

Clinical Radiographic Analysis: Correlation Between Protrusive Interocclusal Record for Recording Condylar Guidance and Panoramic Radiographic Image: A Pilot Study

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ABSTRACT

Background: The aim of this study was to compare the horizontal condylar angles set in the Hanau articulator by use of intraoral protrusive record to those angles found using a panoramic radiographic image.

Materials and Methods: Ten completely edentulous patients from either sex free of signs and symptoms of temporomandibular disorder were selected for in vivo study. For all patients, the protrusive records were obtained while doing extra oral gothic arch tracing and when the mandible moved forward by approximately 6 mm. The condylar guidance angles obtained were tabulated. A panoramic radiographic image of each patient was made and radiographically the angle was determined by cephalometric tracing

Result: The comparison of mean condylar guidance angles between the right side of the protrusive record method and the right side of the panoramic radiographic method and the left side of the protrusive record method and left side of the panoramic radiographic method ($p = 0.513$ and $p = 0.118$, respectively) were not statistically significant ($p < 0.05$)

Conclusion: within the limit of this study, it was concluded that protrusive condylar guidance obtained by radiographic method can be used as an adjunct to protrusive method and error increases as if used independently to programme semi adjustable articulator.

Keywords: Cephalometric tracing, horizontal condylar guidance determination, protrusive records, panoramic radiograph, extra oral gothic arch tracing.

INTRODUCTION

Three general classes of records are used for transferring maxillomandibular records from patients to articulator: interocclusal records, hinge axis records and graphic records. As complexity of articulator is increased it can accept all types of record. So, registration of accurate mandibular movement is important^{5,7}. The inclination of the

condylar path is thus a fundamental consideration in the prosthetic treatment. If condylar guidance is not recorded properly, this might lead to an increased chairside adjustment time due to arbitrary trimming which can be frustrating for both the patient as well as the dentist.

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Graphic writing apparatus needs to be firmly fixed to the jaws, in order to obtain accurate results. This becomes a concern for the clinician in edentulous patients where the attachment can be made only through occlusion rims. The graphic records are inaccurate as a result extra capability of an articulator that will reproduce curved movements is, therefore, of no use when designing complete dentures. Graphic method is sensitive, time consuming and messy and uncomfortable

The radiographic method of recording the horizontal condylar guidance (HCG) was introduced in the 1970s by authors such as Corbett *et al.* to overcome the disadvantages of clinical methods. The radiographic method is simpler, with the angles being read directly on the radiographs¹. On lateral cephalogram and panoramic radiograph, various angles of temporomandibular joint (TMJ) are commonly believed to be related to the HCG angle. Frankfurt horizontal plane is taken as a reference plane when HCG is determined.

MATERIALS AND METHOD

Ten edentulous patients with no signs or symptoms of temporomandibular disorders were selected for the study. All conventional steps up to jaw relation was done. Hanau Wide-View semi-adjustable articulator along with Hanau™ Springbow (Whip Mix Corporation, USA) was used in this study. Facebow registrations were done using the standard technique, and maxillary cast was mounted using indirect technique and tentative jaw relation was done to mount the lower cast. Next extra oral tracers were attached to the occlusal rim. Each patient was instructed to move his/her mandible directly forward by approximately 6 mm, and a protrusive record was obtained (Fig:3). The condylar guidance angles recorded on the articulator were tabulated (fig:4). A panoramic radiographic image of each patient was made with the Frankfurt horizontal plane parallel to the floor of the mouth (Fig 1). All radiographs were made by the same operator at the same time with the same panoramic radiographic unit (Planmeca Promax; Helsinki, Finland). Two radio-opaque lines are consistently apparent on the panoramic radiographs in the region of the temporal bone. One depicts the outline of the articular eminence and fossa, the second, the inferior border of the zygomatic arch. Tracings of the radiographic images

were made. A horizontal reference line was marked by joining the orbitale and porion. The most superior and the most inferior points of the curvatures were identified. These two lines were connected by a straight line representing the mean curvature line (Fig 3). Angles made by the intersection of the mean curvature line and the horizontal reference line were measured (Fig2). The data were subjected to statistical analysis by paired t-test

RESULT

Table 1 shows the angles of the condylar guidance and standard deviations measured by the protrusive interocclusal record and panoramic radiographic method. The comparison of mean condylar guidance angles between the right side of the protrusive record method and the right side of the panoramic radiographic method and the left side of the protrusive record method and left side of the panoramic radiographic method ($p = 0.513$ and $p = 0.118$, respectively) were not statistically significant ($p < 0.05$).

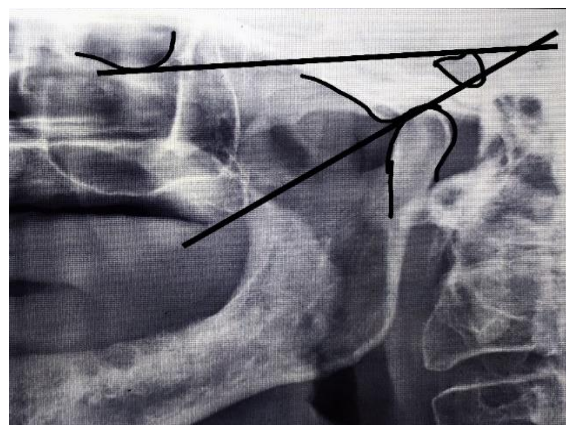


Fig 1: Panoramic radiograph of the patient.

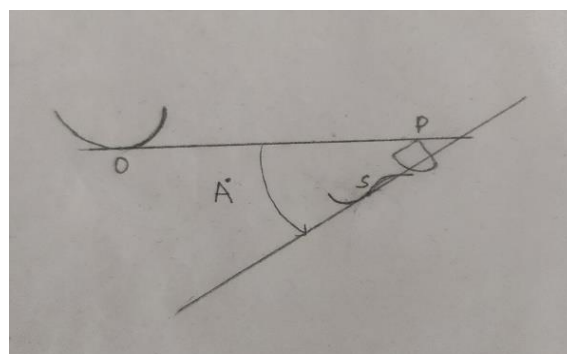


Fig 2: Tracing method to get condylar guidance angle.



Fig 3: Extraoral tracers attached to maxillary and mandibular cast with arrow pointing tracing.

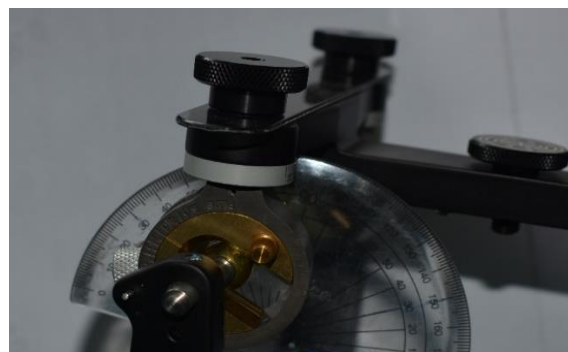
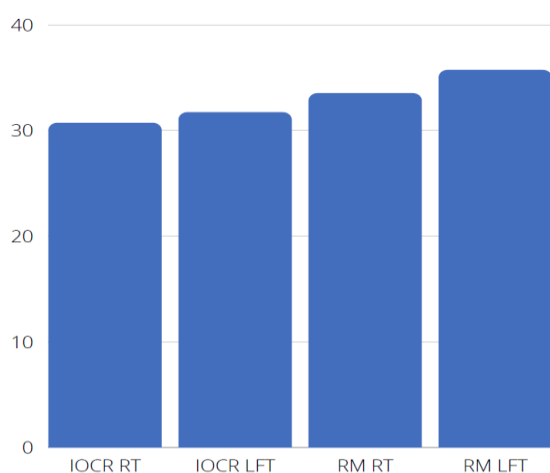


Fig 4: Condylar guidance angle as obtained by protrusive record transfer.

Table 1: Angle of condylar guidance as recorder by protrusive record and panoramic radiograph image.

Patients	Protrusive interocclusal records		Panoramic radiographic image	
	Right Side	Left Side	Right Side	Left Side
1	34	35	36	33
2	33	34	35	38
3	35	36	38	40
4	33	34	35	35
5	34	35	37	39
6	30	31	33	36
7	25	25	27	30
8	29	30	32	36
9	28	28	30	34
10	26	29	32	36
Mean	30.7	31.7	33.5	35.7
S.D	3.4	3.3	3.2	2.7
p Value	0.513		0.1186	

p Value significant if <0.05



Graph 1: Graphic representation of angle of condylar guidance as recorded by protrusive record and panormic radiograph image of both right and left condyle

DISCUSSION

Using protrusive interocclusal record with impression plaster as a material involves multiple clinical steps and leads to decrease in patient compliance. Present study radiographic method was used and also compared with protrusive record. The mean curvature of the articular eminence in the panoramic radiographic image was recorded as condylar guidance angle. However, in radiographic method only hard tissue is traceable that is it only estimate the inclination of the condylar process or the mandibular fossa¹¹. The effect of soft tissue that is ligaments and muscle which limits the movement of condyle is also a factor in condylar guidance is not considered. On average radiographic value is greater than protrusive record as stated by tannamala et al².

CONCLUSION

within the limit of this study, it was concluded that protrusive condylar guidance obtained by radiographic method can be used as an adjunct to protrusive method and error increases as if used independently to programme semi adjustable articulator.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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