

THE REPRODUCIBILITY OF TWO FACEBOW REGISTRATIONS*

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**Meeting Abstract of Communication*

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INTRODUCTION

The facebow is a device used to mount the maxillary cast accurately on the articulator, usually relying on arbitrary located anterior and posterior reference points. Mounting the cast on the articulator in the appropriate position is an operator sensitive procedure, able to reduce the chairside and laboratory time involved. There is little evidence available on the accuracy, validity and reproducibility of articulator mounting of models (Tamaki et al, 1997; Celar et al, 1999). The aim of our study was to assess the reproducibility of the face bow registrations using two different arbitrary facebows.

MATERIAL AND METHODS

Seven registrations with the Dentatus articulator facebow (fig.1) and seven with the Whip Mix earbow facebow (fig. 2) have been performed on one subject.



Figure 1. Dentatus arbitrary face-bow

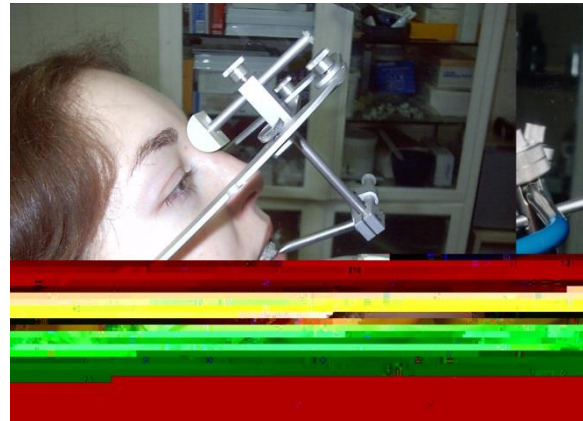


Figure 2. Whip Mix arbitrary earbow face-bow

Informed consent was asked to this subject for participate in our study. After each registration the maxillary cast has been mounted in the articulator and photos have been taken at the same distance (30 cm) and with the same angulation, using a Panasonic apparatus placed in a standardized position, as well as the articulator. All the images were transferred into computer and processed with Adobe Photoshop® version 7.0 in standardized conditions. The distance between the centrum of the condyle house and the pick of the canine incisal edge was assessed. The GraphPad InStat 3 program has been selected for the statistical analysis of the collected data. Because of the small number of collected samples (30), the

paired t test and the Wilcoxon signed ranks test have been selected for the data analysis, taking in account the fact that the values for the arcon articulator were not normally distributed, according to the Kolmogorov-Smirnov method (NON ARCON 0.2172, $p=0.10$; ARCON 0.3994, $p= 0.0012$).

RESULTS

The values registered for the seven sessions of both facebows and the summary of the statistical data are presented in the tables below (table I and II).

TABLE I. The values registered of the condyle house center – pick of canine incizal edge distance

Registration	Non - arcon	Arcon
1	230	245
2	250	250
3	245	245
4	250	250
5	260	265
6	235	250
7	235	250

TABLE II. Summary of statistical data

	NON ARCON	ARCON
Mean:	243.57	250.71
# of registrations:	7	7
Std deviation:	10.690	6.726
Std. error:	4.041	2.542
Minimum:	230.00	245.00
Maximum:	260.00	265.00
Median :	245.00	250.00
95% Confidence interval inf :	233.68	244.49
95% Confidence interval sup:	253.46	256.93

The difference between standard deviations of the two kinds of registrations was not statistically significant ($p= 0.2841$)

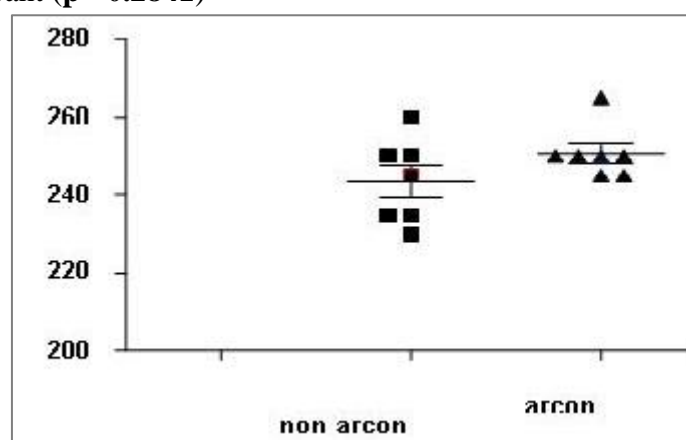


Figure 3. The distribution of the registered values by the two sort of facebows

There was no statistically significant differences between the registrations performed with

the two kind of facebows ($p= 0.1604$). It is well known that in the determination of the hinge axis, a superior-inferior malrelation has a greater negativ effect than an anterior-posterior of same magnitude. However, because of more stable marks used for the registrations, the Whip Mix facebow showed more consistent mounting repeatability (fig.3).

DISCUSSIONS

The data available in the dental literature concerning the reproducibility of facebow registrations are controversial. A lot of factors can alter the accuracy of facebow registrations and thus the transfer of maxillary cast in articulator. Nagy WW et al. (2002), stated that the type of facebow transfer fork clamp may be a significant source of error in recording the reference position due to mechanical distortion. In one of their studies, the mentioned authors showed that the y axis points were the least variable and the x axis the most variable with the non torsion clamp. With the torsion clamp, the x points were the least variable. The mounting procedure error ranged from 0.08-0.21 mm.

The amount of plaster needed to attach the upper cast to the articulator can cause inaccuracy as the plaster expends on setting. This can be avoided by using a low expansion plaster and two separate mixes of plaster if there is a large space between the mounting plate of the articulator and the maxillary cast (Peregnina and Feil, 1994; Clark et al., 2001). The basic premise for use of the retruded position in mounting the models on an articulator is its reproducibility. However, some authors have demonstrated that the registered position may be influenced by the manner in wich the mandible is guided into the retruded position (Ingervall, 1971), the material used for registration (Fattore et al., 1984; Assif et al., Piehshlinger Eva, 1993; 1995) and the time of day (Latta, 1992).

There are few available data in the dental literature on the accuracy, validity and reproducibility of articulator mounting of models. The early works comparing jaw movements with the movements on articulator concluded that in fact the articulator is not a good simulator of jaw movements (Kurth, 1949). In other study, Janson (1986) stated that the reproducibility of tooth contacts was observed more frequently in the articulator than in the mouth. Dos Santos and Ash (1988), as well as Hatano et al. (1989) have presented statistically significant differences between the recordings of mandibular movements generated by articulators and by pantographic tracings. In another study (Hatzi et al., 2001) carried out for determining the accuracy of articulator interchangeability and hinge axis reproducibility, the authors concluded that none of the articulator systems was found to be exact and no single articulator was an exact duplicate of another.

The results from our study confirm the few data available in prosthodontic literature using the articulator mounting of models to assess the dental contacts patterns and wich have demonstrated that the casts were accurately attached on the articulator and the articulator is an appropriate simulator of both static and dynamic craniomandibular relations (Johnston, 1988; Utt et al., 1995, Clark si Evans, 1998).

CONCLUSIONS

Both sort of registrations are reproductible enough to provide an accurate position of maxillary cast in articulator; the earbow facebow seems to be more accurate because of the less arbitrary reference points; only a properly used facebow can reduce the occlusal discrepancy of prosthetic restorations.

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