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Research Article

EVALUATION OF ANTERIOR TEETH DISPLAY BY DIGITAL PHOTOGRAPHIC METHOD. A RELIABLE TECHNIQUE

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A B S T R A C T

Introduction: Photographic records aid in identifying esthetic disharmony, planning for esthetics correction and establishing mutually compatible expectations of the prosthodontist and patients. In older patients and especially in men the mandibular anterior teeth receive greater exposure than those of the maxillary anterior teeth and are a zone of primary esthetic significance. In younger individuals many a times we came across a condition when there is a generalized attrition in maxillary and mandibular anterior teeth which most of a time require full mouth rehabilitation; so this study will also help in restoration of anterior teeth in younger individuals. This study also shows how a video function of a digital camera with readily available software can be used for effective esthetic analysis of the mandibular anterior teeth.

Method: In this study the faces of 120 subjects were individually filmed. 120 subjects were divided into four different age groups. Group 1(21-30 yr), group 2(31-40 yr), group 3(41-50 yr), group 4(51-60yr). Spontaneous smiles were captured with a digital camera, then it is transferred to a computer after that it is analysed with the help of ANOVA and post hoc analysis.

Result: An increase in visibility of mandibular anterior teeth was found in persons of 50 years of age or older.

Conclusion: This videographic method is reliable for measurement of tooth display and lip position in spontaneous and posed smiling and speaking.

INTRODUCTION

Anterior tooth display is dependent of smiling, speaking age and sex. The smile is an important form of facial expression. Nowadays the smile is even more important because of its increasing role in esthetics. Heartwell and Rahn[1] have contended that in edentulous patients the interinscisal distance increases with age and that therefore the mandibular anterior teeth become more visible. In younger individuals many a times we came across a condition when there is a generalized attrition in maxillary and mandibular anterior teeth which most of a time require full mouth rehabilitation; so this study will also help in restoration of anterior teeth in younger individuals[2]. In older patients the mandibular anterior teeth receive greater exposure than those of the maxillary anterior teeth and are a zone of primary esthetic significance[3]. Increased visibility can result from loss of muscle tonus which can allow lower lip to sag and upper lip to drop[4].

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Most of the studies have been done on the visibility of anterior teeth but they have not targeted the age group i.e. They have not compared the visibility of anterior teeth. So this study will help in knowing the visibility of anterior teeth in all the group. Group 1(21-30 yr), group 2(31-40 yr), group 3(41-50 yr), group 4(51-60yr). In this study a digital videographic technique has been used to measure the display of mandibular and maxillary anterior teeth during smiling and speech expressions and to evaluate correlation with age and sex.

MATERIALS AND METHOD

120 individuals were selected which were divided into four age groups Group 1(21-30 yr), group 2(31-40 yr), group 3(41-50 yr), group 4(51-60yr). Each subject was observed as an individual. Subjects were asked to read a designed performa. Each person was recorded with a digital camera using the macro and video mode. While holding a ruler in a vertical position so that its mm marking were clearly visible at the left border of the frame. The subject pronounced 'ah' sound (Fig.1) 3 times closing the mouth and resting between each sound. The syllable 'sheash' (Fig.2) was then pronounced 3 times. 'Sheash' has been observed to clearly reveal the mandibular anterior teeth. The researcher meanwhile records

the subjects expression with the help of a digital camera, special attention was paid to the amount of their mandibular anterior teeth. Showing in various facial expressions. Also noted the instances where the subjects showed maxillary and mandibular teeth equally in speaking, smiling or resting situation (Fig.3).

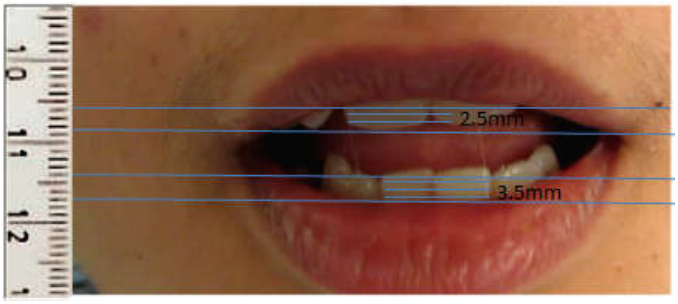

Fig 1 Video frame of "ah" expression

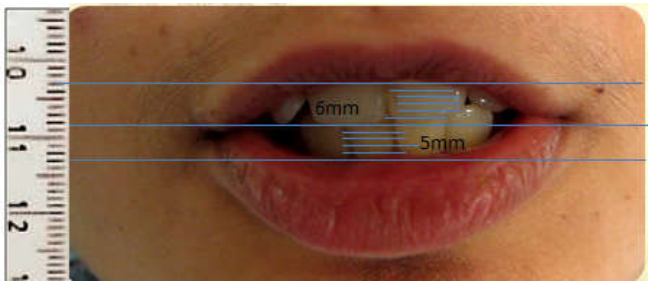

Fig 2 Video frame of "sheash" expression

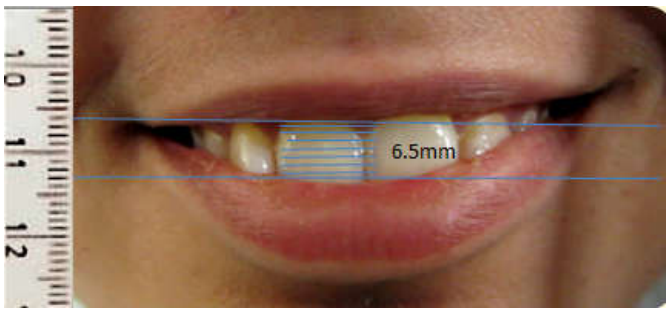

Fig 3 Video frame of a smile

Technique

1. Set the mode dial of the digital camera to video (Fig.4).

Fig 4

2. Set the camera to macro mode to produce focused images from close distances (Fig.5a and 5b).

Fig.5a

Fig 5b

3. Depress the shutter-release button halfway until the camera focuses on the anterior teeth of the subject (Fig.6).

Fig 6

4. Depress the button completely to commence video recording. Record the subject for approximately 1 minute when speaking, smiling, and pronouncing the "Ah" and "Sheash" sounds that effectively demonstrate the full range of maxillary and mandibular tooth exposure by the lips.
5. Transfer the movie file produced by the camera to a personal computer with operating system.
6. Play the file from beginning to end with software for initial evaluation.
7. Using the mouse, drag the small triangle on the scrolling bar of the program carefully forwards and backwards to view frames of particular interest within the recording (Fig.7).

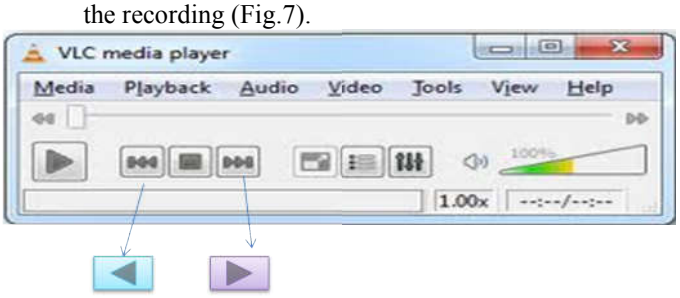

Fig.7

8. Use, File, Copy. or, ALT ,Prt Sc to capture and place individual frames on the clipboard; these frames can

then be pasted into a slide presentation or saved as images (Fig.8).

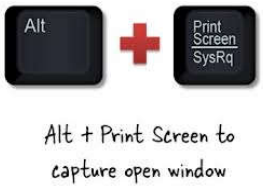

Fig 8

Statistics

Averages were calculated with each subject (Table.1). For each expression ANOVA test was done to find out difference between the age groups and within the age group where n=30 and $p<0.05$ is considered as statistically significant. Post hoc analysis (Benferroni) was also done for multiple compression.

Table 1

		Sum of Squares	df	Mean Square	F	Sig.
"Ah" mandible	Between Groups	183.341	3	61.114	340.812	.000
	Within Groups	20.801	116	.179		
	Total	204.142	119			
"Sheash" mandible	Between Groups	167.166	3	55.722	109.394	.000
	Within Groups	59.087	116	.509		
	Total	226.252	119			
"Smile" mandible	Between Groups	26.374	3	8.791	28.898	.000
	Within Groups	35.289	116	.304		
	Total	61.663	119			
"Ah" maxilla	Between Groups	158.545	3	52.848	225.507	.000
	Within Groups	27.185	116	.234		
	Total	185.730	119			
"Sheash" maxilla	Between Groups	162.303	3	54.101	221.691	.000
	Within Groups	28.308	116	.244		
	Total	190.611	119			
"Smile" maxilla	Between Groups	90.058	3	30.019	64.411	.000
	Within Groups	54.062	116	.466		
	Total	144.120	119			

RESULTS

This study clearly showed that the mandibular anterior teeth do play an important role in patient appearance. Teeth were displayed in resting, smiling and speaking facial expressions. There was a statistically significant difference in all the age groups (Table 2 and 3).

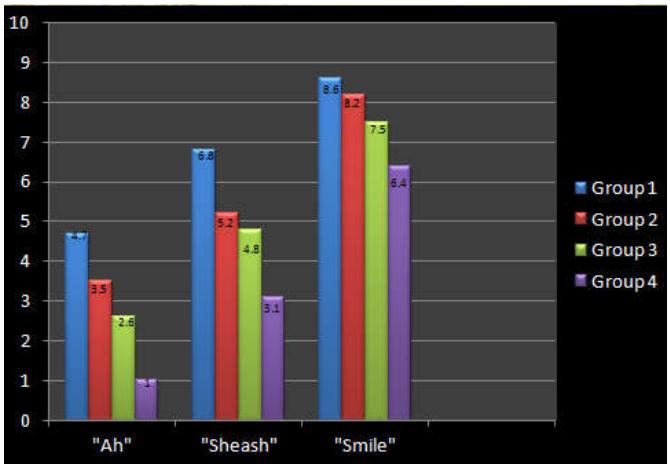

Table 2 Display of maxillary anterior teeth during smiling, saying " Ah" and saying "Sheash".

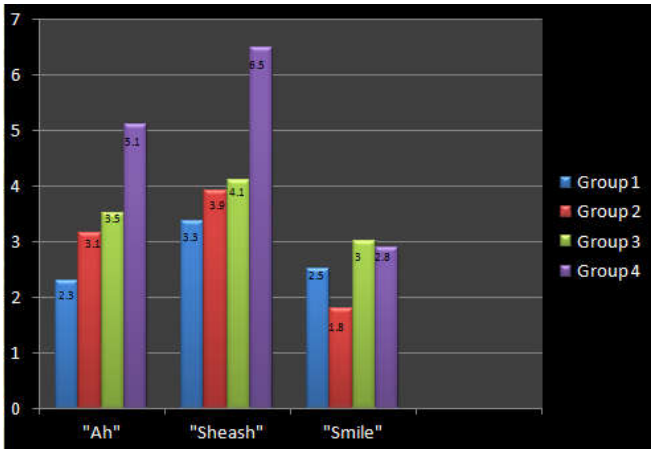

Table 3 Display of mandibular anterior teeth during smiling, saying " Ah" and saying "Sheash".

The mandibular anterior teeth were displayed to a greater extent that the maxillary anterior teeth in atleast half or more of the resting and speaking facial expressions. Also a positive relationship appeared to exist between visibility of mandibular anterior teeth and age. An increase in visibility of mandibular anterior teeth was found in persons of 50 years of age or older.

DISCUSSION

A reliable assessment of the smile line and tooth and gingival display during smiling and speech can be obtained with this digital videographic method. Moreover, this method is suitable for clinical practices. In view of the increasing esthetic demands of patients with regard to orthodontics, esthetic dentistry, and dental surgery treatment, irreversible procedures in dentofacial esthetics should be undertaken only when adequate information is obtained regarding the smile and functional tooth display. Robert G. Vig in 1978[2]: done a study which deals with one aspect of the "denture look". The amount of maxillary and mandibular teeth exposure with the lip at rest. Results showed the average amount of maxillary inscisor exposure in men was 1.91 mm. In women almost twice as much maxillary tooth exposure noted 3.40 mm. R.E. Cade[3] was focused on exposure of natural maxillary and mandibular teeth. The results of the study suggested that among patients over 60 yrs old, the mandibular incisor teeth were displayed to approximately the same extent that maxillary incisor teeth were displayed by patients under 30 yrs of age. Max Sackstein[4] in his study showed a digital video technique to measure display of maxillary and mandibular anterior teeth during smiling and 2 repetitive speech expressions and to evaluate correlation with age and sex. Results showed increase in age was associated with significant decrease in maxillary anterior tooth display between age 20-60 yrs. Pieter A.A.M. in 2007[5] developed a method to measure tooth display in both smile type and speech. Reliability was established by means of the generalizability theory which incorporates replication and selection facets. Results showed that the videographic method reliable for measuring the tooth display and lip position in spontaneous and posed smiling speaking. Max Sackstein again in 2008[6] purposed the use of digital video technique to measure display of maxillary and mandibular anterior teeth during smiling and 2 repetitive speech expressions and to evaluate correlation with age and sex. Results showed increase in age was associated with significant decrease in maxillary anterior tooth display between age 20-60 yrs. A significant correlation was noted by Brian J[7] between smile mesh

measurements which were obtained by clinical photography and those obtained by digital video clips.

CONCLUSION

This videographic method is reliable for measurement of tooth display and lip position in spontaneous and posed smiling and speaking. Digital videography is particularly useful in both smile analysis and in doctor/patient communication. We arrived to a conclusion stating that speech may reveal mandibular anterior teeth to a significant extent. According to conventional definition of esthetic zone i.e a zone visible in a wide smile, be expanded to include observation of the patients during speech. A decrease in mandibular anterior tooth display in older age, should be taken into consideration.

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