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Research Article

AN EVALUATION INTO THE DIGITAL IMPRESSION ACQUIRING TECHNIQUE- INVITRO STUDY

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ABSTRACT

An acrylic model of upper left anterior teeth(11,12,13),lower anterior(41,42,31), lower right posterior teeth (44,45,46)and lower left posterior(34,35,36) was prepared in typhodont with the standard set of burs which is suitable for ceramic preparation was used to achieve the controlled tooth substance removal. The preparation featured a 1.5mm occlusal height reduction, a 1mm of chamfer ended margin and an axial reduction of 1.5mm

SPRAYING AND DIGITILIZATION: A totally 12 prepared tooth placed in the typhodont with the normal adjacent teeth and the typhodont mounted on the fantam head after mounting, sparying were done in all surface of tooth (labial,lingual,mesial,distal) including occlusal surface and tooth were equally sectioned in two halves in a horizontal direction using cardamom disc. After dissection sony digital SLR camera are choosen to take photos of sparyed tooth of each surfaces and this RGB images are converted into grayscale by using gray scale photo effect generator .After converting the image where thickened spray areas were appeared dark and thinner portions of the spray appear lighter so those converted images are kept at constant 66.7% magnification and measured as inches using klonk image measurement application.and thereby measuring pixel density of the thinner and thicker portions of the prepared tooth surface using pixel density calculator .Calculating the diagonal resolution in pixels using the Pythagorean theorem:

INTRODUCTION

The increasing use of(CAD/CAM) Computer aided design and computer aided manufacturing in dentistry has led to considerable improvements in clinical practice by saving time and making possible to analyze,reproduce, modify the tooth shapes. This technology will allow prosthetic restoration to be directly or indirectly processed (Poggio *et al.*, 2012; Renne *et al.*, 2012; Wittneben *et al.*, 2009; Euán *et al.*, 2014; Hamza *et al.*, 2013).Optical and mechanical impression methods are used to scan and model the crown preparation (Hamza *et al.*, 2013; Miyazaki *et al.*, 2009). So there will be more benefits in digital impression technique like it can visuvalze and analyze properly .Long term dimensional stability and they are not subject to the decontamination problems associated with in direct impression technique (Martin *et al.*, 2007; Thouati *et al.*, 1996). And even though powder free system also available (Kurbad, 2000; Willershausen *et al.*, 2012). Some powder system require the prior application of an adhesive to retain the powder on the tooth surface, whereas other spray system include the adhesive.spray system allow thinner layering and better image quality and superior marginal adaptation than in powder system (Willershausen *et al.*, 2012; Lehmann *et al.*, 2011).

Scan spray provide more detailed about reproductions and better data quality of tooth impression when the powder coating is thin and well distributed (Kurbad *et al.*, 2000; Lehmann *et al.*, 2011). The computer aided design/computer aided manufacturing (CAD/CAM) technique for dental restoration have been developed with the aim of automating the production process in order to optimize the quality of the restoration as well as efficacy of the workflow (Mehl and Hickel, 1999). The manufacturing of CAD/CAM for dental restoration was achieved in two ways they are: by the dentist and using in chairside CAD/CAM and another by technician, in the laboratory.

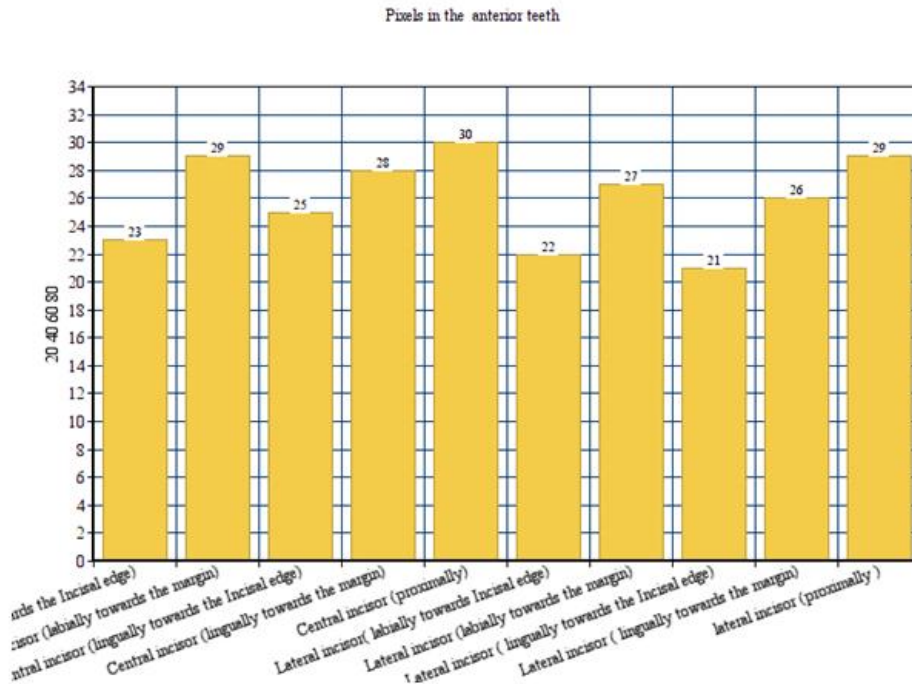
Before to this, the only one system capable of performing digital impression was available to dentists they are: CEREC 3D (sirconia dental system, charlotte, NC).The CAD/CAM technology was almost entirely limited to the laboratory, where stones dies, obtained using conventional impression, are digitized so that the restoration can be designed and milled (Beuer *et al.*, 2008; Al-Bakri *et al.*, 2007). Now new digital impression systems have been arrived with total digitization of the workflow, ranging from the chairside impression to the milling of monolithic (not associated to coping) and polyolithic (associated with coping)restoration in laboratory or milling centre (Beuer *et al.*, 2009). The LAVA chair side oral scanner (lava C.O.S) system has been recently introduced.

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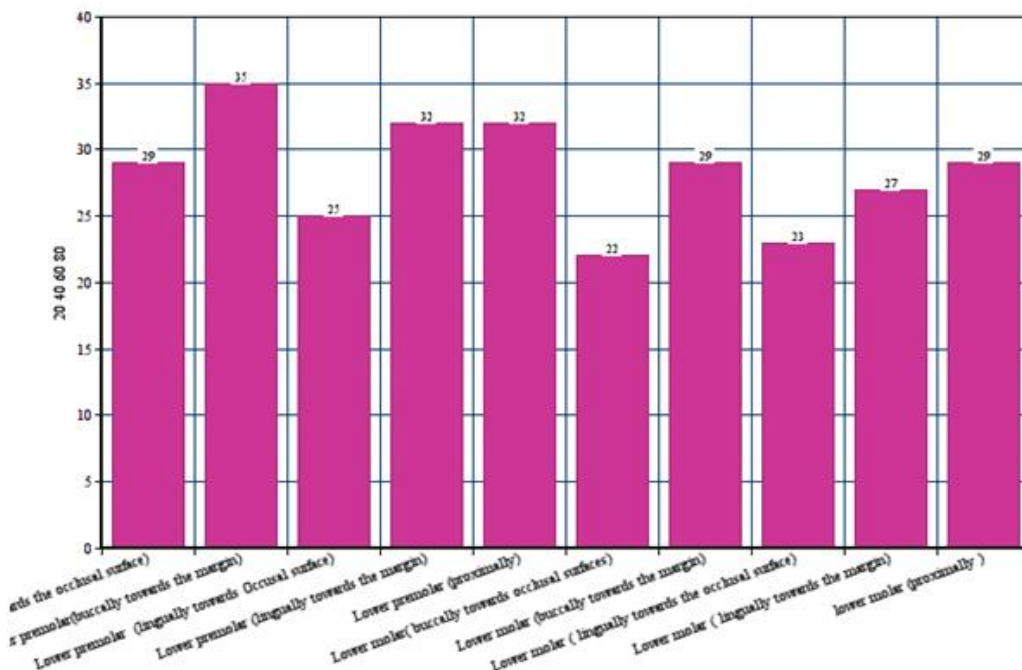
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This intraoral scanner is based on the principle of active optical wavefront sampling, which generate 3D information from a single lens imaging system (Jablonski, 1993). The results recently shown that all ceramic crown manufactured by lava C.O.S, demonstrate better marginal fit, when compared to all ceramic crown fabricated by conventional impression. The purpose of the study was to evaluate the difference in thickness and homogeneity in the anterior and posterior tooth surface in typhodont. The optispray which is being used for extra oral application in digital impression may vary in thickness. This may lead to errors in conversation of extra oral dental data into electronic data.

Those errors can also be transfer onto the fitting of the CAD/CAM restoration. Previously have found that thickness of the spray can be measured by microscale-resolution, computed tomography and confocal microscopy are suitable method for measuring coating thickness without altering the specimen, the higher accuracy and large number of measurement points increase the quality and amount of data, making such microscopy a suitable method (Lehmann *et al.*, 2011; Fransson *et al.*, 1985; Karlsson, 1993; McLean and von Fraunhofer, 1971).



Bar Chart 2. Shows Pixels in the Anterior Teeth



Bar Chart 3. Shows The Pixel in the Posterior Teeth

MATERIALS AND METHODS

TOOTH PREPARATION

An acrylic model of upper left anterior teeth(11,12,13),lower anterior(41,42,31), lower right posterior teeth (44,45,46)and lower left posterior(34,35,36) was prepared in typhodont with the standard set of burs which is suitable for ceramic preparation was used to achieve the controlled tooth substance removal.The preparation featured a 1.5mm occlusal height reduction, a 1mm of chamfer ended margin and an axial reduction of 1.5mm

SPRAYING AND DIGITILIZATION

A totally 12 prepared tooth placed in the typhodont with the normal adjacent teeth and the typhodont mounted on the fantam head after mounting, sparying were done in all surface of tooth (labial, lingual, mesial, distal) including occlusal surface and tooth were equally sectioned in two halves in a horizontal direction using cardamom disc.

$$d_p = \sqrt{w_p^2 + h_p^2}$$

FIT EVALUATION

Where the RGB images were converted into grayscale images those images kept at constant magnification of 66.7% and measured the pixel per inch (PPI) is the measurement of the pixel density (resolution) of an electronic image device, such as compuer monitor or television display,or imaging digitizing device such as a camera or image scanner. Horizontal and vertical density are usually the same and grayscale images have sqaure pixels.”PPI” or “pixel density” may also describe image scanner resolution.In this context,PPI is synonymous with sample per inch.in digital photography, pixel density is the number of pixel divided by the area of the sensor.A typical DSLR has 1-6.2 MP/cm² ; A typical compact has 20-70 MP/Cm² .for example the sony digital SLR camera has 20.1 megapixels on an APS-C sensor having 6.2 MP/Cm² and this camera has lower PPI than the compact camera,because it has larger photobodies due to having far large sensor.

RESULTS

Among the totally prepared tooth is 12, 6 were anterior and 6 were posterior teeth.and a significant correlation in term of visual homogeneity scores were found between anterior and posterior teeth. This visual aspect of the tooth areas examined were more thinner towards incisally (approx.20 to 25 pixels) in the anterior region and toward occlusaly in the posterior tooth region (approx.25 to 30 pixels) and thicker towards the margin of both anterior and posterior tooth (approx.26 to 30 pixels), proximally in the anterior teeth (approx. 25 to 30) and proximally in the posterior teeth were quite higher than anterior (approx. 30 to 40)

DISCUSSION

In this study significant correlation of the homogeneity values were calculated in amount of pixels in the image was recorded.the crown preparation were coated homogeneously by the anterior teeth than by the posterior teeth.although a small number of previous studies have compared the coating thickness and have reported thinner coating (13.3+6.6 to 15.6+7.2 microns), by using scanning electron microscope or stereomicroscope but they did not describe coating method or

Spray thickness in anterior vs posterior teeth

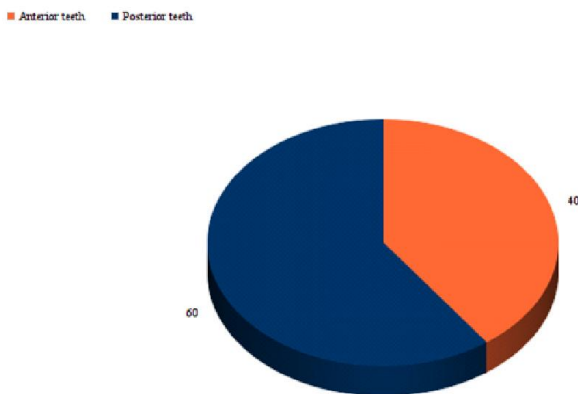


Fig. 4. This Pie Chart Showing the Thickness is More in Posterior Teeth Than in Anterior Teeth

After dissection sony digital SLR camera are chosen to take photos of sparyed tooth of each surfaces and this RGB images are converted into grayscale by using gray scale photo effect generator.

Statistical Analysis

TABLE 1. This tabular column shows the number of pixels in the anterior and posterior teeth.

SURFACES	NO.OF SPECIMEN	ANTERIOR TEETH(PIXELS)	POSTERIOR TEETH(PIXELS)
LABIAL OR BUCCAL	12	20-25	25-30
LINGUAL	12	22-24	35-40
MESIAL	12	25-29	25-30
DISTAL	12	25-29	25-30
OCCLUSAL OR INCISAL	12	21-23	30-35

After converting the image where thickened spray areas were appeared dark and thinner portions of the spray appear lighter so those converted images are kept at constant 66.7% magnification and measured as inches using klonk image measurement application.and thereby measuring pixel density of the thinner and thicker portions of the prepared tooth surface using pixel density calculator. Calculating the diagonal resolution in pixels using the Pythagorean theorem:

operator experience.In addition,different coating agents were used (scanspray plus and bluespray;dentaco) and the results were only expressed as global mean value for the complete crown preparation surfaces.this limit the ability to compare them with the result of the present study. The high standard deviation within anterior and posterior teeth group indicated that the thickness of the coating are highly variable depending on operator experience and tooth area assessed.

The entire coated surface cannot be scored with the single mean value; and the each tooth are has to be scored separately.the detailed results for the preparation surfaces (occlusal,buccal,mesial,distal,lingual)in the anterior and posterior teeth found that smallest difference in the thickness of the coating of spray.the excessive occulsal coating were recored in the molars teeth. In the present study,coating on the incisal third,middle third of the anterior were thinner than cervical part of the anterior tooth.detailed results with the anterior teeth for four surfaces (mesial,distal,labial and lingual) found that thinner than coating which present toward the margin.whereas in posterior teeth the coating were thinner towards the middle third than the thickness towards the margin or cervical region of the tooth.A number of clinical recommendation could be implemented with a view to increasing the quality of CAD/CAM impression made with powder systems,including the CAD/CAM training, visually checking the thickness of the coating on tooth surfaces, and taking particular care when coating proximal area (Belser *et al.*, 1985)

Conclusion

within the limitation of the present in vitro study,the following concerning scan spray system.Thickness and homogeneity were more in the cervical region of the tooth than the other parts,Whereas homogeneity and thickness were lesser in incisally (upper anterior) and bucal portion of the lower molar crown preparation surfaces.

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