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Perception of Smile Esthetics Varies Between Patients and Dental Professionals When Recession Defects are Present

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The aim of this study was to compare the smile esthetic perception of patients, dental students and dentists faced to different situations concerning gingival margin position. A total of 123 individuals (41 patients, 41 dental students and 41 dentists) completed a structured questionnaire and evaluated 6 pictures of the same smile modified in Adobe Photoshop® image-editing software representing: no gingival recession, 2 mm recession in one maxillary lateral incisor, 2 mm recession in both maxillary lateral incisors, 2 mm recession in one maxillary canine, 2 mm recession in both maxillary canines and generalized 2 mm recession. The visual analogue scale (VAS) was used to rate the esthetic perception. Mean VAS values were calculated and compared among gingival situations as well as group of respondents by one-way ANOVA, with an alpha level of 0.05. VAS analysis revealed that mean values ranged from 4.2 (±1.8) to 6.8 (±1.7). Images with no gingival recession received the highest score by all groups, with statistically significant differences among dentists and dental students. However, patients scored images with no recession with significantly lower ranks as compared with dentists and dental students. No significant differences were observed among patients for any of the situations. When dentists and dental students were compared, the worst situation was observed for generalized gingival recession, with scores 4.2 (±1.8) and 4.9 (±1.8), respectively. Patients and dental professionals had different perceptions about esthetics related to gingival margin position.

Key words: esthetics, gingival recession, patient perception, smiling.

Introduction

Esthetics is an individual and subjective concept. Each person has a particular way to self-assess his/her own appearance and the beauty of other persons (1).

Esthetics is often the main complaint in the dental office and patients usually evaluate treatment results based on the positive changes in their smile (2). A possible reason for patients seeking for a better look is the fact that appearance may influence relevant concepts such personality, physical attractiveness, professional success, intelligence and happiness. This was observed in a research with more than 500 participants that evaluated photographs of pre and post treatment cases of esthetic changes (3). Scores attributed to the concepts cited above were significantly higher in posttreatment photographs compared with pretreatment photographs and participants were blinded to the timing of the photograph. An attractive smile also seems to impact social acceptance (4). Another study (2) in which photographs taken before and after orthodontic treatment with or without premolar extractions presented gingival position in maxilla and position of anterior teeth as the most important factors. Only superior gingival margin position presented statistically significant results. The more gingival tissue was shown, the worst the esthetic score. Decades ago, Hulsey (5) showed that maxillary lip height should be coincident with the gingival margin of central incisor to be considered an attractive smile. Other authors considered ideal esthetics when 1 mm of gingiva is shown, however 2 to 3 mm also might be acceptable esthetically (6). In a study performed only with dental students that evaluated smile esthetics of 5 distinct cases with different gingival margin position, scores in the visual analogue scale (VAS) varied between 3.45 to 7.6 points. The worst score was to gingival unevenness and best score to no recession (7).

It seems that no consensus exists among professionals in relation to which criteria should be taken into consideration when evaluating smile esthetics. Certainly, gingival margin has emerged as an important one. It should be given importance to patient participation as an active subject in his treatment (8). Especially in the case of the alteration of gingival margin, the treatment usually recommended for gingival recessions involves a delicate surgery, in the most of cases with 2 sites (a receptor and a donor site), complex grafts, some of them that are just being tested (9) or multi-therapies (10). Even for defects of Miller Class I or II, with the most predictable results, it is difficult to achieve a 100% coverage and the cost/benefit of the procedure should be discussed with the patient, particularly when

multiple recessions are involved (11). One important aspect is the perception of the patient about the alteration in judging it or not as a problem.

The aim of the present study was to compare the esthetic perception of patients, dental students and dentists of six different situations of gingival margin position. The tested hypothesis is that dental professionals have different perceptions from patients considering esthetics.

Material and Methods

Study Population

This was a cross-sectional survey performed at the School of Dentistry of the Federal University of Rio Grande do Sul, Brazil, from October 2011 to January 2012. A total of 123 subjects were enrolled in the study: 41 patients, 41 dental students and 41 dentists. A sample size calculation was based on the highest standard deviation in the VAS and a relevant difference of 2 points (7). Forty-one subjects were included for each group considering a statistical power of 80% and alpha error of 5% (12).

Data Collection

After filling out a structured questionnaire with questions on sociodemographic data and one question about the main factor considered for an esthetic smile, the participants evaluated six 13 x 18 cm photographs of the same smile standardized in terms of color and proportion (Fig. 1), which had been modified in Adobe Photoshop® image-editing software (Adobe Software Inc., San Diego, CA, USA). The photographs were examined in a random sequence and no possibility of comparison of images was given to the participants to avoid that comparisons could highlight the differences between the photographs. The images represented the following situations: no gingival recession, 2 mm recession in one maxillary lateral incisor, 2 mm recession in both maxillary lateral incisors, 2 mm

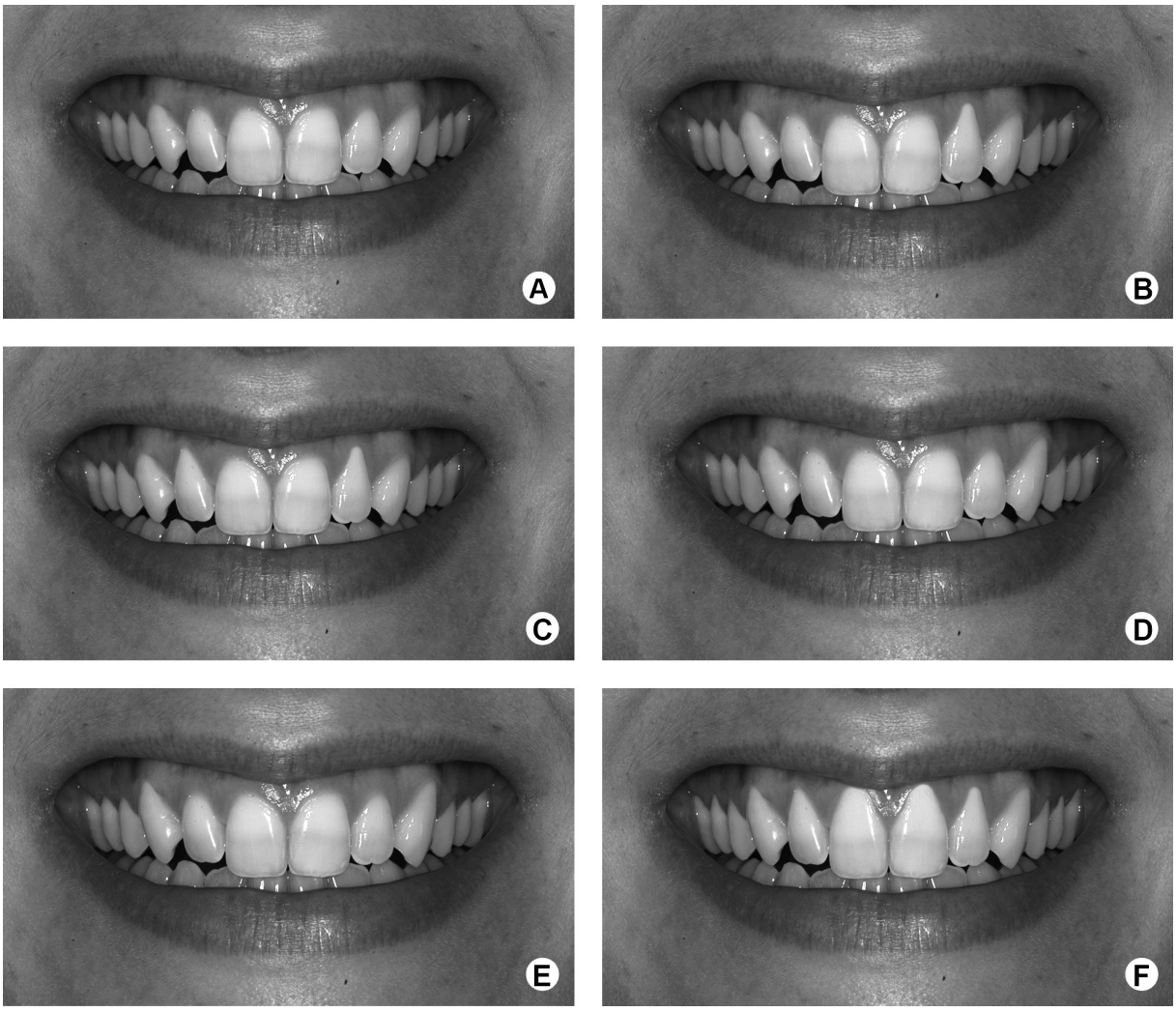

Figure 1. Composite figure of clinical images. A: No recession. B: 2 mm recession on one maxillary lateral incisor. C: 2 mm recession on both maxillary lateral incisors. D: 2 mm recession on one maxillary canine. E: 2 mm recession on both maxillary canines. F: Generalized 2 mm recession.

recession in one maxillary canine, 2 mm recession in both maxillary canines, and generalized recessions (six maxillary anterior teeth). The VAS was used to rate the esthetic perception. The most extreme left point represent the worst possible esthetic situation whereas the extreme right point was the most beautiful esthetic situation.

Statistical Analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) (17). Frequency distribution of categorical data and means and standard deviations of continuous data were calculated. For data from the structured questionnaire, descriptive statistics was used. Mean VAS values were calculated and compared among gingival situations as well as group of respondents by one-way ANOVA and Tukey's multiple-comparison test. Additionally, scores from unilateral were compared with bilateral recessions, as well as scores from lateral incisors were compared with canines. These comparisons were performed by independent-samples t test. The alpha level used in the present study was 0.05.

The Ethics Committee of the Federal University of Rio Grande do Sul approved this study and each participant signed an informed consent form (FR 463600).

Results

The majority of participants included in present study were females (65%) and the mean age in the groups varied between 23.2 (dental students) to 45.3 years (patients) (Table 1). Table 1 also shows the results of the structured questionnaire. More than half of the participants (59.3%) chose tooth alignment as the main factor for an esthetic smile. Tooth color was chosen by 17.9%, gingival contour by 8.1% and tooth size by 6.5% of the respondents. Patients and dental students considered tooth color as the second most important factor (29.3% and 17.1%, respectively), whereas gingival contour was the least significant (2.4%). In the group of dentists, gingival contour was considered the second most important factor (17.1%), while tooth color was chosen by 7.3%.

The VAS results of the 6 different situations are presented in Table 2. Images with no gingival recession had the highest score in all groups ($p<0.05$). This category showed statistically significant difference between the scores of dental students (6.8 ± 1.7) and patients (5.6 ± 2.5) ($p<0.05$). Mean scores attributed to canine recessions (unilateral and bilateral) showed statistically significant differences between patients and dental students ($p<0.05$). Bilateral recessions in lateral incisors displayed statistically significant difference between dental students (5.6 ± 1.9) and dentists (4.3 ± 1.5) ($p<0.05$). Unilateral recession in lateral incisor and generalized recession did not differ among groups ($p>0.05$). Intragroup analysis was performed taking unchanged periodontium as reference. Recessions in lateral incisors (unilateral and bilateral) and generalized recession were rated with significantly lower scores ($p<0.05$) by dental students and dentists. No statistically significant differences were observed for any type of recession in the group of patients ($p>0.05$).

When unilateral and bilateral recessions in lateral

Table 1. Characteristics of the study sample and main factor considered by each group for having an esthetic smile

	Patients (n=41)	Dental students (n=41)	Dentists (n=41)	Total
Characteristics				
Mean age	45.3 ±16.3	23.2 ± 2.7	35.7 ±11.7	34.7 ±14.7
Male	16 (39%)	8 (19.5%)	19 (46.3%)	43 (35%)
Female	25 (61%)	33 (80.5%)	22 (53.7%)	80 (65%)
Main factor for an esthetic smile				
Tooth color	12 (29.3%)	7 (17.1%)	3 (7.3%)	22 (17.9%)
Tooth alignment	24 (58.5%)	28 (68.3%)	21 (51.2%)	73 (59.3%)
Gingival contour	1 (2.4%)	2 (4.9%)	7 (17.1%)	10 (8.1%)
Tooth size	2 (4.9%)	2 (4.9%)	4 (9.8%)	8 (6.5%)
Others	2 (4.9%)	2 (4.9%)	6 (14.6%)	10 (8.1%)

Table 2. Means and standard deviation of visual analogue scale for the different clinical situations

Condition	Patients (n=41)	Dental students (n=41)	Dentists (n=41)
Healthy periodontium	5.6 (2.5) A	6.8 (1.7) B	6.5 (2.0) AB
Unilateral lateral incisor recession	5.1 (2.4) A	5.4 (1.9) A*	4.4 (1.6) A*
Bilateral lateral incisor recession	5.1 (2.5) ABC	5.6 (1.9) B*	4.3 (1.5) AC*
Unilateral canine recession	4.6 (2.6) A	6.2 (1.7) BC	5.7 (2.2) AB
Bilateral canine recession	5.0 (2.5) A	6.2 (1.7) BC	5.9 (1.8) AB
Generalized gingival recession	5.0 (2.3) A	4.9 (1.8) A*	4.2 (1.8)A*

Statistically significant intragroup difference ($p<0.05$) when compared with healthy periodontium (Tukey's test).

incisors and canines are compared, no statistically significant differences were observed (p>0.05) (Table 3).

Table 4 shows the comparison of lateral incisor and canine recessions. Lateral incisor recessions showed lower scores than canine recessions by dental students and dentists. No statistically significant differences were found in the patients' group (p>0.05). The differences between scores of canines and lateral incisor recessions were 0.7 (1.1) and 1.4 (1.4) for dental students and dentists, respectively.

Discussion

The quest for a better appearance is an issue of considerable prominence today. Among the different involved factors, the esthetics of the smile has an important influence in the perception about the individual appearance and personality (3,4). The understanding of esthetic perception is extremely important because this approach can affect treatment decisions. Treatment planning of gingival recessions is based upon the premise that root coverage will result in best esthetic profile and, therefore, less perceived. The definition of esthetically unpleasant situation is often associated with the dentist perceptions and not to the patient perceptions. The present study compared smile esthetic perception among dental students, dentists and patients. The intention was to know whether there is difference among the esthetic perception of these groups as well as which kind of alteration in gingival margin really matters for them.

The characteristics of the present study should be taken into perspective in order to better understand the results. A standard photograph of a healthy patient was used. Based on this photograph, gingival recessions with 2 mm of length were created by a computer program (Photoshop®). This approach aimed to eliminate the possibility of other factors such tooth alignment, tooth color, tooth size and other possible bias affecting the results. An interesting aspect of this study is that it comprised three categories of participants - dentists, dental students and patients - that represent two groups of oral care providers (one of them under training) and the most important subject for dental treatment: the patient. Their perceptions of esthetics are of utmost importance in proposals for clinical approaches and the hypothesis tested in the present study was that they would differ. The numbers were calculated in order to achieve a sufficient power and the occurrence of statistically significant differences among groups in the main outcome indicates that the sample is adequate. This is not a representative survey and population extrapolation should not be performed. However, as cultural aspects are also important in respect to esthetical perception, the groups are from the same area and cultural differences are unlike to have biased the results.

The main outcome of the present study was the VAS evaluation of different gingival esthetical situations. The VAS has been widely used for purposes of evaluating subjective feelings and has demonstrated good levels of reproducibility and validity (13-15).

The clinical situation best scored for all groups was absence of gingival recession. Dental students gave the highest score, followed by dentists and patients, who gave the lowest score, with statistically significant difference from dental students. Another evaluation that also differed between dental students and patients was canine recessions. When considered lateral recessions, symmetrical recession was significantly different between dental students and dentists. In contrast, unilateral recession in lateral incisor, as well as generalized recession, did not differ among groups.

Mean scores related to no recession varied from 5.6 to 6.8 (in a 0-10 scale). In other study that also evaluated esthetic perception, Guo et al. (16) considered scores between 50 and 80 as acceptable and only scores beyond 80 and 100 could be considered attractive. This result can be expected because other characteristics of the smile might influence the esthetic perception. For example, tooth alignment was the most important factor related to smile esthetics in the present study. These findings are in agreement with those of other authors (17).

Recessions of lateral incisors showed a worse evaluation when compared with canine recessions. One possible explanation for this difference is the anterior and central location of lateral incisors, increasing the visibility of the

Table 3. Comparison between unilateral and bilateral recessions

Group	Unilateral recessions	Bilateral recessions	p value*
Patients (n=41)	4.8 (2.5)	5.1 (2.5)	0.58
Dental Students (n=41)	5.8 (1.8)	5.9 (1.8)	0.74
Dentists (n=41)	5.0 (2.0)	5.1 (1.9)	0.84
Total	5.2 (2.2)	5.4 (2.1)	0.52

*Independent-samples t-test. Values are expressed as mean (S.D.).

Table 4. Comparison between lateral incisors and canine recessions

Group	Lateral incisors	Canine	p value*
Patients (n=41)	5.1 (2.4)	4.8 (2.5)	0.37
Dental students (n=41)	5.5 (1.9)	6.2 (1.7)	0.02
Dentists (n=41)	4.4 (1.6)	5.8 (2.0)	0.00
Total	5.0 (2.0)	5.6 (2.2)	0.00

*Independent-samples t-test. Values are expressed as mean (S.D.).

recessions by the participants. Furthermore, normal position of the gingival zenith in lateral incisors usually is located slightly below or around the line present between the gingival zenith of central incisor and canine (17). Therefore, gingival lateral recessions change this default location of zenith, creating a disharmonious situation.

Similarly to Rocha et al. (7), no recession was the situation with the highest score in the VAS, indicating the best esthetics. However, localized and generalized recessions did not differ in that study, the opposite occurring in the present study. The use of standardized photographs can eliminate possible bias that may lead to this difference, and might explain in part this difference.

Although symmetry could be considered a standard aspect to be evaluated relating to smile esthetics, in the present study, unilateral recessions in lateral incisors did not differ from bilateral recessions, and the same fact occurred with canines.

Interestingly, in the present study, patients did not observe significant differences in the analysis of the six situations of gingival margin. These results are in agreement with a recent paper published by Crawford et al. (19) that found a range of acceptability of 1 mm deviations (0 to 2 mm) from the ideal gingival margin position in posterior maxillary teeth. Furthermore, it might be considered that patients are less critical about esthetics than dental professionals (20). In the same way, in a study evaluating gingival exposure and comparing perceptions of doctors and laypersons, the authors also found worst scores by doctors (16). In addition, several other studies also demonstrated differences in the maxillary anterior esthetic perception between dental professionals and patients or laypersons in general (15,17,21,22).

The findings of the present study highlight the importance of a broader understanding of smile esthetics, since oral care providers tend to perceive esthetics differently from those who seek care. Since patients are the most important subjects to be considered in esthetic procedures, caution should be taken in order to offer procedures that might not be perceived as necessary by the patients.

Future studies considering recessions of higher magnitude (>2 mm) could add more data to this question. It can be concluded that dental professionals and patients express different perceptions about smile esthetics, in respect to differences in gingival margin position. It seems that patients could not observe recessions up to 2 mm. It would be important for dental professionals consider this fact when evaluating treatment needs of their patients and propose treatment approaches.

Resumo

O objetivo do estudo foi comparar a percepção estética do sorriso de pacientes, estudantes de odontologia e dentistas, em relação a diferentes situações de posição da margem gengival. Cento e vinte e três indivíduos (41 pacientes, 41 estudantes de odontologia e 41 dentistas) responderam um questionário estruturado e avaliaram 6 fotografias de um mesmo sorriso modificadas no Photoshop representando: periodonto inalterado (sem recessão gengival), recessão de 2 mm em um incisivo lateral superior, recessão de 2 mm em ambos incisivos laterais superiores, recessão de 2 mm em um canino superior, recessão de 2 mm em ambos caninos superiores e recessão generalizada de 2 mm. Uma escala visual analógica (EVA) foi usada para graduar a percepção estética. Médias da EVA foram calculadas e comparadas entre as situações gengivais, bem como entre os grupos de respondentes pela ANOVA de um critério com nível de significância de 0,05. A análise da EVA revelou que os valores médios variaram entre de 4,2 (±1,8) a 6,8 (±1,7). Periodonto inalterado foi avaliado com o maior escore por todos os grupos (com diferença estatisticamente significativa entre dentistas e estudantes de odontologia). Entretanto, pacientes avaliaram periodonto inalterado com valores menores quando comparados a dentistas e estudantes de odontologia. Entre pacientes nenhuma diferença significativa foi observada para nenhuma das situações apresentadas. Quando dentistas e estudantes de odontologia foram considerados, a pior situação foi observada para recessão gengival generalizada (4,2±1,8 e 4,9±1,8, respectivamente). Pacientes e profissionais da odontologia demonstraram diferentes percepções sobre as situações de estética relacionadas à posição da margem gengival.

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