

Relationship of intercommissure width with buccal corridor display during social smile

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Abstract

Introduction: Smile frame work is determined by the position, shape, shade of the teeth; texture, colour and lines of the gingiva and the lips. Many features are said to increase the pleasing effect of a smile or they render beauty to a smile e.g. consonance in a smile, appropriate gingival display, harmonious gingival scaffolding, colorful gingiva, minimal buccal corridors, appropriate incisal show during smiling and so on. Having minimal buccal corridors is a preferred esthetic feature for both men and women. The purpose of this study was to establish the correlation between inter-commissure width and the buccal corridor area show of a patient during posed smile.

Material and Methods: A sample of 147 patients was selected through non-probability consecutive sampling. Pictures were taken in the same environment for every patient. Inter-pupillary distance and the inter-commissure width at rest were measured on the frontal photographs and were compared.

Results: The correlation analysis with Pearson correlation showed that the correlation of buccal corridor area show (in mm on frontal smile) with inter-commissure width was not statistically significant.

Conclusions: There was an insignificant association between inter-commissure width and buccal corridor space during smiling.

Keywords: Soft tissue paradigm; divine proportions; smile analysis

Introduction

Orthodontic diagnosis has come a long way and now includes patient driven esthetic diagnosis and treatment planning with its problem oriented approach. Ideal soft tissues render balance in a face and confer beauty. Beauty is the phenomenon of experiencing pleasure through the perception

of balance.¹ There is a universal standard for facial beauty regardless of race, gender, age and other variables named as the 'divine proportion' which is also found in numerous phenomenon, geometrical propositions and human architectural constructions.² Facial attractiveness has various essential components including balanced skeletal bases, harmonious soft tissues, proportionate relationship between hard and soft tissues and many others.

The focus on soft tissue paradigm in orthodontics has made smile consideration one of the fundamental treatment point.

A wide attractive smile expedites easy psychosocial adjustability of a patient in the community around.³ It is expressed as a result of pleasure, emotional agreement, amusement, a friendly gesture and to convey compassion. The importance of physical and facial attractiveness in which the smile plays a major role, has been studied and related to job recruitment decisions, initial impressions,

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susceptibility to peer acceptance, voting, juror decisions and social interactions.⁴ Gender, age and income among other factors have influenced people's perception of attractiveness of smiles.^{5,6}

Smile is a corner stone of social interaction and should now be a fundamental diagnostic point in diagnosis and treatment planning session of a patient seeking orthodontic treatment.⁷

'Mini esthetics' is a sub-domain of diagnosis in the frontal examination of an orthodontic patient. Buccal corridor space is one of the key feature of smile analysis (Fig 1).

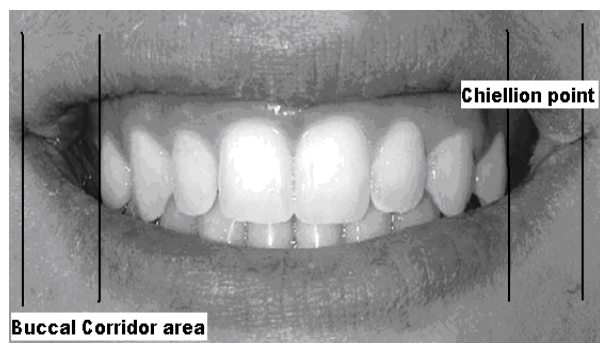


Fig 1: Buccal corridor areas

Moreover, the smile frame work is determined by the position, shape, shade of the teeth; texture, colour and lines of the gingiva and the lips.⁸ Many features are said to increase the pleasing effect of a smile or they render beauty to a smile e.g. consonance in a smile, appropriate gingival display, harmonious gingival scaffolding, colorful gingiva, minimal buccal corridors, appropriate incisal show during smiling and so on. All these add perfection to a smile. Many studies have been conducted with results confirming the above mentioned facts.^{9,10} Having minimal buccal corridors is a preferred esthetic feature for both men and women.⁹

Many hard and soft tissue factors influence the buccal corridor area show during posed smile e.g. Lower anterior facial height ratio, inter-premolar width, inter-commissure width (Fig 2), arch form and lip length etc.¹⁰



Figure 2: Inter-commissure width

The purpose of this study was to establish the correlation between inter-commissure width and the buccal corridor area show of a patient during posed smile.

The inter-commissure width, if found to be the main cause of increased buccal corridor show during posed smile, can identify one of the limitations of orthodontic treatment. Since orthodontic mechanotherapy has no effect on inter-commissure width changes hence this fact can be identified in the beginning of treatment. This can help in patient education also since the main reason for seeking orthodontic treatment in this modern era is esthetics. Realistic goals can be established on the basis of such findings.

Material and Methods

The sample was collected at the Department of Orthodontics, KRL Hospital, Islamabad. A sample of 147 patients was selected through non-probability consecutive sampling. This achieved 80% power to detect a difference of 0.229 between the null hypothesis, correlation of 0.00 and the alternative hypothesis correlation of -0.229 using a two-sided hypothesis test with a significance level of 0.05

(n =147, 40 males and 107 female patients with excess, normal and insignificant buccal corridors). Male and female patients of any age group seeking orthodontic treatment for all types of malocclusions with complete permanent dentition except third molars, symmetrical arch form and normal upper lip length: 19-22 mm¹¹ were included in the study sample. Patients with facial asymmetry,

temporo-mandibular joint disorder, cleft lip and palate or any other syndrome or who had undergone orthognathic surgery, with active periodontal disease or patients undergoing any surgical periodontal procedure and those with severe malocclusion / Cant of maxillary plane were excluded from the sample.

Informed written consent was taken from the selected patients who were to undergo orthodontic treatment after taking permission for this study from the ethical committee of the hospital. To control the bias each measurement was verified by a senior colleague.

Pictures were taken in the same environment for every patient with the same lighting conditions keeping a distance of 90cm from the camera constant, in natural head position, using Sony DSC-W55, Effective 7.2 megapixels, 3x zoom lens. The camera was fixed in position with a tripod and all photographs were taken in colour. The pictures were then transferred to computer software (Adobe Photoshop version 7, Adobe system, San Jose, California) and editing was done to standardize all. The pictures were cropped to include only the peri-oral region. Pictures were standardized to 5×3 inches, with 7.2 Mega pixel resolutions. Inter-pupillary distance and the inter-commissure width at rest were measured on the frontal photographs and were compared. Ideally they should be equal.⁵ The buccal corridor area were quantified. All readings were recorded on data collection form. Inter-commissure width was correlated with buccal corridor space via Pearson Correlation. Data was explored through SPSS (version 10). Pearson correlation coefficient was determined for inter-commissure width with the buccal corridor area show. *r* value was determined between -1.0 and +1.0

Results

The study was conducted on 147 participants, in which there were 40 (27.2%) males and 107

(72.8%) females. The mean age of the participants was 15.725 ± 5.467 . The inter-pupillary distance was measured, the minimum distance was 21.5 mm and the maximum was 36 mm. The mean inter-pupillary distance was 28.505 ± 2.468 mm as given in (Table I). The minimum inter-commissure width was 17 mm and maximum 34 mm with a mean inter-commissure width of 22.799 ± 2.388 mm (Table II).

The buccal corridor area show on frontal smile was measured, the minimum being 0 mm and maximum being 4.50 mm. The mean buccal corridor area show was 1.799 with standard deviation of 0.9904 mm as given in (Table III).

Similarly, the distribution of difference of inter-pupillary distance and inter-commissure width is given in (table IV), which shows that the minimum difference was 0 and maximum was 12 mm. The mean difference of inter-pupillary distance and inter-commissure width in this study was 5.71 ± 2.217 mm.

The correlation analysis with Pearson correlation shows that the correlation of buccal corridor area show (in mm on frontal smile) with inter-commissure width was not statistically significant. The correlation coefficient being -0.141 (P-value > 0.05) which means that there is negative correlation between inter-commissure width and buccal corridor area show (in mm on frontal smile, Table V).

Table I: Inter-pupillary distance (mm)

	N	Minimum	Maximum	Mean	Std. deviation
Inter-pupillary distance (mm)	147	21.50	36.00	28.505	2.468

Table II: Inter-commissure width (mm)

	N	Minimum	Maximum	Mean	Std. deviation
Inter-commissure width (mm)	147	17.00	34.00	22.799	2.388

Table III: Buccal corridor area show (in mm on frontal smile)

	N	Minimum	Maximum	Mean	Std. deviation
Buccal corridor area show (in mm on frontal smile)	147	.00	4.50	1.799	.9904

Table IV: Difference of inter-pupillary distance and inter-commissure width

	N	Minimum	Maximum	Mean	Std. deviation
Difference of inter-pupillary distance and inter-commissure width	147	0	12	5.71	2.217

Table V: Correlation of buccal corridor area show (in mm on frontal smile) with Inter-commissure width (mm)

	Buccal corridor area show (in mm on frontal smile)	
	Pearson correlation	Sig. (2-tailed)
Inter-commissure width (mm)	-0.141	0.089

Table VI: Relationship of buccal corridor area show (in mm on frontal smile) and difference of inter-pupillary distance and inter-commissure width

Difference of inter-pupillary distance and inter-commissure width	N	Mean buccal corridor area shown (mm)	Std. deviation	p value
<3	20	1.325	0.97704	0.001
3-5	40	1.500	0.89514	
5-8	71	1.965	0.96204	
> 8	16	2.406	0.93486	

Discussion

A pre-treatment sample was selected for this study since it exemplified typical orthodontic patients requiring treatment. Since a pre-treatment sample was used, these subjects varied greatly. The variety in the sample provided a range of smiles and dentofacial discrepancies that was ideal in correlating the hard tissue structures to the resulting smile configurations. In this study more female subjects were present as the sample was not collected on the basis of gender.

As already mentioned, minimization of buccal corridor area show during posed smile is an integral component of problem list and hence treatment planning and treatment goals.¹¹ Smile is one of the most important phenomenon being a corner stone of social interactions, concerns patients, and is one of the major reasons for seeking orthodontic treatment. Moreover, out-come of treatment is evaluated by improvement in smile characteristics.¹² Smile is an important facial feature. It can be altered tremendously as a result of orthodontic treatment. Many studies have been carried out for the diagnosis and implications of buccal corridor area show during posed smile and the factors that

increase or decrease it. Every effort should be made to minimize it.

The inter-commissure width which should be ideally equal to the inter-pupillary width was measured against increased or decreased buccal corridor area. This variable has not been tested before in the literature against the buccal corridor space. The null hypothesis was that increased inter-commissure width in comparison to inter-pupillary distance (ideally being equal) should increase the buccal corridor space evident during social smile.

However, the results proved other way around since there was negative correlation between the two variables with Pearson correlation test.

Once grouping was done the ratios changed in the favor of the hypothesis. The grouping was made for applying other statistical analyses. These groups were four in number depending upon the measurement of the Buccal Corridor display during social smile. These were less than 3mm, between 3 and 5 mm, between 5 and 8 mm, and greater than 8 mm of difference between the inter-commissure width and the inter-pupillary distance. These were than correlated with increased or decreased Buccal Corridor display during social smile (Table VI). With the grouping and division of sample the results confirmed that with increase of inter-commissure width, Buccal Corridor display during social smile also increased.

This variable was tested to define the limitation of a variable that could not be altered as a result of orthodontic treatment. Hence a patient with increased buccal corridor area show having greater inter-commissure width than the inert-pupillary distance could also have multi factorial origin of the increased show including variable muscle tonus, difference in incisor exposure, anteroposterior variance in maxillary plane, differences in tooth material as compared to norms, variation in occlusal plane etc.

Conclusions

There is insignificant difference between the inter-commissure width and the Buccal Corridor display during social smile (p value is > 0.05). If the data is stratified on the basis of extent of Buccal Corridor Area Show, the results become significant and inter-commissure distance seems to effect the Buccal Corridor Area Show on posed smile.

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