4	0	4	0
Canine	81	84	81	84	81	84	81	84
1st premolar	92	85	92	85	92	85	92	85
2nd premolar	70	65	70	65	70	65	70	65
1st molar	68	48	68	48	68	48	68	48
2nd molar	54	33	54	33	54	33	54	33

Table 1. Contact frequency at different positions on working and nonworking side



Bar Diagram 1. Contact frequencies at different positions on working side

frequency increased from 0.5 mm to 3 mm position on the canine, and the frequency decreased from 0.5 mm to 3 mm on premolars and molars .Table 1 and bar diagram 2 shows the nonworking side contact was prevalent mainly on the first and second molars. Further, the contact on the second molar predominated, especially in the 0.5 mm position. In this study, most contact patterns (96.0%) were group function.



Bar Diagram 2. Contact frequency at different positions on non working side

DISCUSSION

In most of the studies of occlusal contact patterns, the occlusal contacts have been recorded in an edge-to-edge position of the canines approximately 3 mm lateral from the maximum intercuspation, or in an unregulated position.[5] This position is used only during incising food and in parafunction such as bruxism. It is highly possible that the occlusal contact during mastication occurs only within the 1 mm lateral position, depending on the person. [6] Yaffe and Ehrlich suggested that occlusal gliding contact during masticatory function would occur in the 0.5mm position and this position must be evaluated when investigating the role of occlusal contact on masticatory function.[3] Therefore, in this study, multiple lateral excursions were examined from 0.5 to 3 mm, which means the functional region to parafunctional region in the masticatory system. The current method used shim stock seemed to have acceptable reliability for examining occlusal contacts during the lateral excursion.

The diagnosis and treatment of occlusal disharmonies require a considerable knowledge & understanding of the variables that affect occluding tooth contacts. Previous reports indicate that both tooth contact patterns and the number of participating teeth vary in each of the mandibular positions measured. A.Takai et al, reported that the number of tooth contacts varies with the recording materials and methods used and occlusal force could be an additional variable that influences the numbers of recorded tooth contacts and clearances.[5] Riise and Ericsson reported variations in the number of tooth contacts in intercuspal position when light and hard occlusal forces were applied to the teeth.[7] The distribution of occlusal contacts in an individual can vary with time of day[2], head posture[7], and thickness of occlusal registration strips.[8]

CONCLUSION

Most of the working-side contacts observed were group function at 0.5mm and at 3mm canine protection was observed. Non-working side contact mostly was seen on the 2nd molar and most of them in 0.5mm position. Many variables are the sources of disparity in recording tooth contacts. These variables should be considered when occlusal examination procedures are performed.

REFERENCES

1. Ogawa T, Ogimoto T, Koyano K. Pattern of occlusal contacts in lateral positions: Canine protection and group function validity in classifying guidance patterns. J Prosthet Dent 1998;80:67-74.
2. Anderson GC, Schulte JK, Aeppli DM. Reliability of the evaluation of occlusal contacts in the intercuspal position. J Prosthet Dent 1993;70:320-3.
3. Yaffe A, Ehrlich J. The functional range of tooth contact in lateral gliding movements. J Prosthet Dent 1987;57:730-3.
4. Singh A, Sangur R, Rao BL, Mahajan T. A clinical study to determine the pattern of occlusal contacts in lateral positions and its validity in classifying guidance patterns. J Indian Prosthodont soc 2013;13:101-7.
5. Takai A, Nakano M, Bando E. Evaluation of three occlusal examination methods used to record tooth contacts in lateral excursive movements. J Prosthet Dent 1993;70:500-5.
6. Woda A, Vigneron P, Kay D. Nonfunctional and functional occlusal contacts: A review of the literature. J Prosthet Dent 1979;42:335-41.
7. Riise C, Ericsson SG. A clinical study of the distribution of occlusal tooth contacts in the intercuspal position at light and hard pressure in adults. J Oral Rehabil 1983;10:473-80.
8. Toledo MF, Joias RP, Marques-Iasi YS, Neves AC, Rode Sde M. Thickness and marking quality of different occlusal contact registration strips. J Appl Oral Sci 2014;22:516-21.

Source of Support: Nil
Conflict of Interest: Nil