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COULD ORTHOPANTOMOGRAMS BE USED TO DETERMINE CONDYLAR GUIDANCE ANGLES?

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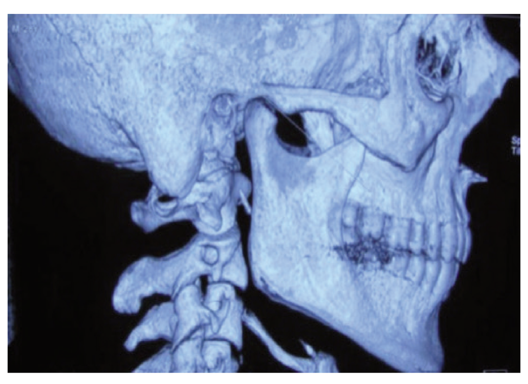
INTRODUCTION

Different clinical procedures are used to obtain numerical data on the condylar guidance angle

Some of these require intraoral records or extraoral measurements with pantographic equipment.

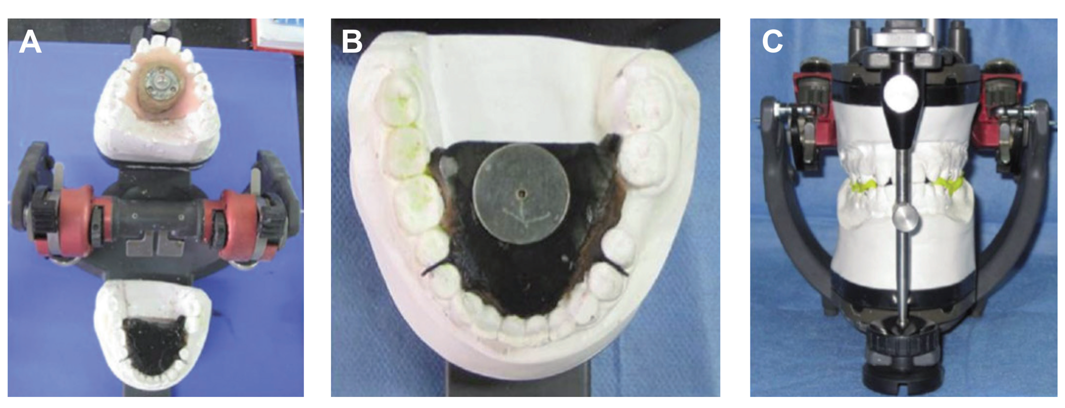
A comparative study to measure the condylar guidance by the radiographic and clinical methods

Pragya Shreshta, MDS, Veena Jain, MDS, Ashu Bhalla, MD, Gunjan Pruthi, MDS; Department of Prosthodontics, All India Institute of Medical Sciences, New Delhi, India*
J. Adv. Prosthodont 2012; 4:153-7.



Radiographic method to measure horizontal condylar guidance

Anterior jig method

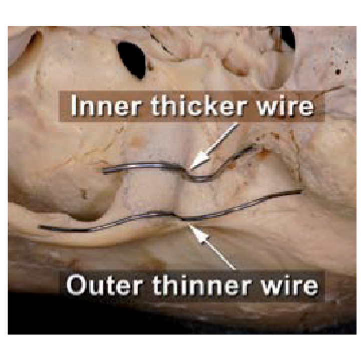


A: Intraoral tracers attached to the maxillary and mandibular cast, B: Arrow point tracing, C: Protrusive record transferred to the articulator

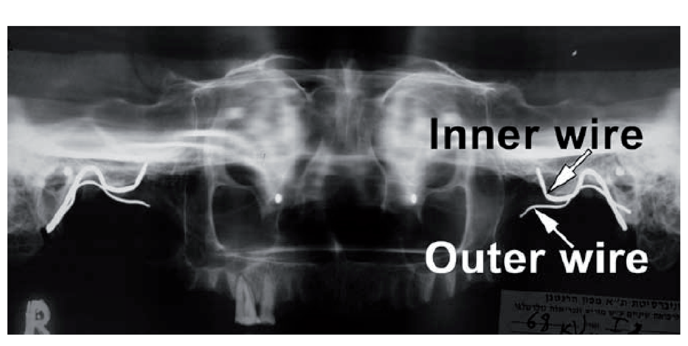
A method using orthopantomogram radiographic images (OPG) has been described in the literature:

Condylar guidance: Correlation between articular morphology and panoramic radiographic images in dry human skulls

Ilan Gilboa, DMD, Harold S. Cardash, BDS, LDS RCS Eng, Israel Kaffe, DMD, and Martin D. Gross, BDS, LDS, RCS MSc The Maurice and Gabriela Goldshleger School of Dental Medicine, Tel Aviv University, Tel Aviv, Israel
J Prosthet Dent 2008; 99:477-82.



Inferior view of left fossae showing wire markers adapted to midfossa eminence contour and inferior border of zygomatic arch

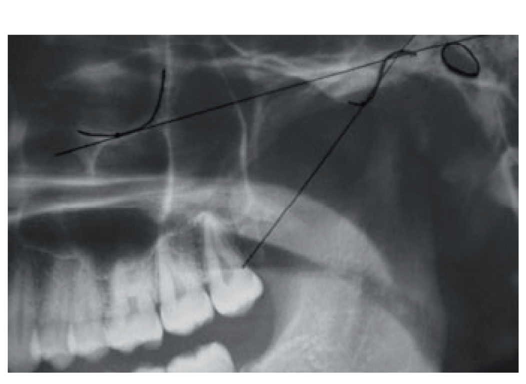


Panoramic radiograph of skull with inner and outer wire markers

Condylar Guidance: Correlation between Protrusive Interocclusal Record and Panoramic Radiographic Image: A Pilot Study

Pavan Kumar Tannamala, MDS, Mahesh Pulagam, MDS, Srinivas R. Pottem, MDS, B Swapna, BDS
J Prosthodont 2012; 21:181-4.

Superior and inferior points marked in panoramic radiograph



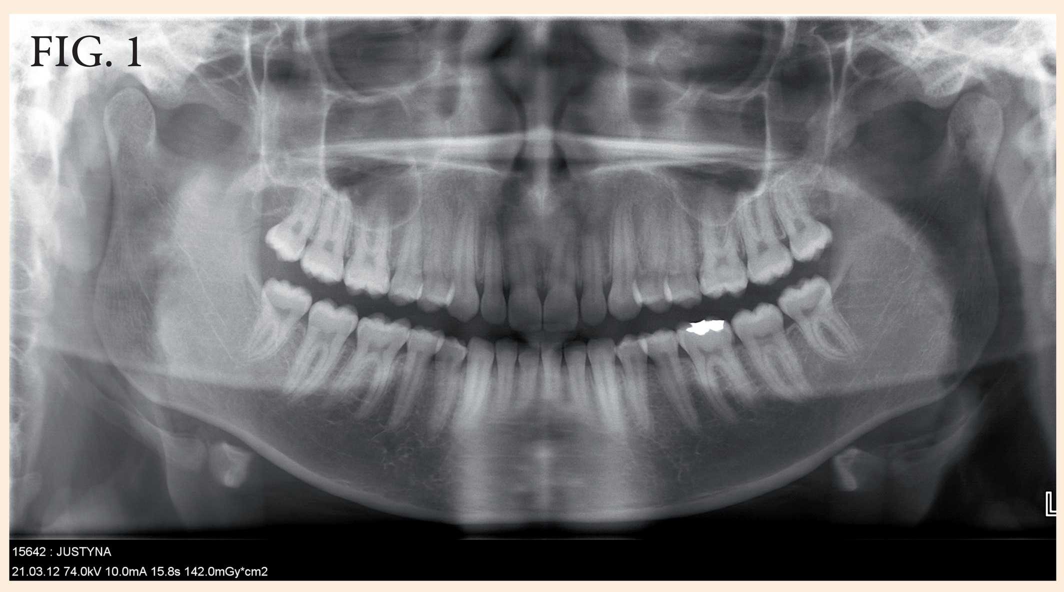
Horizontal reference line marked in panoramic radiograph

THE AIM

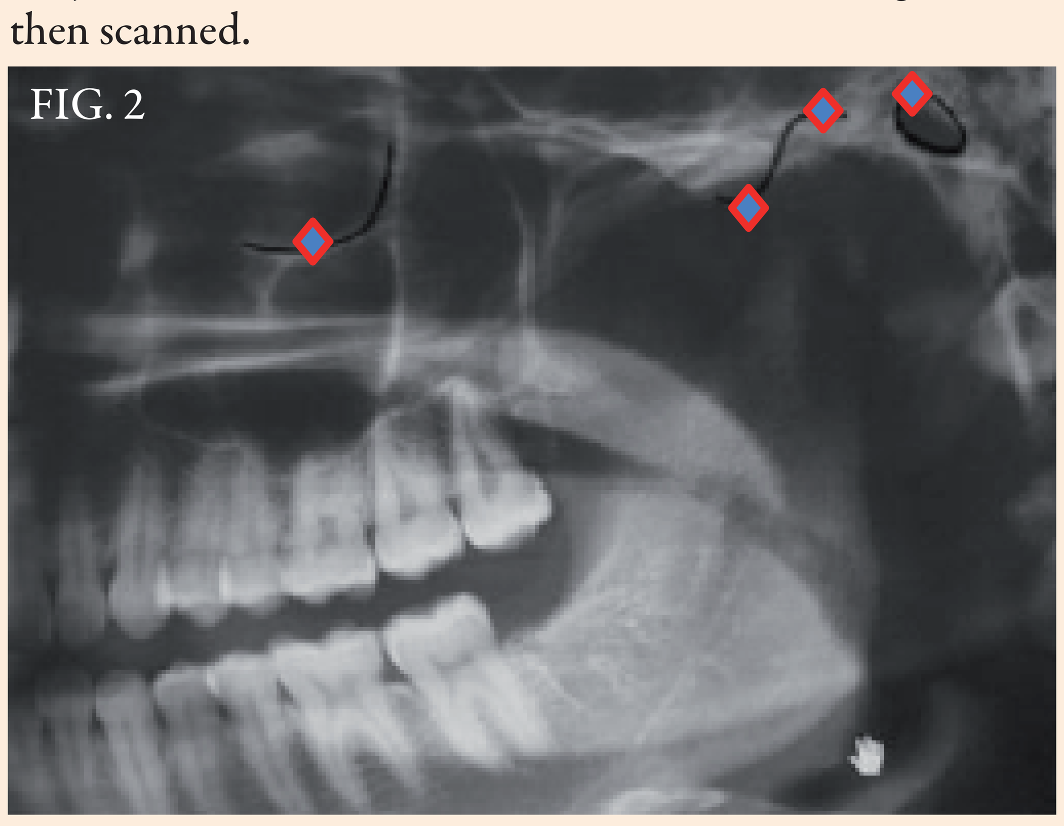
The aim of the present study was to verify the recommendation of this method in clinical use.

MATERIALS AND METHOD

The panoramic radiographic image (FIG. 1) was randomly chosen from a group of 191 images from examinations of volunteers who participated in a project funded by a Polish grant (MNiSW nr N N403 589138). The image was from individuals who were free of the signs and symptoms of temporomandibular disorders and possessed intact dentition. The consent of the Bioethics Committee of the Jagiellonian University, Kraków, was obtained (number KBET/89/B/2009).

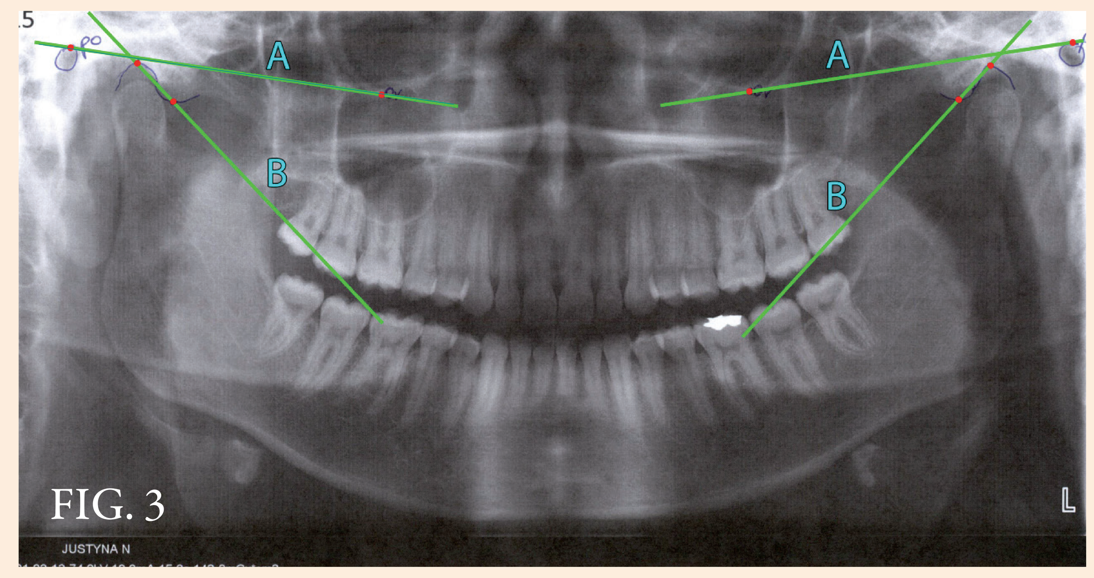


The panoramic radiographic image was taken with the Frankfurt horizontal plane parallel to the floor of the mouth; a cephalostat was used to align the head in that position. The radiograph was made using a ProMax radiographic unit (Planmeca, Helsinki, Finland 2005) at 74 kVp and 10 mA. The digital image was converted to analog and printed. The study involved prosthodontists (SP), trainees (T), and general dental practitioners (GDP) who were asked to position four dots on both sides of the image (the *orbitale* and *porion*, and the most superior and the most inferior points of the jaw's articular surface) FIG. 2. The marked images were then scanned.



Using computer software, the points were connected with lines A and B on both sides. FIG. 3 To evaluate the accuracy of the lines, the equation of the straight line, y = ax + b, was used, with "a" representing the slope and "b" the Y intercept. We calculated the slope of each line in order to compare the repeatability of the points.
The condylar guidance angle between lines A and B was calculated using the equation:

$$tg\ \varphi = \left| \frac{a_{OP} - a_{WN}}{1 + a_{OP} \cdot a_{WN}} \right| \qquad \varphi = arctg \left| \frac{a_{OP} - a_{WN}}{1 + a_{OP} \cdot a_{WN}} \right|$$

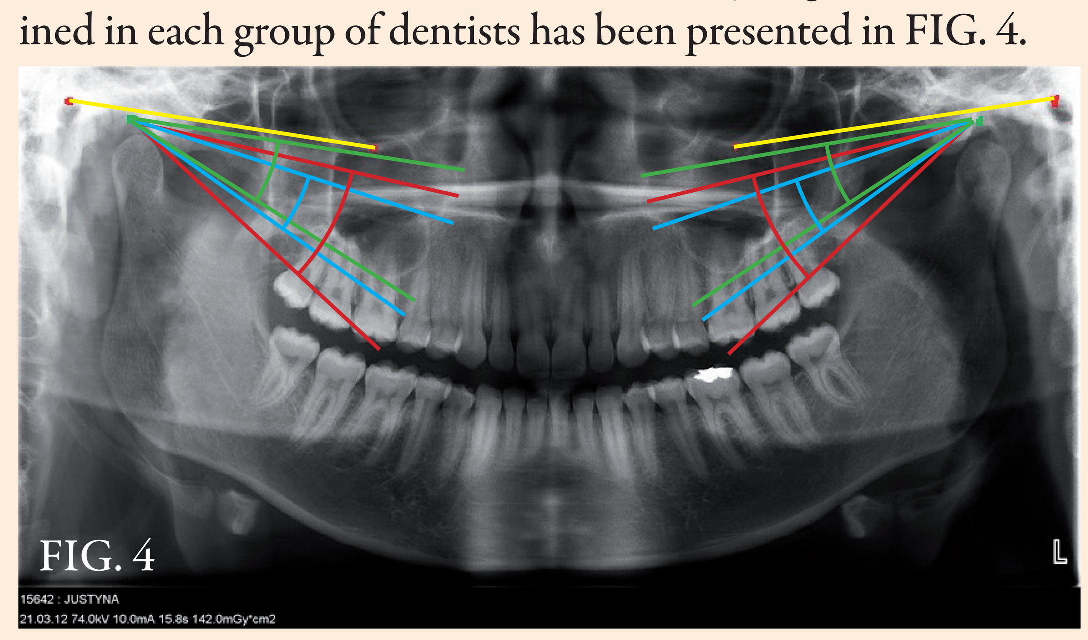


STATISTICAL ANALYSIS

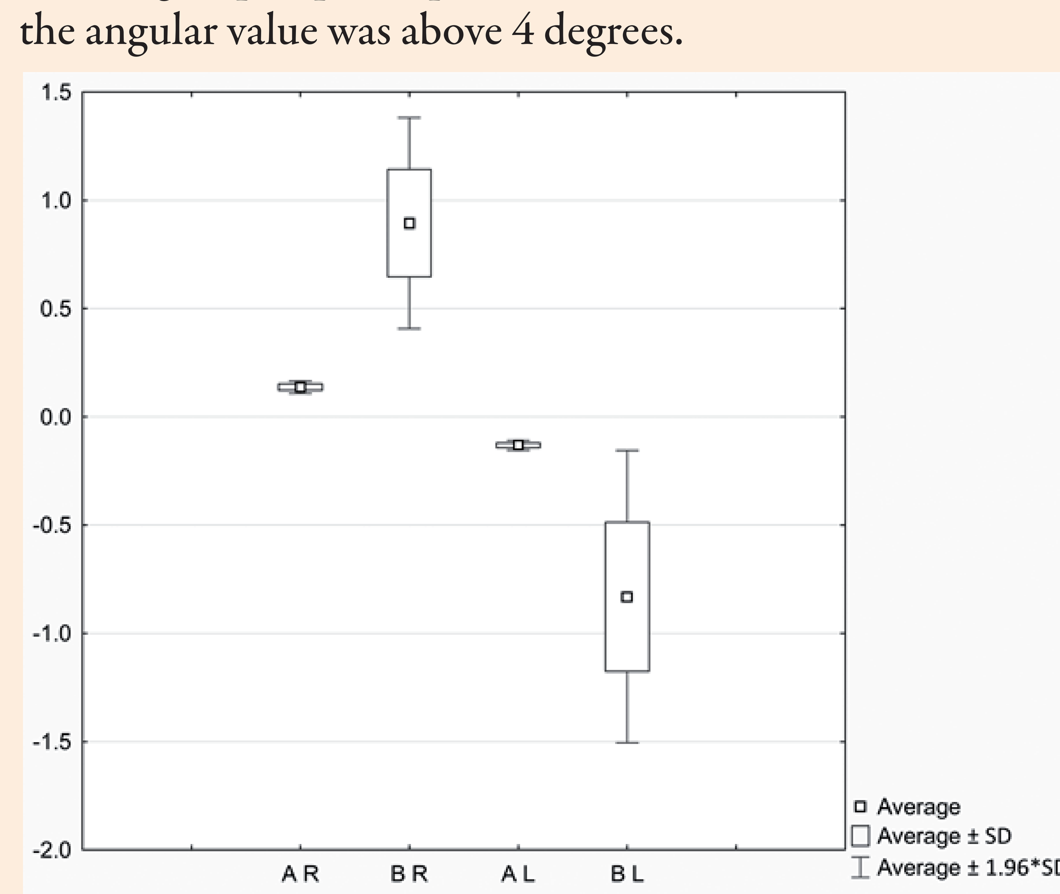
All data were analyzed using the Statistica data analysis software system version 10 (StatSoft, Inc., 2011; www.statsoft.com). Data normality was tested using the Shapiro–Wilk test. Homogeneity was tested using Levene's test. The descriptive statistics and ANOVA test were used, and the multiple independent samples were compared using the Kruskal–Wallis test. The level of statistical significance was set at 5% (P = 0.05).

RESULTS

21 dentists participated in the study; of these, 7 were specialists in prosthodontics (SP), 8 were trainees (T), and 6 were general dental practitioners (GDP).
Minimal and maximal dimension of condylar guidance obtained in each group of dentists has been presented in FIG. 4.



The spread of the results for the condylar guidance angle on the right side was 30 degrees; on the left side, it was more than 40 degrees for all of the participants. There were no significant statistical differences between the groups of dentists.
In each group of participants the standard deviation (SD) of the angular value was above 4 degrees.



Average value of slopes of lines A and B on both sides, all participants. (AR: slope of line A on the right side; BR: slope of line B on the right side; AL: slope of line A on the left side; BL: slope of line B on the left side).

The SD for the slope of line A was 0.01 on both sides. The slope value of line B varied from 0.25 to 0.34.

CONCLUSION

The use of OPG to obtain the condylar guidance angle is not recommended in clinical use because of inaccuracies in the determination of the most superior and the most inferior points of the jaw's articular surface.