

Resurfacing of Perioral Wrinkles in Correlation with Individual Dental Aesthetic Outcome

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Since most areas of dentistry deal increasingly with aesthetics, we conducted this study to evaluate the influence of perioral wrinkles on patients' subjective assessment for their "beautiful smile" appearance before and after laser resurfacing. Thirty patients were included in the study. All selected patients had previously done reconstructive dental therapy. Prior to wrinkles resurfacing the following aesthetic analyses were performed: dentofacial aesthetic analysis beautiful smile and facial analysis for skin resurfacing using Fitzpatrick alternative classification system for degree of perioral wrinkles. The resurfacing was performed using Life Touch Er:Yag pulsed laser with Life Touch Aesthetic Peri-Oral Handpiece. The energy utilized in all patients ranged from 50 mJ at 10 pulses/sec. The analysis of patients' degree of perioral wrinkles was performed as objective parameters which will influence the resurfacing outcome. The survey addressed patients' satisfaction with regard to existing patient's smile - "beautiful smile" in correlation with the presence of perioral wrinkles. The obtained data showed significant differences in individual assessment likeability versus that of the physician/examiner for appearance of the upper lip, incisal edge to lower lip and midline-relationship of central incisors to philtrum ($p < 0.05$). Individual likeability of upper lip appearance after resurfacing in correlation with the degree of perioral vary significantly depending on the degree of perioral wrinkles (Kruskal-Wallis $H = 15.36$, $p = 0.005$). Assessment concerning the personal likeability of the smile before and after treatment was tested with Wilcoxon Matched pairs test. The obtained results were statistically significant ($p < 0.001$).

Keywords: beautiful smile, dental aesthetic, Er:YAG resurfacing, full mouth reconstruction

Aesthetics is an element of philosophy, concerning the science of beauty, and is often associated with circumscriptions as "good" and "true". Historically, attempts to define the essence of beauty were a combination of artistic expression and mathematical proportion. Universally, it is accepted that looking good directly affects an individual's self-confidence and the image that he or she express. There should be no question that it is advantageous in our society for individuals to make every effort to optimize their appearance. A beautiful smile is an added asset to a beautiful face and it lies in the domain of an aesthetic dentist. Key to the successful results in aesthetic dentistry lies in a saying by Dawson (1995) i.e. "If you know where you are and you know where you want to go, getting there is easy [1]. Because the face and mouth are the most noticeable parts of the human body, it is no wonder that there is such an increase in demand for smile and teeth makeovers in everyday dental practices. It has often been stated that the eyes are the windows to the soul. If that is the case, the dento - facial complex or mouth is the key to defining an individual's dynamic personality.

Too often we are faced with tooth loss which have already caused changes that are accompanied with bone atrophy and collapse of the lower face vertically, loss of lip

support, and peri-oral wrinkles. In such cases of impaired aesthetics, the therapy becomes complex and challenging.

Interestingly, the general practitioners concept of aesthetics varied considerably from that practiced by prosthodontists where, in the full denture set-up, they could not only select the most desirable shape and colour of denture tooth suit to the patient's facial features but could position them in the optimal relationship with regards to the upper and the lower lip of the mouth thereby creating the desired ideal smile. General dentists are faced with demanding and tricky resolving therapeutic solutions when they have to meet the patient individual aesthetics perception. Contemporary aesthetic dentists realize that a true aesthetic result includes the teeth, as well as the surrounding soft tissues. It makes little sense to perform a beautiful full mouth reconstruction, and not pay attention to aging lips and perioral wrinkles.

Wrinkles whether they are result of habitual facial expressions, aging, sun damage, smoking, poor hydration or loss of lip support, are a huge aesthetic problem, especially for women [2]. Usually when we think about wrinkle we assume that they are result of aging. As the face ages, skin quality deteriorates. Intrinsic aging from the genetically determined, natural, chronological degradation of metabolic processes leads to epidermal

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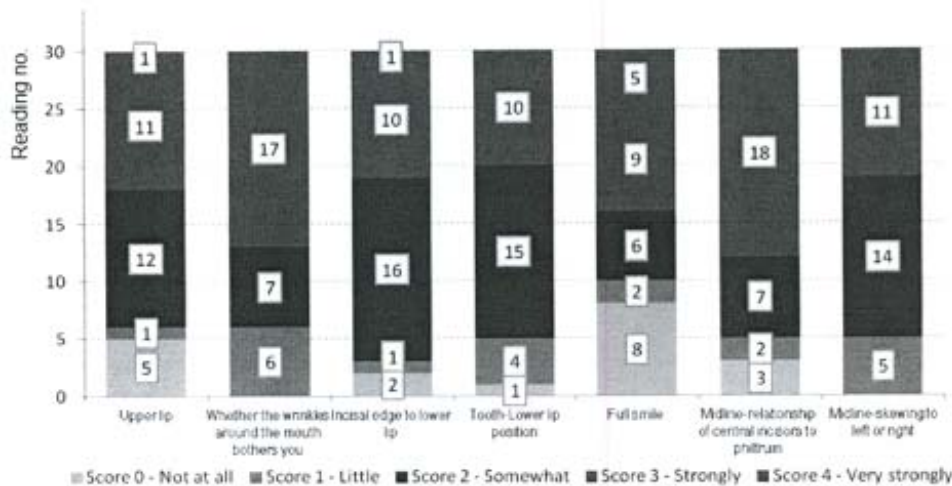


Fig.1. Patient's subjective likeability for each of the parameters that define the beautiful smile

How do you like the appearance of your:	Score 0. not at all	Score 1. little	Score 2. somewhat	Score 3. strongly	Score 4. very strongly
Upper lip	5(16.7%)	1(3.3%)	12(40.0%)	11(36.7%)	1(3.3%)
whether the wrinkles around the mouth bothers you aesthetically	0	6(20.0%)	7(23.3%)	17(56.7%)	0
Incisal edge to lower lip	2(6.7%)	1(3.3%)	16(53.4%)	10(33.3%)	1(3.3%)
Tooth-Lower lip position	1(3.3%)	4(13.3%)	15(50.1%)	10(33.3%)	0
Full smile	8(26.7%)	2(6.7%)	6(20.0%)	9(30.0%)	5(16.6%)
Midline-relationship of central incisors to philtrum	3(10.0%)	2(6.7%)	7(23.3%)	18(60.0%)	0
Midline-skewing to left or right	0	5(16.7%)	14(46.7%)	11(36.6%)	0

Table 1
THE DISTRIBUTION OF THE ANSWERS OF THE RESPONDENTS BEFORE BEING SUBJECT TO TREATMENT

thinning, dermal hypocellularity, decreased number of dermal blood vessels, and decreased amount of collagen and elastic tissue. These changes manifest as skin atrophy, pallor, and loss of elasticity [3-6]. Extrinsic aging from years of sun exposure and other external factors leads to the deposition of abnormal elastic fibers, the degeneration of collagen, and dilation of microvasculature. These are compounded with the intrinsic changes and result in a rough surface texture with wrinkling, scaling, dyspigmentation, telangiectasias, and skin laxity [7-13].

In the late 1980s, laser light was used for skin resurfacing - a popular option in the family of ablative (wounding) skin resurfacing techniques. Since then different lasers were developed to successfully treat and reduce the appearance of skin wrinkles. With advancements in technology a high pulse energy Er: YAG lasers were introduced. This Er: YAG laser wrinkle treatment involve photothermal tissue reaction without damaging the skin surface or appearance. The wrinkles "resurfacing" is accomplished by removing the outer layers to the level of the papillary dermis and triggering the body's wound healing responses. This induces re-epithelialization and fosters new collagen formation which can increase skin smoothness and elasticity.

In our beauty conscious society, a smile has great impact. When a patient's smile is destroyed by dental disease, the result often is damage to his or her overall physical and mental health [14]. The lips are notable part of the facial complex and significant facial element when viewed by others. There is no wonder, that the attractive smile can have a profound negative impact on an individual's personality, outlook, emotions, and the outcome of dental reconstructive therapy. More and more, aesthetic dentists realize a true aesthetic result cannot be accomplished if they disregard the appearance of aging

lips and perioral wrinkles. So, with perioral wrinkled resurfacing, can we achieve improvement in the individual aesthetic judgment? Can we influence the patient aesthetics perception, likeability and his/her positive psychological response, even though, dental - facial aesthetic analysis some time is unsatisfactory?

Because most areas of dentistry deal increasingly with aesthetics, we conducted this study to evaluate the results of treatment of aging lips and its influence on patients' subjective assessment of "beautiful smile" appearance before and after laser resurfacing of perioral wrinkle.

Experimental part

Thirty patients, ages range from 40-65 years old, were included in this study. All patients had detectable perioral wrinkles and previously done reconstructive dental therapy. No active bacterial infections, viral infections or inflammatory condition in the area to be treated, were detected. History of previous wound healing and pigmentation problems were obtained. The picture of each patient was taken before and 3 weeks after treatment.

Prior to wrinkles resurfacing the following aesthetic analyses were performed:

- dental - facial aesthetic analysis [15] beautiful smile [16];
- facial analysis for skin resurfacing using Fitzpatrick alternative classification system for degree of perioral wrinkles [17] as follows: Class I - Fine wrinkles; Class II - Fine-to-moderately deep wrinkles and moderate number of wrinkle lines; Class III - Fine-to-deep wrinkles, numerous wrinkle lines, and redundant folds possibly present.

The resurfacing was performed using Lite-Touch Er:Yag pulsed laser with Lite-Touch Aesthetic Peri-Oral Handpiece. The energy utilized in all patients ranged from 50 mJ at 10

How do you like the appearance of your:	Descriptive statics			
	mean	Std. dev.	median	mode
Upper lip	2.1	1.1	2.0	3.0
Whether the wrinkles around the mouth bothers you aesthetically	2.4	0.8	3.0	3.0
Incisal edge to lower lip	2.2	0.9	2.0	2.0
Tooth-Lower lip position	2.1	0.8	2.0	2.0
Full smile	2.0	1.5	2.0	3.0
Midline-relationship of central incisors to philtrum	2.3	1.0	3.0	3.0
Midline-skewing to left or right	2.2	0.7	2.0	2.0

Table 2
AVERAGE SCORES OF THE ANSWERS OS RESPONDENTS, DEVIATIONS FROM THEM, THEN MEDIUM SCORES OR MEDIAN,AND TYPICAL OR MODAL SCORES OF THE GIVEN ANSWERS

Assessment of the appearance: Best position is marked by column			
Upper lip	a. average	b. high	c. low
	24(80.0%)	5(16.7%)	1(3.3%)
Incisal edge to lower lip	a.convex curve	b.straight	c.concave curve
	10(33.3%)	5(16.7%)	15(50.0%)
Tooth-Lower lip position	a.touching	b.note touching	c.sllightly covered
	5(16.7%)	19(63.3%)	6(20.0%)
Full smile..... number of teeth exposed	b.8	c.10	d.16
	2(6.6%)	23 (76.7%)	5(16.7%)
Midline-relationship of central incisors to philtrum	a.center	b.right of center	c.left of center
	16(5.4%)	7(23.3%)	7(23.3%)
Midline-skewing to left or right	a. straight	b.left	c. right
	15(50.0%)	10 (33.3%)	5(16.7%)

Table 3
EXAMINER CONDUCTED ANALYSIS OR ASSESSMENT, CONCERNING THE "BEAUTIFUL SMILE", BEFORE TREATMENT.

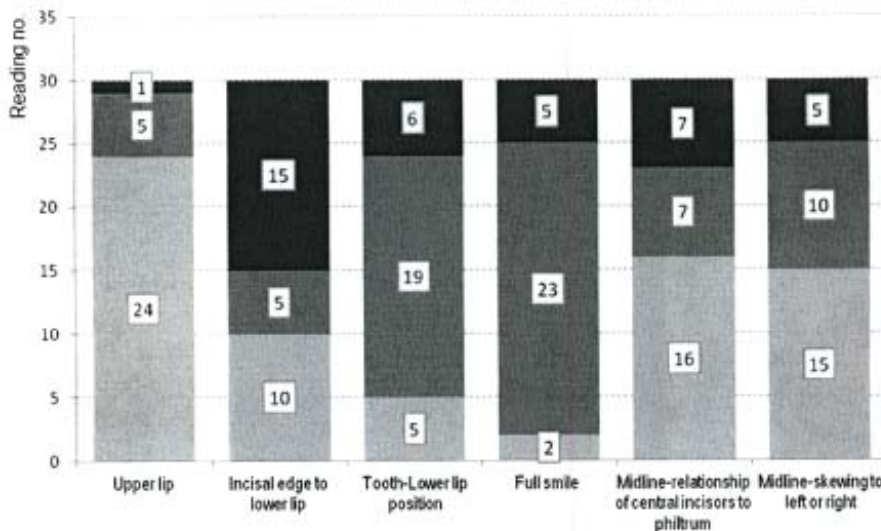


Fig.2. Examiner data according to parameters of beautiful smile

pulses/s. The shoulders of each one of the rhytides were treated with 2 passes with wide treatment tip.

All patients were asked to fill-in the questionnaire about subjects' self-report estimation of appearance before and after wrinkles resurfacing.

The analysis of patients' degree of perioral wrinkles was performed as objective parameters which will influence the resurfacing outcome. The survey addressed patients' satisfaction with regard to existing patients' smile- "beautiful smile" in correlation with the presence of perioral wrinkles. Likert scale questionnaires [18] were used to estimate degree of individual likeability of "beautiful smile" before and after resurfacing.

Results and discussions

For the purpose of the study collected data were analyzed using Kruskal-Wallis test, and Wilcoxon signed ranks tests.

The table 1 and figure 1 present distribution of answers to questions that are basic parameters used in defining a beautiful smile according to "Dental - facial aesthetic analysis - beautiful smile" before being subject to treatment in respect of their subjective experience (Likert scale questioners). Responses are expressed quantitatively, with scores from 0 to 4, and qualitatively, with the following modalities: not at all, little, somewhat, strongly and very strongly.

Whereas, table 2 shows the mean scores of the answers of the respondents, stand.deviation, medium scores or median, and typical or modal scores of the given answers. The examiner assessment of "beautiful smile", before treatment are shown on table 3 and figure 2. Assessments are expressed quantitatively, with (a), (b), and (c), and qualitatively, with: average, high and low. The analysis (table 4) showed that there are significant differences in individual assessment likeability versus that of the physician/examiner for appearance of the upper lip, incisal

Evaluated parameters	Z	p-level	Valid N	Valid N
Upper lip	3.46695	0.000526*	30	30
Your smile	0.00000	1.000000	30	0
Incisal edge to lower lip	2.06982	0.038470*	30	30
Tooth-Lower lip position	0.70226	0.482517	30	30
Full smile	-2.73512	0.006236*	30	30
Midline-relationship of central incisors to philtrum	2.58727	0.009674*	30	30
Midline-skewing to left or right	-1.06448	0.287113	30	30

Wilcoxon matched pairs test - Marked tests are significant at $p < 0.05$

Table 4
STATISTICAL DIFFERENCES IN INDIVIDUAL ASSESSMENT LIKEABILITY VERSUS THAT OF THE PHYSICIAN/EXAMINER

How do you like the appearance of your upper lip after resurfacing	The degree of perioral wrinkles			
	1	2	3	Total
0. not at all	0	0	0	0
1. little	0	0	2(40.0%)	2
2. somewhat	0	4(26.7%)	2(40.0%)	6
3. strongly	5(50.0%)	11(73.3%)	1(20.0%)	17
4. very strongly	5(50.0%)	0	0	5
Total	10	15	5	30

Kruskal-Wallis H = 15.36, $p = 0.005$ Sig.

Table 5
INDIVIDUAL LIKEABILITY OF UPPER LIP APPEARANCE AFTER RESURFACING IN CORRELATION WITH THE DEGREE OF PERIORAL WRINKLES

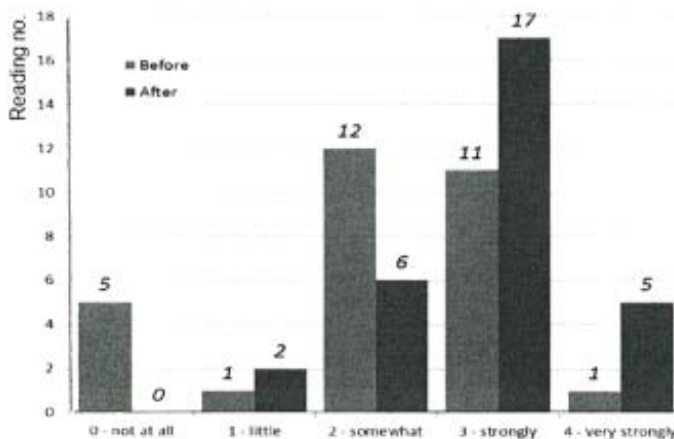


Fig. 3. Assessment of patients' likeability of individual smile before and after treatment.

edge to lower lip and midline - relationship of central incisors to philtrum ($p < 0.05$); concerning the Tooth-Lower lip position and Midline-skewing to left or right, there is no significant difference in individual v. examiner assessment ($p > 0.05$).

The collected data about individual likeability of upper lip appearance after resurfacing in correlation with the degree of perioral wrinkles are presented on table 5. The tested difference in their answers after the treatment vary significantly depending on the degree of wrinkle (Kruskal-Wallis H = 15.36, $p = 0.005$).

Assessment concerning the personal likeability of the smile before and after treatment was tested with Wilcoxon Matched pairs test which was statistically proved to be highly significant ($p < 0.001$), i.e., the treatment significantly improved the perception of respondents (fig. 3 and table 6).

It is generally accepted that an attractive smile is an important social asset. But, what is a beautiful smile? How to evaluate a beautiful smile? Goldstein in 1998 [12], described certain parameters of a beautiful and aesthetic smile stating vital parameters in his "dental - facial analysis".

Until recently, restorative dentistry considered mostly functional demands (for example, repairing the destructive effects of dental caries). However, with the decrease in caries prevalence, [19, 20] the focus has shifted gradually from functional dentistry per se to aesthetic dentistry. Despite agreement among professionals about the

importance of the psycho-social effects of treatment, no psychometric instruments are currently available for objective assessment of the impact of dental aesthetics on subjective well-being [21, 22]. As a result, the perception of tooth appearance in modern society could influence the changes in patients' needs [23]. Several authors have reported discrepancies between the treatment needs perceived by patients and those assessed by dental professionals [24-28]. Osterberg et al. [29] reported that aesthetic rather than functional factors determine a patient's subjective need to replace missing teeth. Many patients find the six anterior teeth indispensable but will accept edentulous spaces in posterior regions [30-35].

Although there is no psychometric parameter for improving individual likeability, obviously, performing a complex restorative dental case without rejuvenating the lips does not serve the patient. Basic lip rejuvenation involves adding definition and volume to the lips. By lasering the skin down to the superficial layers of the dermis, thermal changes cause the formation of new collagen fibers and the skin reforms over a tighter dermis, eliminating wrinkles. This process is called neocollagenation. Laser resurfacing of the lips produces improvements of wrinkles and a generalized tightening of the skin.

Considering that treatment planning according to facial architecture and dental configuration allows harmonious aesthetics and a beautiful smile to be improved; our study refers patients' aesthetic perceptions of smile in correlation with ageing lips before and after perioral wrinkle

How do you like the appearance of your smile	Before treatment		After treatment	
	N	%	N	%
0. not at all	5	16.7	-	-
1. little	1	3.3	2	6.7
2. somewhat	12	40.0	6	20.0
3. strongly	11	36.7	17	56.7
4. very strongly	1	3.3	5	16.6
Total	30	100	30	100

Wilcoxon Matched pairs test T = 47.5, Z = 2.75 p = 0,006 Sig.

Table 6
ASSESSMENT OF THE APPEARANCE OF
INDIVIDUAL SMILE LIKEABILITY BEFORE
AND AFTER TREATMENT

resurfacing. The obtained results suggested that, generally, patients individual aesthetics judgment deviates from Goldstein parameters for beautiful smile". This was supported by data obtained from the evaluation of the dentist pertaining "beautiful smile". The obtained, pre treatment, answers on only 2 out of 6 analyzing question from Likert scale concerning the standards for beautiful smile were in correlation with Goldstein parameters, even though received answers were quantified with score 2 and score 3 from Liker scale. The answers to the question "do they like the appearance of upper lip after resurfacing," were in correlation with the degree of perioral wrinkles which were statistically significant $p < 0.005$. The differences in obtained answer considering the beautiful smile before and after treatment were statistically significant $p < 0.001$. Respectively, the resurfacing of perioral wrinkles significantly improves the individual aesthetics judgment.

Conclusions

A good cosmetic dentist combines artistry and technology together with interdisciplinary approach for realization of highest level of dental care. If the teeth look great but we ignore the rest of the face, then we have really limited what we can accomplish with aesthetic dentistry. Contemporary aesthetic dentistry exceeds the oral cavity, and the smile can be truly improved applying perioral rejuvenation sometimes.

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