



Evaluation of the aesthetic outcome of implant single-unit restorations with titanium and zirconia abutments and reproducibility of aesthetic indexes according to observer dental specialization – a retrospective study

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Coimbra, July 2015

Faculty of Medicine of University of Coimbra

Integrated Master in Dentistry

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ABSTRACT

Objectives: Compare the aesthetic outcome in single-tooth implant restoration using zirconia and titanium abutments in anterior region with aesthetic indexes and the subjective opinion of the patients. It also evaluated the influence of clinical training in perception of the aesthetic results. Reproducibility of the aesthetic indexes was evaluated according to observer dental specialization.

Materials and Methods: All patients who received dental implants in the dental clinic of the Faculty of Medicine of University of Coimbra between 2005 and 2014, and agreed to participate in the study, were selected. The following inclusion criteria were used: single-tooth implant restorations in anterior region; titanium or zirconia abutments; natural teeth adjacent and contralateral. First was evaluated the opinion of the patient using the Visual Analog Scale. During the control visit radiographs and photographs were performed in addition to the evaluation of the aesthetic outcome (PES/WES, ICAI and CIS indexes). Within all the cases were selected two that were evaluated using the aesthetic indexes by dental doctors from different areas of specialization, dental technicians and students of dentistry through photographs.

Results: There are not many differences between the assessment of observers and clinical evaluation in PES/WES index. Regarding the internal consistency the CIS index was what showed a higher value (Cronbach's $\alpha = 0.83$) and the ICAI index had the lowest value (Cronbach's $\alpha = 0.73$). The relationship between the indexes was higher among the PES/WES and ICAI and the lower between ICAI and CIS. The CIS was the best index to be used by the professionals. Colour and translucency of the crown, crown colour match, crown volume and root convexity/soft tissue colour and texture are the parameters that most influenced the aesthetic results. Cases with zirconia abutments had better aesthetic results than the titanium abutments.

Conclusion: Within the limitations of this study, the CIS and PES/WES indexes seem to be the best to assess the aesthetic results of implant single-unit restorations. The protocol followed in this study can be used in future rehabilitations. The zirconia abutments showed better aesthetic results compared to titanium abutments. However, it is necessary more studies to confirm.

Key-Words: aesthetic, implant single unit restoration, titanium abutments, zirconia abutments, Pink Esthetic Score (PES), White Esthetic Score (WES), Implant Crown Aesthetic Index (ICAI), Copenhagen Index Score (CIS), peri-implant soft tissue

ABREVIATION LIST

CIS – Copenhagen Index Score

FDI – Fédération Dentaire Internationale

ICAI – Implant Crown Aesthetic Index

JPEG – Joint Photographic Experts Group

PES/WES – Pink Esthetic Score/White Esthetic Score

VAS – Visual Analog Scale

1. INTRODUCTION

Nowadays implant dentistry has an increasingly important role in oral rehabilitation especially in the replacement of a single tooth; however, it is also a valid option in the absence of several teeth (1-6). In addition, a removable partial denture and the conventional fixed prosthesis are also other valid options. Nevertheless, oral rehabilitation with a single unit implant supported crown proves to be the best option since it does not affect healthy tooth structure (7, 8). In recent years, dental implants and coronary restoration have been the best solution for oral rehabilitation in an area where only one tooth is missing. This option has obtained positive results where aesthetics and function are concerned, as well as high rates of success and duration (1, 3-5, 9-12).

In the past, several authors defended that the success criteria of a dental implant was based on osseointegration and function (chewing, phonetic) (11, 13, 14). Nowadays, it is recommended that the success criteria be based not only on osseointegration and function (chewing, phonetic), but also on aesthetics. This factor has an important role, especially in the restoration of the anterior maxillary and mandibular sector. The main objective is to guarantee that the restoration be as close as possible to the adjacent and contralateral teeth. In order to obtain aesthetic rehabilitation, the prosthodontist has to take into account the position, inclination, shape and colour of the restoration (10). Furthermore, the peri-implant soft tissue should be healthy and as similar as possible to the adjacent soft tissues (10). This is a real challenge for the prosthodontist (especially in the anterior maxillary) since it is essential to create a multidisciplinary team in order to define the best treatment plan (7, 11, 15-19).

When planning a single unit implant restoration in the anterior maxilla, one must take into account the gingival biotype, the bone level and the smile line, among others factors.

The gingival biotype can be classified as thin or thick. A thin gingival biotype is more likely to have gingival recession, bone loss, dehiscence and fenestration. Translucency may cause the metallic appearance of the restoration to be visible. A thick gingival biotype is more resistant to trauma during implant placement surgery being more frequent in healthy periodontium. With these patients there is less probability of gingival recession, which can affect the success of the restoration. In the presence of a thin gingival biotype, a tissue graft can be made to increase its thickness (13, 20). So it can be concluded that a thick gingival biotype is desirable when there is a need to do a restoration on implants (13).

The smile line allows one to see the amount of tissue that is exposed when the patient smiles with the possible exposure of the gingival margin, the buds or no exposure of the papillae.

Today patients are more and more demanding with aesthetics. Therefore, the function and osseointegration as well as aesthetics, must all be part of a success criteria of implant restoration. In order to evaluate aesthetics, one can resort to objective and / or subjective methods.

The objective methods use of indexes and examples of these methods are the aesthetic indexes PES / WES, ICAI and CIS (9, 21, 22).

The Pink Esthetic Score/White Esthetic Score (PES/WES) was first presented by Belser and colleagues in 2009. It assesses the peri-implant soft tissue (PES) and the crown restoration (WES) (3-5, 11, 21, 23-25). In 2005, Meijer and colleagues proposed the Implant Crown Aesthetic Index (ICAI) that assesses the peri-implant soft tissues and the crown restoration. However, this index has been modified giving a score of 2 on major deviation classification where ICAI gives a score 5 (3, 6, 9, 22, 25-27). The Copenhagen Index Score (CIS) was proposed by Dueled and colleagues in 2009 and evaluated the crown restoration and the adjacent soft tissues (27).

Subjective methods take into account the opinion of both the patient and those accompanying him, as well as health professionals. Assessment is usually done using a questionnaire that could possibly be the VAS (Visual Analog Scale).

The abutments used in single-tooth implant restorations may be made: metallic or ceramic. The metal abutments (titanium, used in this study) have excellent stability and biological integration and are therefore considered the gold standard (7, 28, 29). However, one of its disadvantages is the grey coloration of the peri-implant tissues due to its colour. This becomes a problem in the maxillary anterior restorations where the aesthetic requirements are higher (7, 28). On the other hand, there are abutments made of ceramic that have aesthetics as the primary advantage in comparison to the titanium one, as well as having similar biological integration (29). However, this material is less resistant and becomes more fragile with time. The use of zirconia, which is a high-resistant ceramic material, has better properties than other ceramics and thereby has good clinical results. Therefore, we can conclude that the selection of the type of material used for the construction of an abutment must take several factors into account (7). In regards to the color of the peri-implant tissues, the zirconia abutments have a statistically significant difference when compared to natural teeth. Thus, the use of gold or ceramic abutments have been developed to address this problem (18). Also, the stability of the crestal bone, the health of the soft tissues, among other characteristics, are related to the type of material that is chosen when making the abutment (30). When the restoration is located in the anterior sector, the choice of the abutment used is based on: gingival biotype, smile line, angulation of the

implant, space for restoration, material to use in the coronal restoration, type of restoration, preference of surgeon and the cost to the patient (31).

According to different authors, zirconia abutments show the best aesthetic results when compared to titanium abutments; however, in some cases the difference was not statistically significant (6, 7, 12, 15, 16, 28, 32). Thus, the use of titanium abutments may be indicated in certain situations. Therefore, when choosing between zirconia and titanium abutments, various parameters must be taken into account such as the characteristics of soft tissue and bone.

1.1 OBJECTIVES

The aim of this retrospective study was to compare the aesthetic outcome in single-tooth implant restoration using zirconia or titanium abutments and all ceramic or metal-ceramic crowns in anterior region. This aesthetic evaluation is done using aesthetic indexes and the subjective opinion of the patients. It also evaluated the influence of clinical training in perception of the aesthetic results and the reproducibility of aesthetic indexes according to observer dental specialization was evaluated.

2. MATERIALS AND METHODS

2.1 Patient Selection

The patients that participated in this study received dental implants in the clinical department of Dentistry, Faculty of Medicine University of Coimbra between 2005 and 2014. Patients were selected taking according the following inclusion criteria:

Single-tooth implant restorations in anterior region;

Titanium or zirconia abutments;

Natural teeth adjacent and contralateral.

However, it was difficult to get information about the type of material of the abutment and the crown, implant position in the oral cavity, presence or not of the adjacent and contralateral tooth naturals. To obtain more information the researchers sought to speak to the dentists responsible for rehabilitation.

All patients who agreed to participate in this study were explained the objectives as well as all procedure and signed the informed consent. (Annex 1 – Informed Consent)

2.2 Subjective Assessment

The subjective assessment was done before the clinical examination using a questionnaire (VAS – Visual Analog Scale). This consists in a 10 cm line where patient evaluate their satisfaction with the oral rehabilitation (peri-implant soft tissues and crown restoration) where the 0 represent “very bad aesthetic” and 10 “very good aesthetic”. The patient answer by marking a cross line that represent their level of satisfaction. It was also asked to the patients if they would recommend the treatment and, if necessary, they would repeat the treatment (23, 25). (Annex 2 – VAS)

2.3 Control Visit Protocol

- Oral Examination

Initially the operator made a brief oral examination, in order to assess the need to make an ultrasonic tartar removal and the presence of any oral pathology. In case it was

necessary to perform an ultrasonic tartar removal the patient would return later to make the assess protocol. If it was not necessary the operator initiated the aesthetic evaluation.

- Radiographs

The main objective of carrying out a digital periapical radiograph was to evaluate marginal bone loss around implants and the presence of peri-implantitis. For this the bisector radiographic technique was used in which the radiation beam must be perpendicularly to the bisecting angle that is formed between the long axis of the tooth and the radiographic sensor.

- Photographic Collection

To make the collection of images was used a Canon EOS 60D camera, an EF 100mm F/2,8L Macro IS USM lens and a Macro Ring Lite MR-14EX. Photographs were taken using JPEG and RAW file format. To standardize the colour photographs, as the light conditions are not the same, was used a white balance card (WhiteBal®).

In order to achieve the same camera position for all patient (the inclination of the camera was controlled by bubble level located in tripod), it was used a tripod in some of the photos was taken: extra-oral photograph and intra-oral photographs (maximum intercuspal position and front of the upper arch with black background).

First was held an extra-oral photography using the tripod with patient smiling where used the option "Grid 2" (option of the camera) and a vertical line matched with middle line and horizontal line matched with interpupillary line. Then was held the intra-oral photographs using tripod, plastic retractor, white balance card and black backgrounds:

- One in maximum intercuspal position with and without white balance card;
- Another front of upper arch using black background: middle line of camera was aligned with average interincisal line.

Finally, intraoral photographs without tripod were performed:

- Lined up the central focus of the camera viewfinder with the labial surface of the tooth to shoot (in the case of incisors or canines photographed the contralateral tooth in the case of premolars photographed is adjacent).

To carry out the occlusal photographs the patient was sitting in the chair and a reclined position. The central focus of the viewfinder was placed on the occlusal tooth face shooting so we get a photograph perpendicular to the occlusal surface.

Table I Settings

Extraoral Photographs	Intraoral Photographs	Occlusal Photographs
F/20	F/22	F/22
Shutter Speed – 1/125	Shutter Speed – 1/160	Shutter Speed – 1/160
ISO – 1250	ISO – 100	ISO – 100
Flash – 1/1	Flash – 1/4	Flash – 1/4
Focus 3 meters	Magnification – 1:3	Magnification – 1:2

- **Clinical Analysis**

Primarily was evaluated the lip line relatively to exposure of the papillae, enabling the following classification: no exposure of the papillae, exposure of papillae or full exposure of mucosa. The gingival biotype could be classified as thick, medium-thick or thin.

To classify the type of gingival biotype was used the technique of the periodontal probe that is a reproducible, noninvasive method. Our aim was to insert the probe in the gingival sulcus and thus evaluating the transparency of the mucosa. In this study the method was applied to the peri-implant mucosa. If you could not see the probe, the biotype was considered thick; if on the other hand, the probe was visible the biotype was considered thin. Intermediate situations were classified as medium-thick gingival biotype.

The periodontal evaluation was performed to the implant and the contralateral tooth, when it comes to central incisors, laterals incisors or canines, and the adjacent tooth, when it comes to pre-molars. This involves the assessment of:

Probing Depth: measured with a manual periodontal probe (Williams) at four locations (mesial, distal, buccal and palatal teeth to review);

Bleeding on Probing: also evaluated the four locations where the periodontal probing was performed as present or absent;

Mobility: was measured using two metal instruments being classified as:

Normal mobility - as this was an implant is not expected that there mobility is horizontal or vertical;

Grade I - a little more than normal (<0.2mm horizontal movement);

Grade II - moderate mobility (1-2 mm of horizontal movement);

Grade III - severe mobility (> 2mm horizontal mobility or vertical movement).

Regarding to the procedures previously performed there was the day of surgery, the load protocol, the type of implant, bone regeneration, temporary restoration, split crest and retention.

Next, we performed the aesthetic analysis using aesthetic indexes PES/WES, ICAI and CIS. This evaluation was performed to the implant and the contralateral tooth, when it comes to central incisors, lateral incisors or canines, and the adjacent tooth, when it comes to pre-molars. (Annex 3 – Clinical Assessment)

The PES / WES index was proposed by Belser and colleagues in 2009 and assesses the peri-implant soft tissue (PES - Pink Esthetic Index) but also the crown restoration (WES - White Esthetic Index). The PES uses five parameters which are: mesial papilla, distal papilla, curvature of the facial mucosa, level of the facial mucosa and root convexity/soft tissue colour and texture. The first two are classified as absent, incomplete or complete, which correspond, respectively, to a score of 0, 1 and 2. The remaining three are evaluated as having major discrepancy, minor discrepancy and no discrepancy, and with a score of 0, 1 and 2 respectively. The WES focuses on the visible part of the implant restoration and comprises of five parameters: crown form, crown volume, crown colour, surface characterization and translucency. All parameters are evaluated as having major discrepancy, minor discrepancy and no discrepancy corresponding to values of 0, 1 and 2 respectively. In order to evaluate this, the contralateral tooth is used in the case of incisors or canine teeth and the adjacent in the case of a premolar tooth. We can have a value of 20 at the most and there is a great relationship between the peri-implant soft tissues and the crown restoration on the implant and the tooth used with control. A PES/WES score ≥ 12 is considered aesthetic (3-5, 11, 21, 23-25). (Table II)

Table II Pink Esthetic Score/White Esthetic Score (PES/WES)

PES	0	1	2
<i>Mesial Papilla (1)</i>	Absent	Incomplete	Complete
<i>Distal Papilla (2)</i>	Absent	Incomplete	Complete
<i>Curvature of the Facial Mucosa (3)</i>	Major Discrepancy	Minor Discrepancy	No Discrepancy
<i>Level of the Facial Mucosa (4)</i>	Major Discrepancy	Minor Discrepancy	No Discrepancy
<i>Root Convexity/Soft Tissue Colour and Texture (5)</i>	Major Discrepancy	Minor Discrepancy	No Discrepancy
WES	0	1	2
<i>Crown Form</i>	Major Discrepancy	Minor Discrepancy	No Discrepancy
<i>Crown Volume</i>	Major Discrepancy	Minor Discrepancy	No Discrepancy
<i>Crown Color</i>	Major Discrepancy	Minor Discrepancy	No Discrepancy
<i>Surface Characterization</i>	Major Discrepancy	Minor Discrepancy	No Discrepancy
<i>Translucency</i>	Major Discrepancy	Minor Discrepancy	No Discrepancy

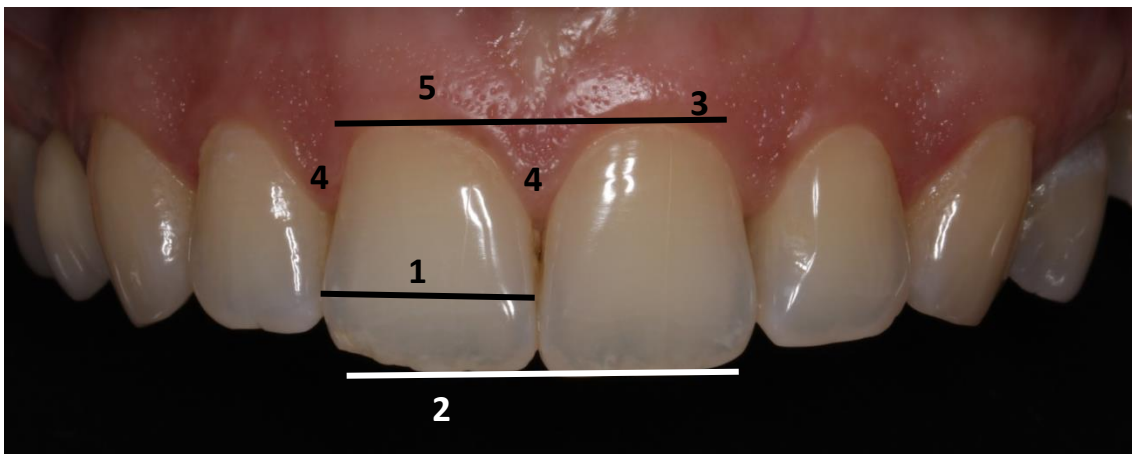


The ICAI index (Implant Crown Aesthetic Index) was proposed by Meijer and colleagues in 2005 and assesses both the peri-implant soft tissues such as the crown restoration. There are nine parameters that are evaluated and they are: the mesiodistal dimension of the crown, the position of the incisal edge, labial convexity of the crown, vestibular contour of the mucosa, colour and translucency of the crown, texture of the crown, position of the vestibular margin of the mucosa, position of the mucosa in the proximal spaces and colour and surface of the mucosa. The first four parameters are evaluated as: grossly overcontoured, slightly overcontoured, no deviation, slightly undercontoured and grossly undercontoured, with a score of 5, 1, 0, 1 and 5 respectively. The remaining five parameters are evaluated as: a major deviation, minor deviation and no deviation with a score of 5, 0 and 1 respectively. Therefore, one can obtain a maximum score of 45 with 0 being the best score. A ICAI score ≥ 5 is considered poor aesthetic. However, when greater deviations occur in this index then a score of 2 is given instead of 5, so that there can be a maximum score of 18 (3, 6, 9, 22, 25-27). (Table III)

Table III Implant Crown Aesthetic Index (ICAI)

ICAI	5	1	0	1	5
<i>Mesiodistal dimension of the crown (1)</i>	Grossly Overcontoured	Slightly Overcontoured	No Deviation	Slightly Undercontoured	Grossly Undercontoured
<i>Position of the Incisal Edge (2)</i>	Grossly Overcontoured	Slightly Overcontoured	No Deviation	Slightly Undercontoured	Grossly Undercontoured
<i>Labial Convexity of the Crown</i>	Grossly Overcontoured	Slightly Overcontoured	No Deviation	Slightly Undercontoured	Grossly Undercontoured
<i>Vestibular Contour of the Mucosa</i>	Grossly Overcontoured	Slightly Overcontoured	No Deviation	Slightly Undercontoured	Grossly Undercontoured

<i>ICAI</i>	5	1	0
<i>Colour and Translucency of the Crown</i>	Major Deviation	Minor Deviation	No Deviation
<i>Texture of the Crown</i>	Major Deviation	Minor Deviation	No Deviation
<i>Position of the Vestibular Margin of the Mucosa (3)</i>	Major Deviation	Minor Deviation	No Deviation
<i>Position of the Mucosa in the Proximal Spaces (4)</i>	Major Deviation	Minor Deviation	No Deviation
<i>Colour and Surface of the Mucosa (5)</i>	Major Deviation	Minor Deviation	No Deviation



The CIS index (Copenhagen Index Score) was proposed by Dueled and colleagues of the Dental School in Copenhagen in 2009. This index evaluates six parameters which are: crown morphology, crown colour match, symmetry / harmony, mucosal discoloration, mesial papilla and distal papilla. The crown morphology was assessed taking into account anatomy, surface texture, contours, prominences, contact points, crown length and crown width. Is classified as Excellent when has an optimal morphology according with the above-mentioned subparameters. Suboptimal when one or two subparameterers are not respected. Moderate when several subparameters are not respected. Poor when most of the subparameters are nor respected. The crown colour match was assessed according to hue, value, chroma and translucency. Excellent when not easy to distinguish from the natural tooth. Suboptimal when

is almost optimal but the reconstruction differed from the natural tooth. Moderate when the colour was suboptimal. Poor when the colour is very different from the natural tooth. Symmetry/harmony was assessed according to the facial midline, the tooth axis, the contralateral tooth and the smile line. The mucosal discoloration was Excellent when no mucosal discoloration was visible; Suboptimal when there is a greyish mucosal discoloration; Moderate when there is a distinct greyish mucosal discoloration; Poor when metal was visible. The mucosal papilla is evaluated using the papilla index (Jemt, 1997). Excellent when papilla filling the entire proximal space. Suboptimal when papilla filling at least half the proximal space. Moderate when filling less than half the proximal space. Poor when there is not papilla. These are classified as excellent, suboptimal, moderate and poor with a score of 1, 2, 3 and 4 respectively. Therefore, we can have a maximum score of 24 and minimum of 6. This index hasn't cut point (27). (Table IV)

Table IV Copenhagen Index Score (CIS)

CIS	1	2	3	4
<i>Crown Morphology (1)</i>	Excellent	Suboptimal	Moderate	Poor
<i>Crown Colour Match</i>	Excellent	Suboptimal	Moderate	Poor
<i>Symmetry/Harmony (2)</i>	Excellent	Suboptimal	Moderate	Poor
<i>Mucosal Discoloration (3)</i>	Excellent	Suboptimal	Moderate	Poor
<i>Mesial Papilla (4)</i>	Excellent	Suboptimal	Moderate	Poor
<i>Distal Papilla</i>	Excellent	Suboptimal	Moderate	Poor



2.4 Photo Analysis

The photographic analysis was performed by using Dentists / Stomatologists with formation (or dedicated practice) in different areas of Dentistry, students of Integrated Master in Dentistry, the Graduated Students of Dentistry Area of Faculty of Medicine University of Coimbra and dental technicians. The observers filled out a survey which consists in evaluation of aesthetics, according to the three objective indexes (PES/WES, ICAI and CIS), of clinical photographs printed in photographic paper in a 10x15cm format and colour. The duration of these evaluations was about ten minutes.

All patients selected to this study were draft through an online sorter (<http://www.sorteador.com.br/>) in order to select two patients to be evaluated by observers. Thus, patients numbered as five and twelve were selected. The clinical case #5 concerned to an implant single unit restoration in place of the tooth 23 and case #11 was related to a restoration in place of tooth 12. In both cases three photographs were chosen: two intraoral of the implant single unit restoration and the contralateral tooth and one of occlusal view of the restoration. In this photographs the implant supported crowns was identified with an arrows. (Annex 5 – Photo Analysis)

To all observers were explained (previously by the researchers) the objectives of the study and operation of each of the indexes used for the aesthetic evaluation of the restorations (Annex 6 – Explanation of the Indexes); this evaluation was made only once. The study design was double-blind, since the observers were unaware of the abutment material of the selected cases. These observers were selected taking into account their available for execution of the assessment.

2.5 Statistical Analysis

The statistical analysis was executed using a statistical software: IBM SPSS Statistics, Version 19 for Windows and SPSS Amos (Arbuckle, J. L. (2006). Amos (version 7.0) (Computer Program). Chicago: SPSS).

3. RESULTS

In this study, the investigator clinically assessed thirty patients who met the inclusion criteria and agreed to participate in this study, using three aesthetic indexes (PES/WES, ICAI e CIS indexes) and a total of twenty-five parameters.

The presence of peri-implantitis and/or significant marginal bone loss was not detected in any of the patients after clinical observation and performing periapical radiograph. The study group consists of 60% women (18) and 40% of men (12). In most cases the implant placement was in the central incisor (21 - FDI) and the most common abutment material used was titanium (56,7%). The remaining data is summarized in the tables and graphs below.

Figure 1 Gender Distribution

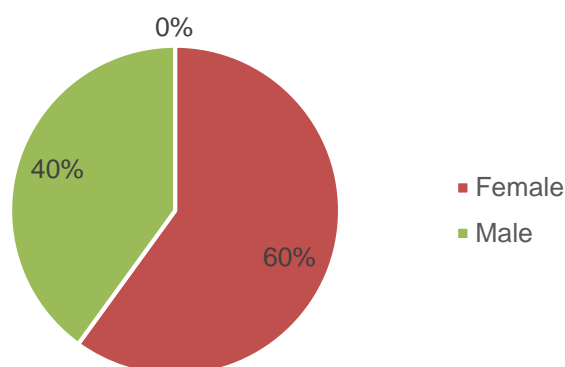


Figure 2 Lip Line Distribution

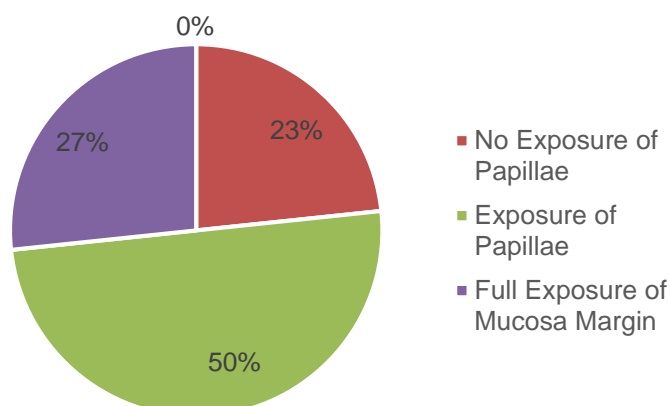
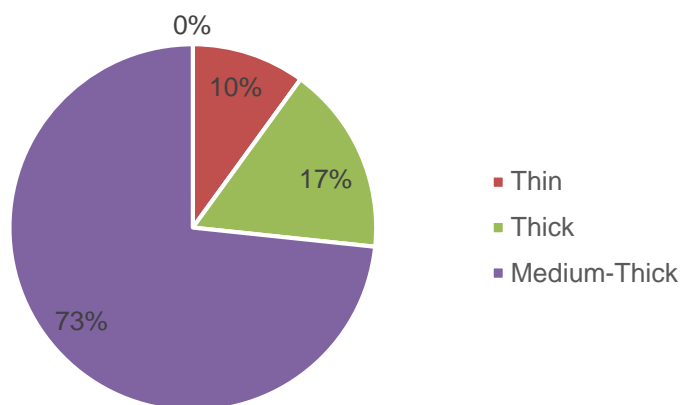
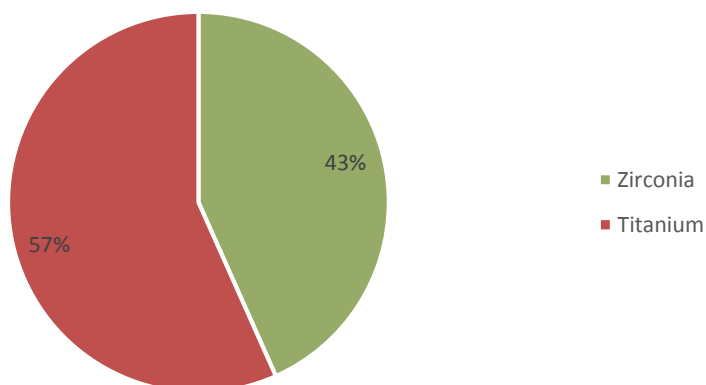


Figure 3 Gingival Biotype Distribution**Figure 4 Abutment Material Distribution****Table V Characteristics of the Study Group Concerning the Abutment Material**

	14	13	12	11	21	22	23	24	TOTAL
Zirconia	2 (6,7%)	0 (0%)	2 (6,7%)	1 (3,3%)	5 (16,7%)	2 (6,7%)	0 (0%)	1 (3,3%)	13 (43,4%)
Titanium	3 (10%)	1 (3,3%)	3 (10%)	2 (6,7%)	3 (10%)	2 (6,7%)	3 (10%)	0 (0%)	17 (56,7%)

Table VI Clinical Assessment

Patient	#1	#2	#3	#4	#5	#6	#7	#8
Implant Position	14	14	14	12	23	11	21	21
Abutment	Zirconia	Titanium	Titanium	Titanium	Titanium	Titanium	Titanium	Titanium
Crown	Ceramic	Metaloceramic	Metaloceramic	Metaloceramic	Metaloceramic	Metaloceramic	Metaloceramic	Metaloceramic
Retention	Cemented	Screwed	Cemented	Cemented	Cemented	Cemented	Screwed	Screwed
Year of Rehabilitation	2008	2006	2009	2008	2005	2011	2008	2008
Lip Line	Exposure of Papillae	Full Exposure of Mucosa Margin	No Exposure of Papillae	Exposure of Papillae	Exposure of Papillae	Exposure of Papillae	Exposure of Papillae	Exposure of Papillae
Gingival Biotype	Medium-Thick	Medium-Thick	Thick	Medium-Thick	Medium-Thick	Medium-Thick	Medium-Thick	Medium-Thick
BOP (Implant)	No	No	No	No	No	Yes	No	No
PD (Implant)	4 mm	2 mm	3 mm	4 mm	3 mm	3 mm	2 mm	2 mm
PES/WES (Clinical)	12	17	17	17	8	10	15	15
ICAI (Clinical)	3	3	8	6	15	21	9	9
CIS (Clinical)	9	7	8	7	17	14	10	10

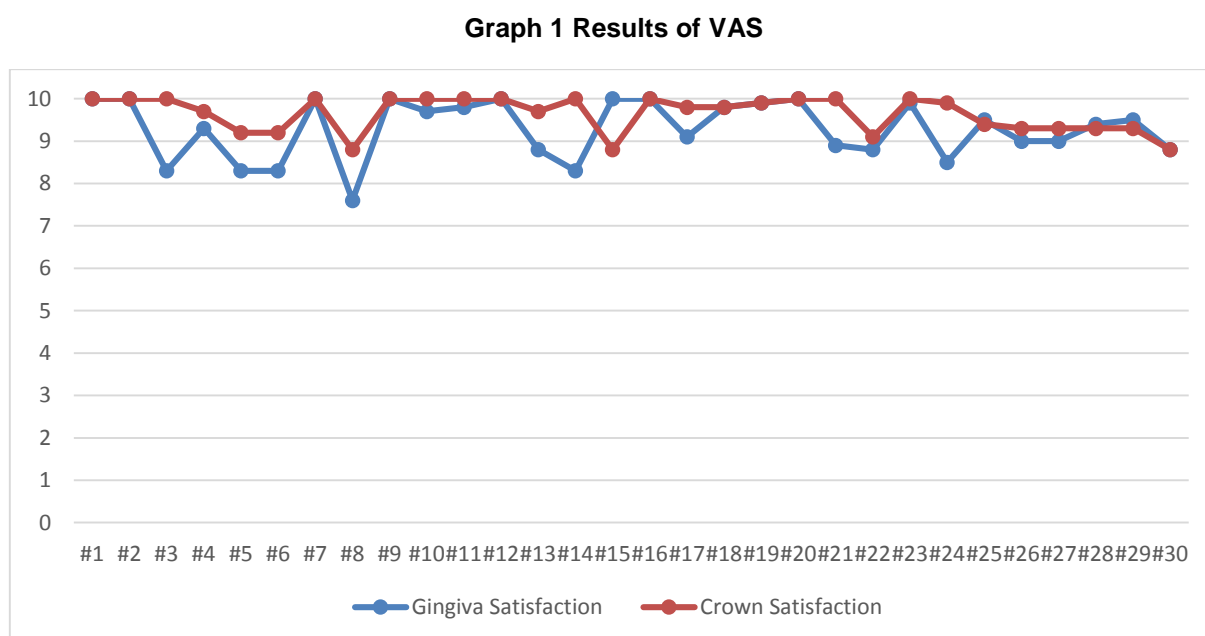
Patient	#9	#10	#11	#12	#13	#14	#15	#16
Implant Position	24	22	12	21	21	14	21	21
Abutment	Zirconia	Titanium	Titanium	Zirconia	Zirconia	Zirconia	Titanium	Zirconia
Crown	Ceramic	Metaloceramic	Metaloceramic	Ceramic	Ceramic	Ceramic	Metaloceramic	Ceramic
Retention	Screwed	Cemented	Cemented	Cemented	Cemented	Screwed	Cemented	Screwed
Year of Rehabilitation	2008	2010	2008	-	2011	2010	2012	-
Lip Line	Exposure of Papillae	Exposure of Papillae	No Exposure of Papillae	Full Exposure of Mucosa Margin	Exposure of Papilla	No Exposure of Papilla	Exposure of Papilla	Exposure of Papilla
Gingival Biotype	Medium-Thick	Medium-Thick	Medium-Thick	Thick	Medium-Thick	Thick	Medium-Thick	Medium-Thick
BOP (Implant)	No	Yes	No	Yes	No	No	No	No
PD (Implant)	3 mm	4 mm	3 mm	8 mm	2 mm	3 mm	2 mm	1 mm
PES/WES (Clinical)	18	10	13	19	17	18	15	19
ICAI (Clinical)	1	9	7	1	13	0	4	2
CIS (Clinical)	9	10	13	6	10	7	10	7

Patient	#17	#18	#19	#20	#21	#22	#23	#24
Implant Position	22	12	23	13	21	23	11	21
Abutment	Titanium	Zirconia	Titanium	Titanium	Titanium	Titanium	Titanium	Zirconia
Crown	Metaloceramic	Ceramic	Metaloceramic	Ceramic	Ceramic	Metaloceramic	Metaloceramic	Ceramic
Retention	Screwed	Screwed	Screwed	Cemented	Cemented	Screwed	Screwed	Screwed
Year of Rehabilitation	2015	2013	2013	2008	2008	2011	2014	2012
Lip Line	No Exposure of Papilla	Full Exposure of Mucosa Margin	Exposure of Papilla	Full Exposure of Mucosa Margin	Full Exposure of Mucosa Margin	Exposure of Papilla	Exposure of Papilla	Full Exposure of Mucosa Margin
Gingival Biotype	Medium-Thick	Medium-Thick	Medium-Thick	Medium-Thick	Medium-Thick	Medium-Thick	Thick	Thick
BOP (Implant)	No	Yes	Yes	Yes	No	No	Yes	No
PD (Implant)	1 mm	3 mm	1 mm	2 mm	2 mm	2 mm	5 mm	3 mm
PES/WES (Clinical)	16	11	14	17	13	15	16	12
ICAI (Clinical)	6	8	6	2	5	8	6	5
CIS (Clinical)	10	13	13	10	11	15	13	9

Patient	#25	#26	#27	#28	#29	#30
Implant Position	14	11	21	12	22	22
Abutment	Titanium	Zirconia	Zirconia	Zirconia	Zirconia	Zirconia
Crown	Metaloceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
Retention	Cemented	Cemented	Cemented	Cemented	Cemented	Screwed
Year of Rehabilitation	2010	2010	2010	2010	2010	2014
Lip Line	Exposure of Papilla	Full Exposure of Mucosa Margin	Full Exposure of Mucosa Margin	No Exposure of Papilla	No Exposure of Papilla	Exposure of Papilla
Gingival Biotype	Medium-Thick	Medium-Thick	Medium-Thick	Thin	Thin	Thin
BOP (Implant)	No	No	Yes	Yes	Yes	No
PD (Implant)	2 mm	2 mm	2 mm	2 mm	3 mm	1 mm
PES/WES (Clinical)	11	14	15	16	18	10
ICAI (Clinical)	7	9	4	1	2	7
CIS (Clinical)	10	10	9	10	9	16

3.1 Patient Satisfaction

A questionnaire was used to evaluate patient satisfaction with the aspects of the gingiva and crown. The results obtained show that over 70% (mean score of 93%) of the patients reported satisfaction with the aspect of the gingiva and over 80% (mean score of 96%) showed satisfaction with the aspect of the crown. (Graph 1) The patients who participated in this study can repeat the treatment if necessary and would recommend it to others.



3.2 Patients Selected for Photographic Analysis

We randomly selected 2 cases of the thirty cases that were evaluated by 77 external observers to study. These external observers are of various fields of dentistry including Dental Technicians, Periodontologists, Orthodontists, Prosthodontists, Operative Dentistry/Endodontics, Students in their 4th and 5th year. They were distributed into 7 groups, with a total of 11 elements in each.

Table VII Patient #5

Patient	I.M.P.
Implant Position	23
Abutment	Titanium
Crown	Metaloceramic
Retention	Cemented
Year of Rehabilitation	2005
Lip Line	Exposure of Papillae
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	3 mm
PES/WES (Clinical)	8
ICAI (Clinical)	15
CIS (Clinical)	17
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	8.3/9.2



Table VIII Comparison of the mean score of the evaluation by observers according to aesthetic indexes (Patient #5)

	PES/WES	ICAI	CIS
Dental Technicians	6,64±1,57	16,91±4,66	18,82±2,04
Periodontologists	7,91±4,30	15,55±7,48	18,27±3,10
Orthodontists	8,55±3,86	15,36±7,87	17,09±2,84
Prosthodontists	7,73±2,69	13,36±5,61	17,73±3,20
OD/Endo	7,45±2,46	18,27±9,07	17,36±3,33
Students of 4th Year	8,09±4,18	17,73±11,76	18,09±5,05
Students of 5th Year	9,09±3,86	17,45±9,76	18,09±2,81

Table IX Most frequent assessment regarding each aesthetic parameter (Patient #5)

PES/WES		
Distal Papilla	Incomplete	80,5%
Mesial Papilla	Incomplete	76,6%
Crown Form	Major Discrepancy	54,5%
Surface Characterization	Minor Discrepancy	53,2%
Root Convexity/Soft Tissue Colour and Texture	Minor Discrepancy	51,9%
Crown Colour	Minor Discrepancy	49,4%
Level of the Facial Mucosa	Major Discrepancy	48,1%
Translucency	Minor Discrepancy	48,1%
Curvature of the Facial Mucosa	Major Discrepancy	46,8%
Crown Volume	Minor Discrepancy	46,8%
ICAI		
Position of the Mucosa in the Proximal Spaces	Major Deviation	58,4%
Mesiodistal Dimension of the Crown	Slightly Overcontoured	54,5%
Colour and Surface of the Mucosa	Minor Deviation	53,2%
Position of the Incisal Edge	Slightly Undercontoured	51,9%
Vestibular Contour of the Mucosa	Slightly Undercontoured	51,9%
Colour and Translucency of the Crown	Minor Deviation	50,6%
Texture of the Crown	Minor Deviation	48,1%
Position of the Vestibular Margin of the Mucosa	Major Deviation	48,1%
Labial Convexity of the Crown	No Deviation	45,5%
CIS		
Mesial Papilla	Poor	59,7%
Distal Papilla	Moderate	53,2%
Mucosal Discoloration	Moderate	53,2%
Crown Morphology	Moderate	44,2%
Symmetry/Harmony	Moderate	41,6%
Crown Colour Match	Moderate	39,0%

Table X Patient #11

Patient	P.C.P.
Implant Position	12
Abutment	Titanium
Crown	Metaloceramic
Retention	Cemented
Year of Rehabilitation	2008
Lip Line	No Exposure of Papillae
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	3 mm
PES/WES (Clinical)	13
ICAI (Clinical)	7
CIS (Clinical)	13
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	9.8/10



Table XI Comparison of the mean score of the evaluation by observers according to aesthetic indexes (Patient #11)

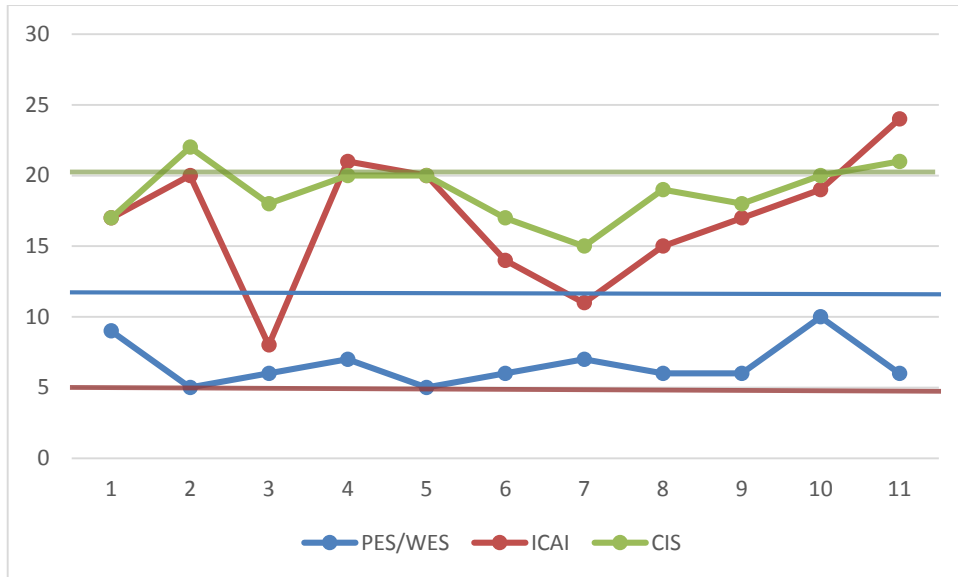
	PES/WES	ICAI	CIS
Dental Technicians	12,00±2,83	9,09±4,30	15,73±3,00
Periodontologists	12,09±2,88	7,91±5,59	14,09±3,18
Orthodontists	13,45±3,11	6,27±3,13	13,73±3,88
Prosthodontists	13,45±3,17	8,36±4,23	14,09±3,27
OD/Endo	12,45±2,77	7,82±4,90	13,82±2,93
Students of 4th Year	12,27±2,80	8,00±4,07	13,73±3,32
Students of 5th Year	12,55±3,70	6,82±3,40	14,91±3,96

Table XII Most frequent assessment regarding each aesthetic parameter (Patient #11)

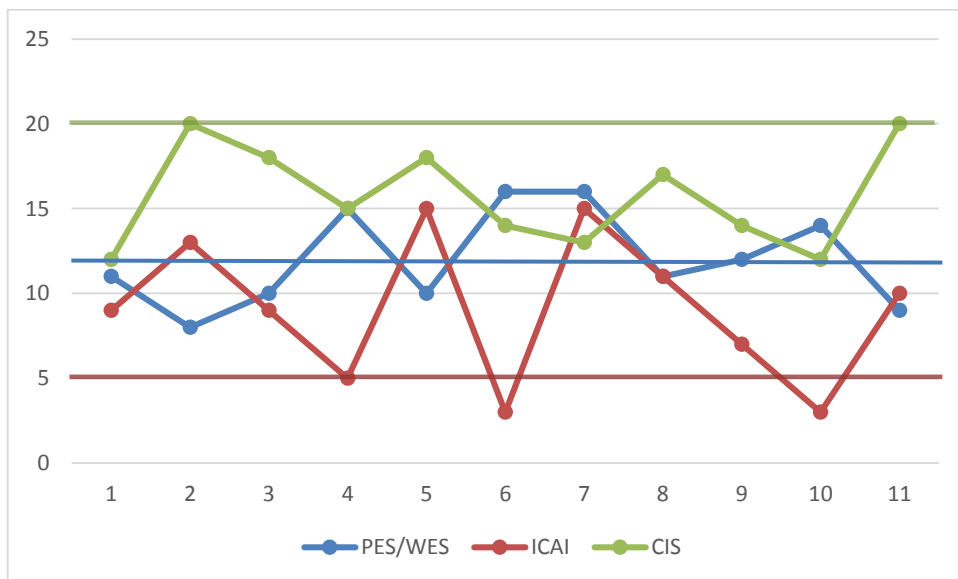
PES/WES		
Distal Papilla	Complete	83,1%
Curvature of the Facial Mucosa	Minor Discrepancy	81,8%
Level of the Facial Mucosa	Minor Discrepancy	64,9%
Root Convexity/Soft Tissue Colour and Texture	Minor Discrepancy	64,9%
Translucency	No Discrepancy	62,3%
Crown Colour	No Discrepancy	59,7%
Crown Form	Minor Discrepancy	59,7%
Surface Characterization	Minor Discrepancy	58,4%
Mesial Papilla	Incomplete	57,1%
Crown Volume	Minor Discrepancy	46,8%
ICAI		
Position of the Incisal Edge	No Deviation	76,6%
Colour and Translucency of the Crown	Minor Deviation	58,4%
Position of the Vestibular Margin of the Mucosa	Minor Deviation	57,1%
Labial Convexity of the Crown	No Deviation	53,2%
Position of the Mucosa in the Proximal Spaces	Minor Deviation	53,2%
Texture of the Crown	Minor Deviation	53,2%
Colour and Surface of the Mucosa	Minor Deviation	49,4%
Mesiodistal Dimension of the Crown	Slightly Undercontoured	49,4%
Vestibular Contour of the Mucosa	Slightly Undercontoured	42,9%
CIS		
Mesial Papilla	Poor	70,1%
Mucosal Discoloration	Suboptimal	50,6%
Crown Morphology	Suboptimal	46,8%
Distal Papilla	Suboptimal	46,8%
Crown Colour Match	Excellent	40,3%
Symmetry/Harmony	Suboptimal	39,0%

3.3 Observers Ratings

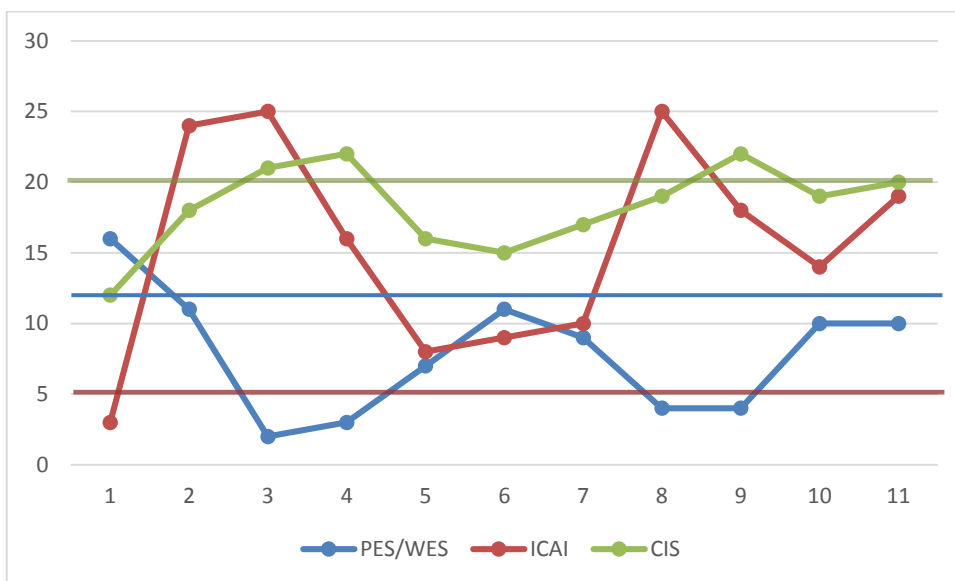
Graph 2 Aesthetic Assessment by Dental Technicians (Patient #5)



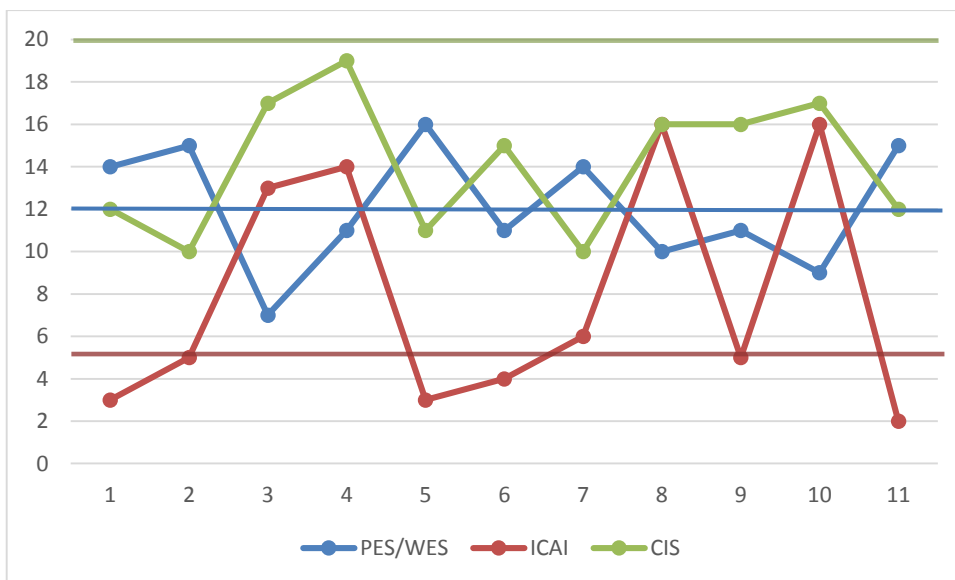
Graph 3 Aesthetic Assessment by Dental Technicians (Patient #11)



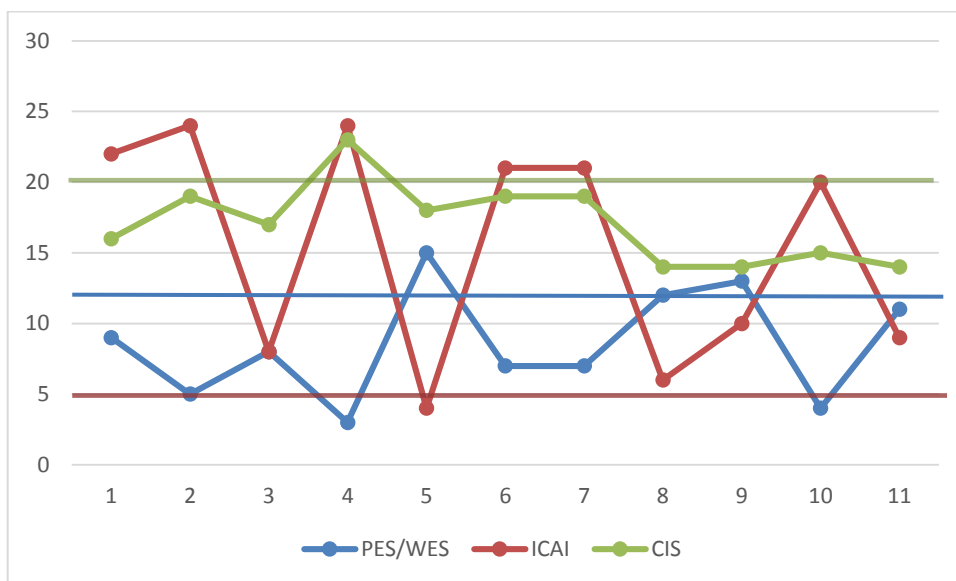
Graph 4 Aesthetic Assessment by Periodontologists (Patient #5)



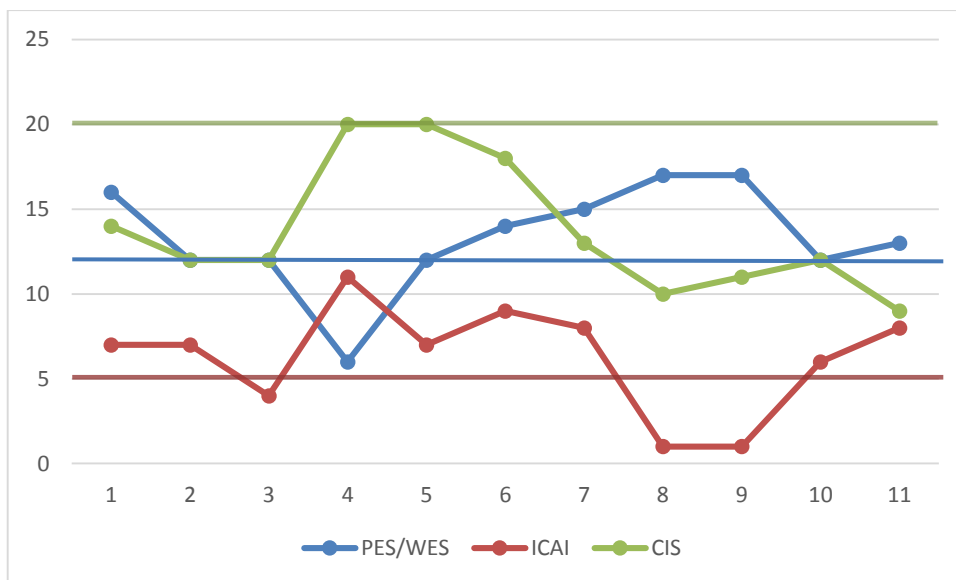
Graph 5 Aesthetic Assessment by Periodontologists (Patient #11)



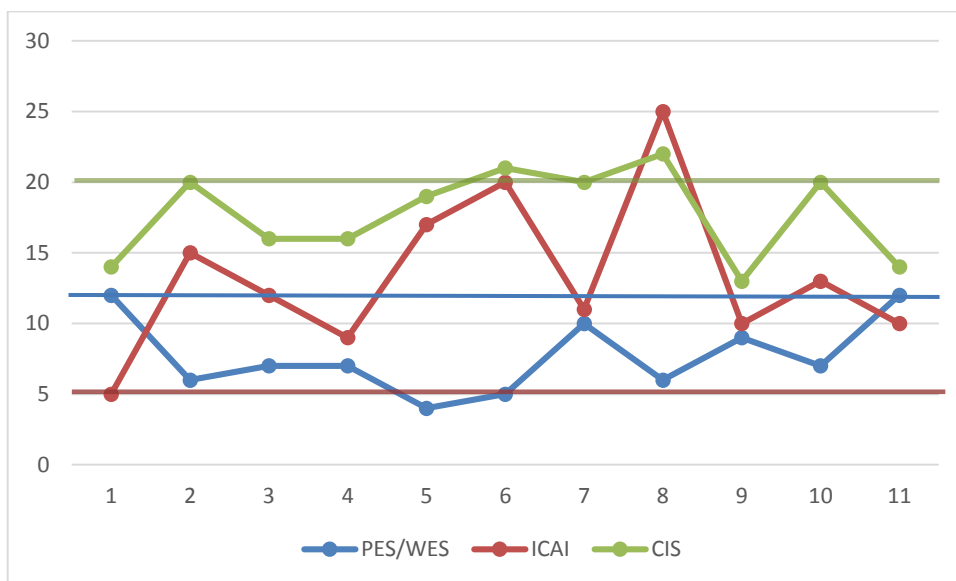
Graph 6 Aesthetic Assessment by Orthodontists (Patient #5)



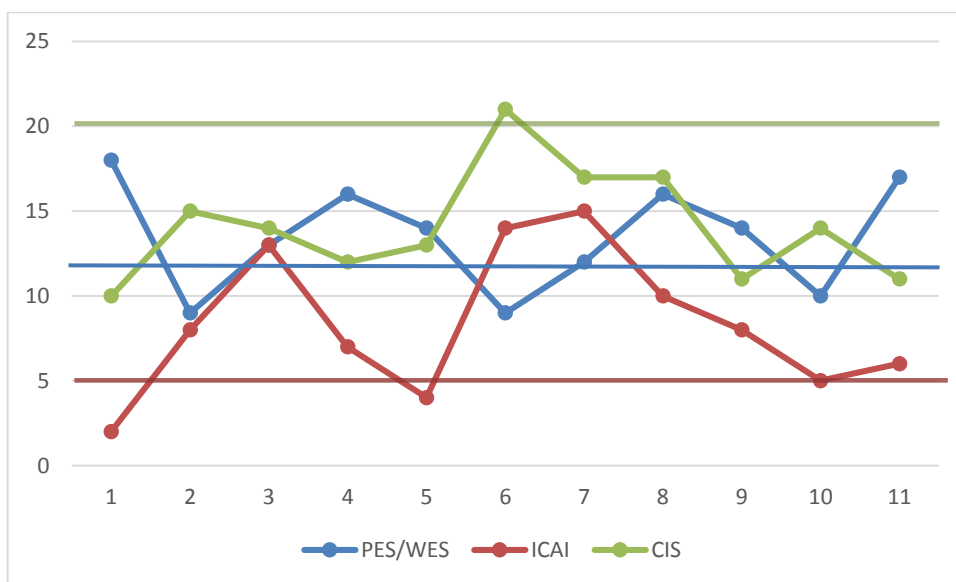
Graph 7 Aesthetic Assessment by Orthodontists (Patient #11)



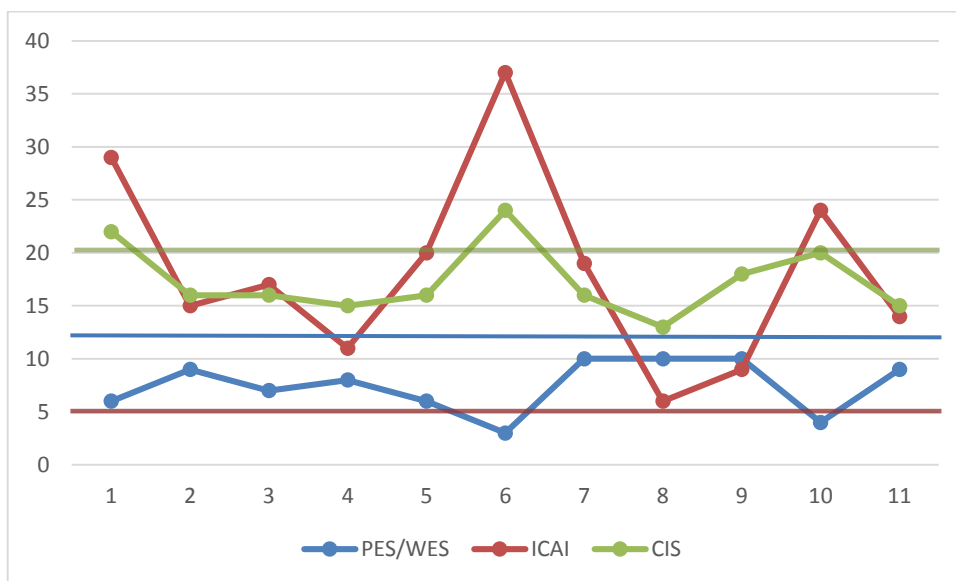
Graph 8 Aesthetic Assessment by Prosthodontists (Patient #5)



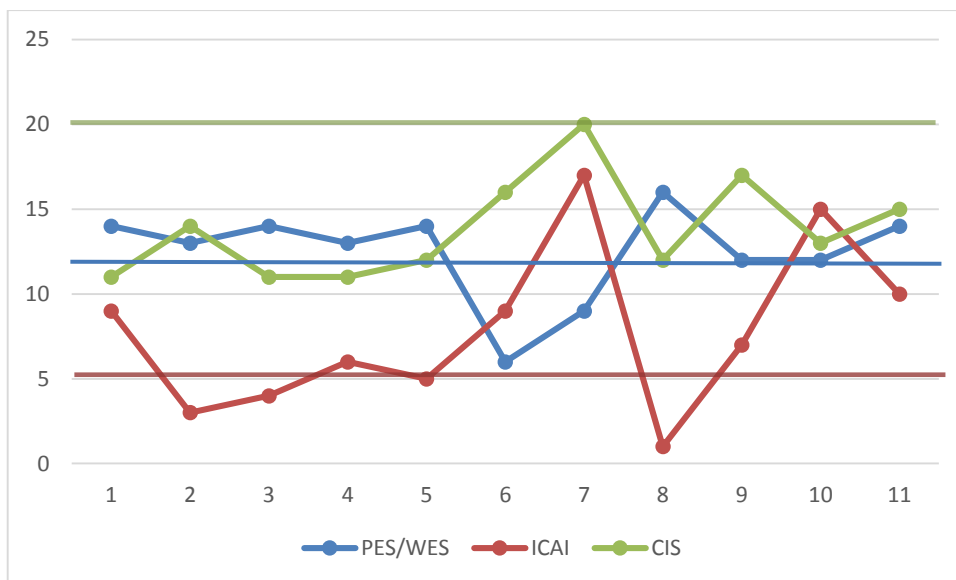
Graph 9 Aesthetic Assessment by Prosthodontists (Patient #11)



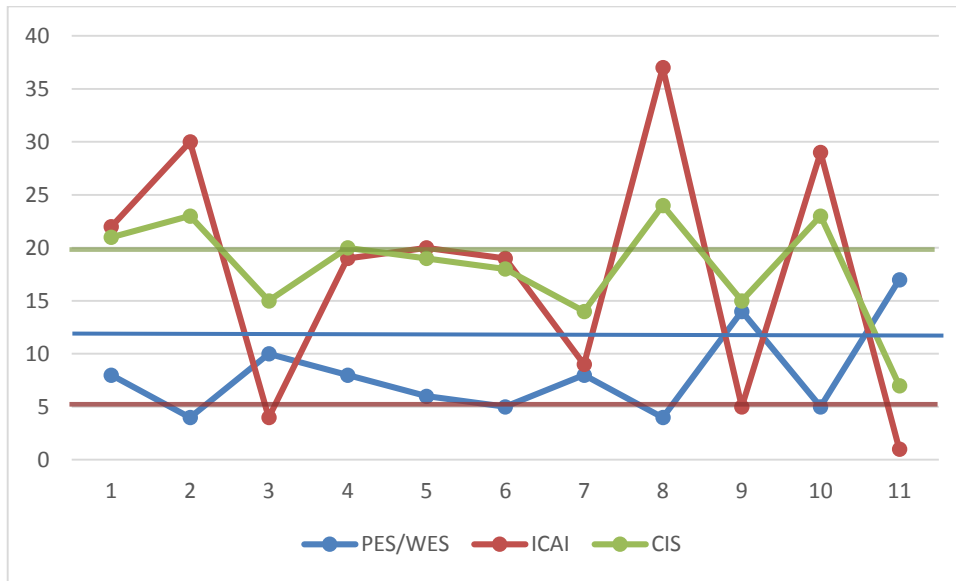
Graph 10 Aesthetic Assessment by OD/Endo (Patient #5)



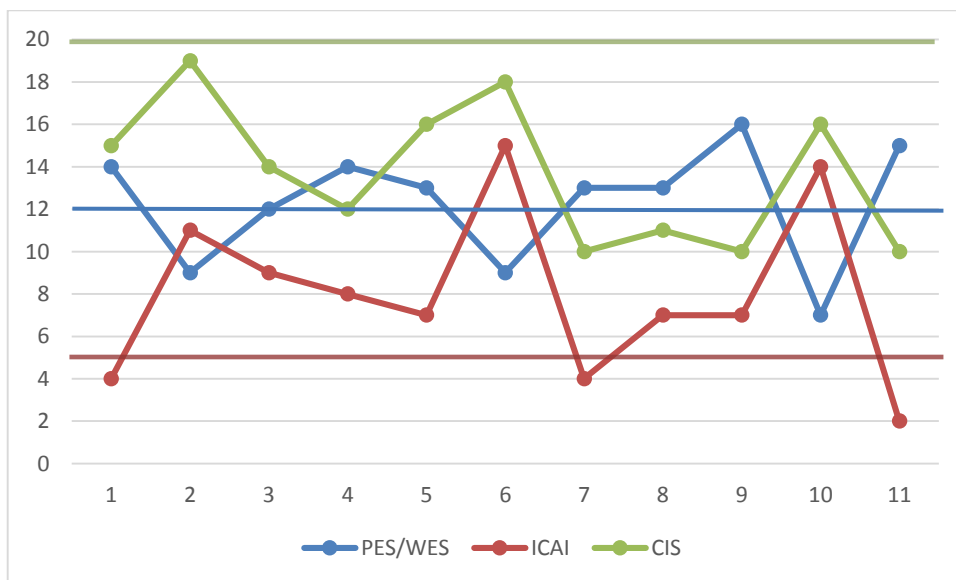
Graph 11 Aesthetic Assessment by OD/Endo (Patient #11)



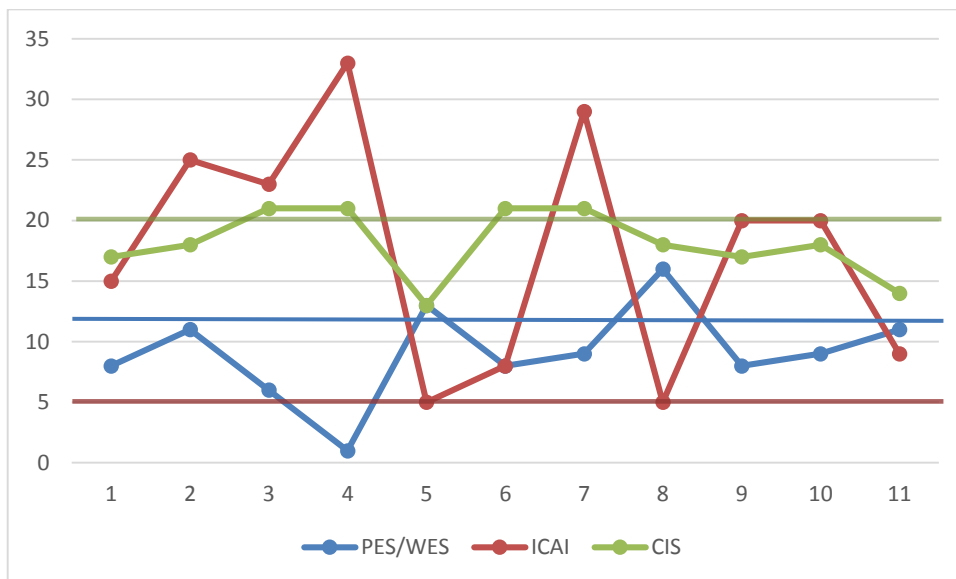
Graph 12 Aesthetic Assessment by Students of 4th Year (Patient #5)



Graph 13 Aesthetic Assessment by Students of 4th Year (Patient #11)



Graph 14 Aesthetic Assessment by Students of 5th Year (Patient #5)



Graph 15 Aesthetic Assessment by Students of 5th Year (Patient #11)

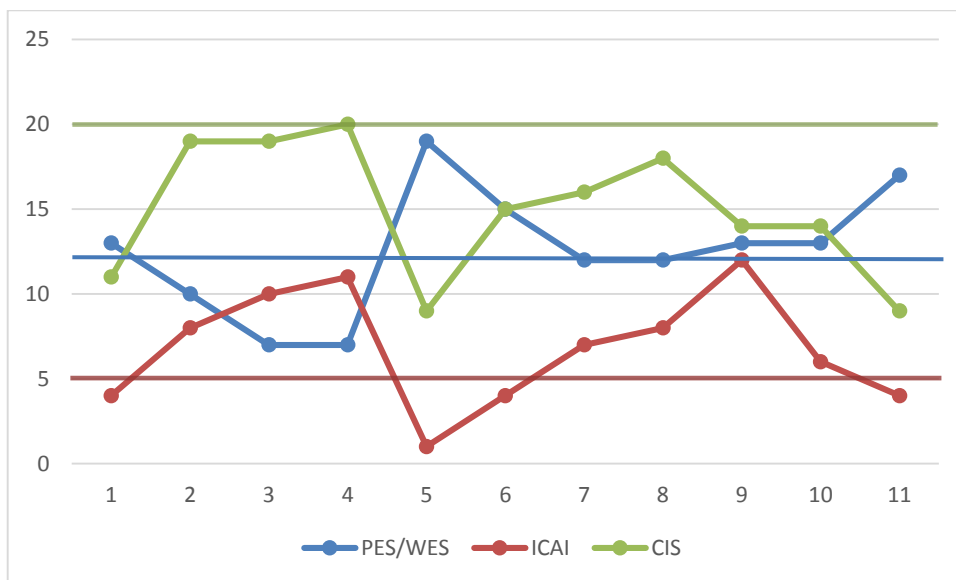


Table XIII Cronbach's Alpha

	PES/WES	ICAI	CIS
Dental Technicians	0,721	0,556	0,744
Periodontologists	0,841	0,774	0,837
Orthodontists	0,832	0,714	0,831
Prosthodontists	0,827	0,462	0,786
OD/Endo	0,789	0,782	0,811
Students of 4th Year	0,812	0,804	0,897
Students of 5th Year	0,808	0,841	0,851

The majority of the groups used in this study had a good Cronbach's alpha value therefore having a good internal consistency score. However, the lower values were observed within the Dental Technicians. The ICAI in Dental Technicians and Prosthodontists has shown poor consistency, therefore it is not the most suitable index to be used by them. CIS is the index that can be used for all groups because it showed the largest Cronbach's α value. (Table XIII)

Table XIV Cronbach' Alpha without some parameters

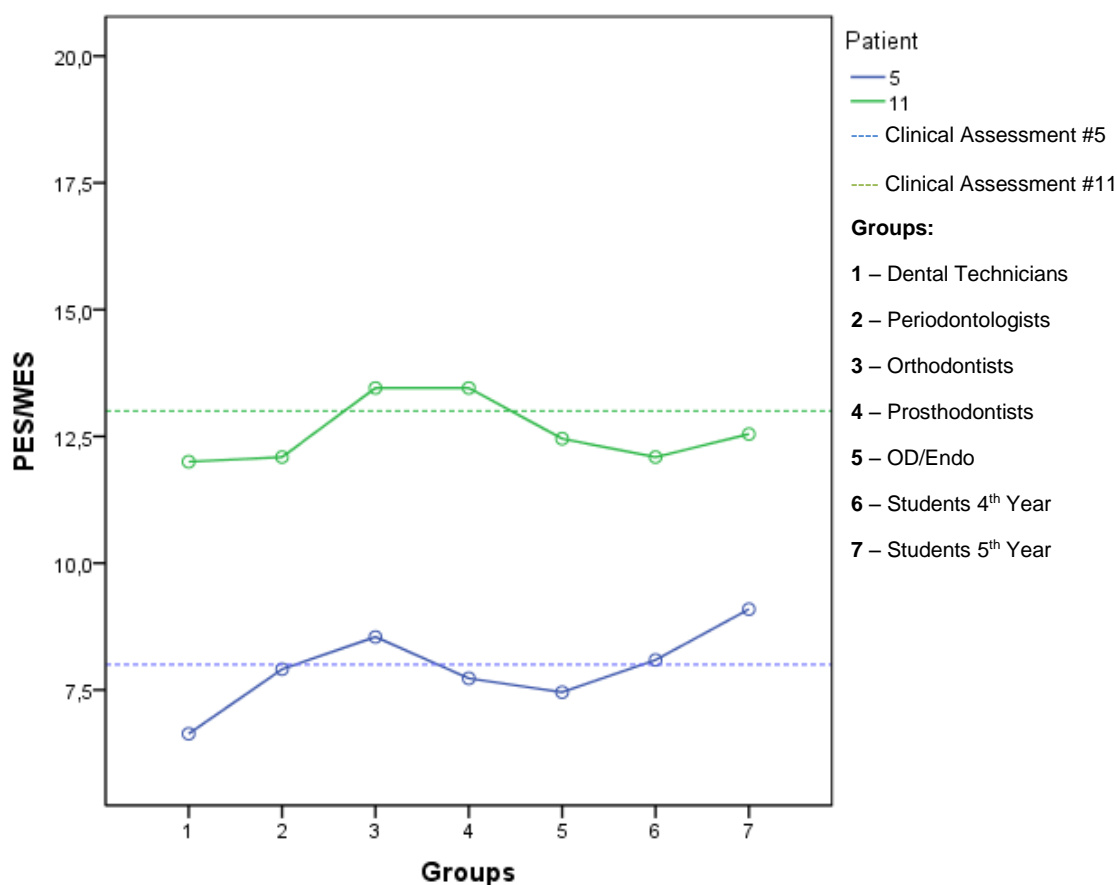
	PES/WES	ICAI	CIS
Dental Technicians	Without Mesial Papilla 0,753	Without Position of the Vestibular Margin of the Mucosa 0,605	Without Mesial Papilla 0,843
Periodontologists	Without Crown Volume 0,851	Without Labial Convexity of the Crown 0,795	Without Distal Papilla 0,853
Orthodontists	Without Mesial Papilla 0,864	Without Position of the Mucosa in the Proximal Spaces 0,751	Without Mesial Papilla 0,840
Prosthodontists	Without Mesial Papilla 0,865	Without Colour and Surface of the Mucosa 0,409	Without Mesial Papilla 0,833
OD/Endo	Without Mesial Papilla 0,830	Without Vestibular Contour of the Mucosa 0,795	Without Mesial Papilla 0,845
Students of 4th Year	Without Mesial Papilla 0,842	Without Colour and Surface of the Mucosa 0,800	Without Mesial Papilla 0,909
Students of 5th Year	Without Root Convexity/Soft Tissue Colour and Texture 0,826	Without Labial Convexity of the Crown 0,851	-

The evaluation of mesial papilla was the parameter that raised the most doubts among observers in the PES/WES and the CIS. In the ICAI it was labial convexity of the crown as well as the colour and surface of the mucosa. If we eliminate these parameters we could set a higher value of Cronbach's alpha, thus having a greater internal consistency. (Table XIV)

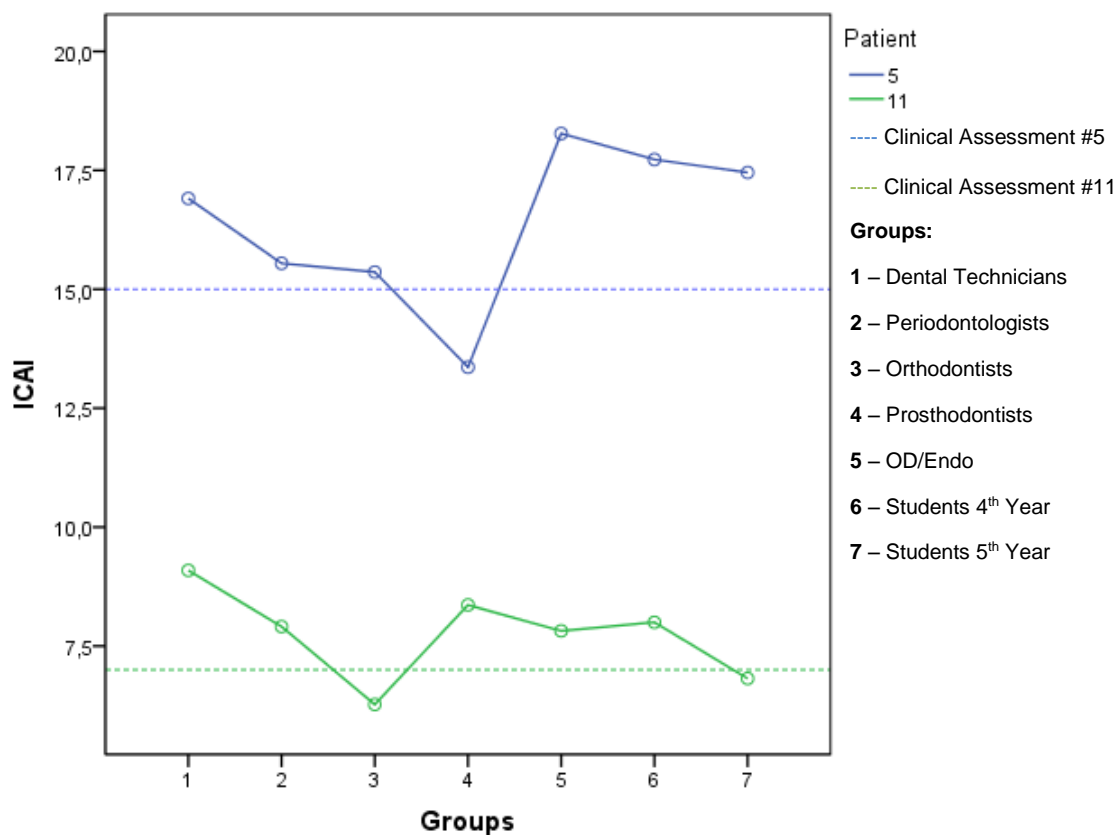
3.4 Clinical Analysis VS Observers Ratings

The graphs below show the evaluation of the relationship between clinical analysis by the investigator and the analysis of photographs made by the observers. They relate to an average score of aesthetic indexes of each group of observers with the clinical evaluation. (Graph 16, Graph 17 and Graph 18)

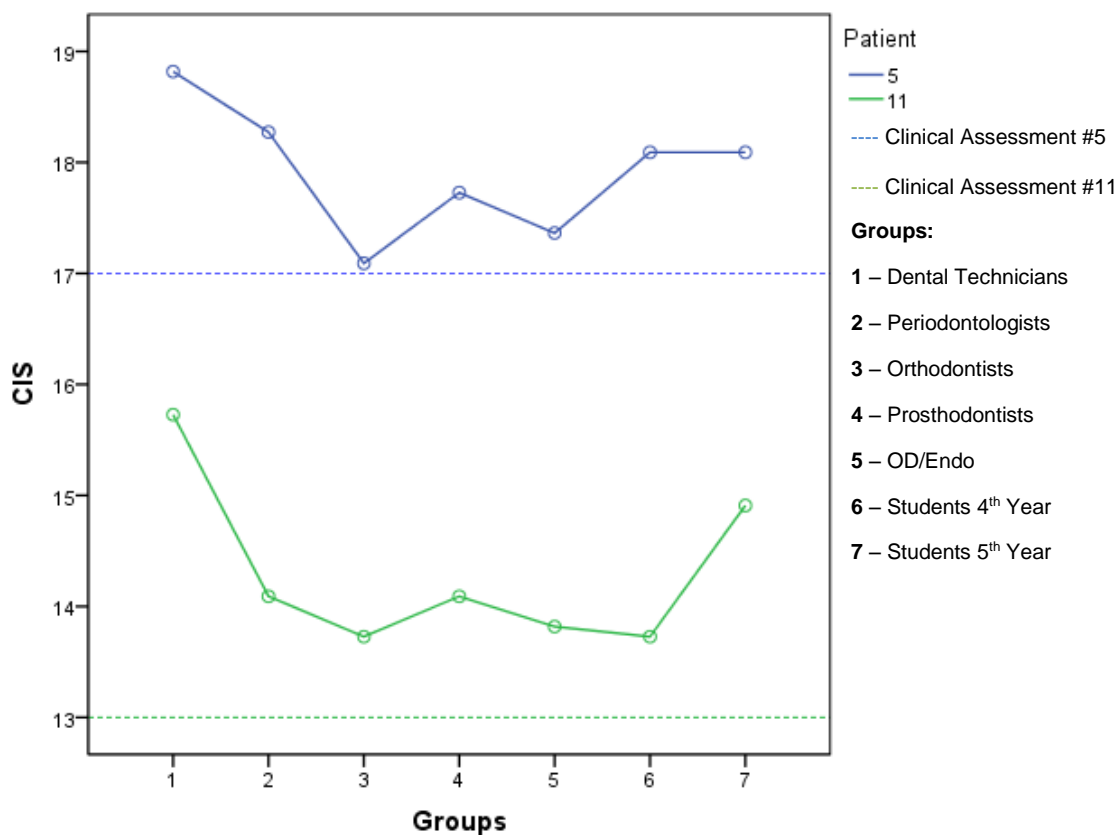
Graph 16 Clinical Assessment and Evaluation of Groups (PES/WES)



According to the clinical evaluation made on patient #5, the PES/WES index showed a value of 8. As a result, the periodontologists (7.91) and students of 4th year (8.09) were the ones who were closer to this score. With regard to patient #11 investigator assigned a score of 13 to the restoration based on the PES/WES index. The students of 5th year (12.55), the orthodontists (13.45) and the prosthodontists (13.45) were the ones who were closer to this score.

Graph 17 Clinical Assessment and Evaluation of Groups (ICAI)

With regard to the ICAI in clinical analysis, the investigator attributed patient #5 a score of 15 and thus, the periodontologists (15.55) and the orthodontists (15.36) were the ones who were closer to this value. The restoration on patient #11 had a score of 7 attributed by clinical analysis, students of 5th year (6.82) and orthodontists (6.27) with the closest value.

Graph 18 Clinical Assessment and Evaluation of Groups (CIS)

In the assessment made on the restoration of patient #5 with CIS, the investigator assigned a score of 17. So the orthodontists (17.09) and OD / Endo (18.27) have come closer to this value. Regarding the restoration made on patient #11, it was evaluated with a score of 13 thus, the orthodontists (13.73) and the students of 4th year (13.73) were the ones who were closer to the value of clinical analysis.

With this assessment PES/WES demonstrated the closest values to clinical analysis.

3.5 Calculating the Cut-Point of CIS Index

As the CIS has no cut-point, using Fisher's formula (33) and making reference to the PES/WES, an experimental cut-point was calculated. Therefore, it was possible to compare the indexes used in this study.

$$P = \frac{(\bar{x}1 + S1) + (\bar{x}2 + S2)}{2}$$

$\bar{x}1$ – Mean of “Aesthetic” and “Poor Aesthetic” restorations in PES / WES

$\bar{x}2$ – Mean of “Poor Aesthetic restorations in PES/WES”

S1- Standard deviation of “Aesthetic” and “Poor Aesthetic” restorations in PES/WES

S2 – Standard deviation of “Poor Aesthetic” restorations in PES/WES

$\bar{x}1 < \bar{x}2$

Table XV Mean Score PES/WES

PES/WES	Mean Score
Aesthetic	12,36±2,697
Poor Aesthetic	17,80±2,926
Total	15,97±3,834

$$P = \frac{(15,97 + 3,834) + (17,80 + 2,926)}{2}$$

$$P = 20,26$$

$$P = 20$$

Table XVI Cut-Points

PES/WES ≥ 12	Aesthetic
ICAI < 5	Aesthetic
CIS < 20	Aesthetics

3.6 Comparison Between Indexes

Accuracy lets one know if the assessment is close to its true value. This gives us the precision of the assessments on what is aesthetic and not aesthetic (True Positives and Negatives True). In the following tables, one can see the distribution of accuracy values. (Table XVII, Table XVIII and Table XIX)

Table XVII Comparison Between Aesthetic Outcome (Evaluation of Groups) - Accuracy: PES/WES ICAI

		<i>PES/WES</i>						
		1	2	3	4	5	6	7
<i>ICAI</i>	1	84%	64%	68%	59%	59%	50%	73%
	2	68%	86%	64%	73%	73%	64%	77%
	3	64%	55%	68%	77%	68%	59%	64%
	4	73%	82%	59%	77%	77%	68%	54%
	5	68%	68%	55%	73%	82%	55%	50%
	6	78%	77%	64%	64%	64%	73%	39%
	7	73%	82%	68%	77%	77%	68%	83%

1 – Dental Technicians; 2 – Periodontologists; 3 – Orthodontists; 4 – Prosthodontists; 5 – OD/Endo;
6 – Students 4th Year; 7 – Students 5th Year

Table XVIII Comparison Between Aesthetic Outcome (Evaluation of Groups) - Accuracy: PES/WES CIS

		<i>PES/WES</i>						
		1	2	3	4	5	6	7
<i>CIS</i>	1	50%	41%	55%	55%	45%	55%	50%
	2	50%	45%	50%	50%	50%	41%	62%
	3	23%	32%	55%	27%	27%	36%	41%
	4	36%	55%	59%	59%	59%	68%	45%
	5	27%	27%	50%	50%	50%	50%	55%
	6	41%	41%	64%	55%	55%	64%	50%
	7	32%	50%	64%	45%	45%	55%	59%

1 – Dental Technicians; 2 – Periodontologists; 3 – Orthodontists; 4 – Prosthodontists; 5 – OD/Endo;
6 – Students 4th Year; 7 – Students 5th Year

**Table XIX Comparison Between Aesthetic Outcome (Evaluation of Groups) - Accuracy: ICAI
CIS**

		ICAI						
		1	2	3	4	5	6	7
CIS	1	41%	45%	41%	41%	36%	36%	41%
	2	27%	41%	36%	27%	32%	23%	36%
	3	23%	27%	32%	14%	27%	36%	23%
	4	27%	41%	45%	36%	41%	50%	36%
	5	27%	32%	36%	27%	32%	32%	36%
	6	32%	36%	41%	32%	36%	45%	41%
	7	32%	45%	41%	32%	36%	36%	41%

1 – Dental Technicians; 2 – Periodontologists; 3 – Orthodontists; 4 – Prosthodontists; 5 – OD/Endo;
6 – Students 4th Year; 7 – Students 5th Year

The comparison between the aesthetic indexes used in this study was made using the calculation of Cohen's k that determines the correlation between them. Landis and Koch (1977) proposed the following agreement graduation:

Agreement graduation of k coefficients

(Landis and Koch, 1997)

< 0	Poor
0 – 0.2	Slight
0.21 – 0.4	Fair
0.41 – 0.6	Moderate
0.61 – 0.8	Substantial
0.81 - 1	Almost Perfect

**Table XX Comparison Between Aesthetic Outcome (Evaluation of Groups) – Cohen’s k:
PES/WES ICAI**

PES/WES

		1	2	3	4	5	6	7
ICAI	1	Substantial	Poor	Fair	Poor	Poor	Poor	Fair
	2	Fair	Substantial	Slight	Fair	Fair	Slight	Moderate
	3	Poor	Poor	Fair	Moderate	Slight	Slight	Slight
	4	Poor	Moderate	Slight	Fair	Fair	Fair	Fair
	5	Poor	Slight	Poor	Fair	Moderate	Poor	Poor
	6	Slight	Fair	Slight	Slight	Slight	Fair	Slight
	7	Slight	Moderate	Fair	Moderate	Moderate	Fair	Moderate

1 – Dental Technicians; 2 – Periodontologists; 3 – Orthodontists; 4 – Prosthodontists; 5 – OD/Endo;
6 – Students 4th Year; 7 – Students 5th Year

**Table XXI Comparison Between Aesthetic Outcome (Evaluation of Groups) – Cohen’s k:
PES/WES CIS**

PES/WES

		1	2	3	4	5	6	7
CIS	1	Slight	Poor	Slight	Slight	Slight	Slight	Slight
	2	Slight	Slight	Slight	Slight	Slight	Poor	Fair
	3	Poor	Poor	Slight	Poor	Poor	Poor	Slight
	4	Slight	Fair	Fair	Fair	Fair	Moderate	Slight
	5	Poor	Poor	Slight	Slight	Slight	Slight	Fair
	6	Slight	Slight	Fair	Fair	Fair	Fair	Slight
	7	Slight	Slight	Fair	Slight	Slight	Slight	Fair

1 – Dental Technicians; 2 – Periodontologists; 3 – Orthodontists; 4 – Prosthodontists; 5 – OD/Endo;
6 – Students 4th Year; 7 – Students 5th Year

**Table XXII Comparison Between Aesthetic Outcome (Evaluation of Groups) – Cohen's k: ICAI
CIS**

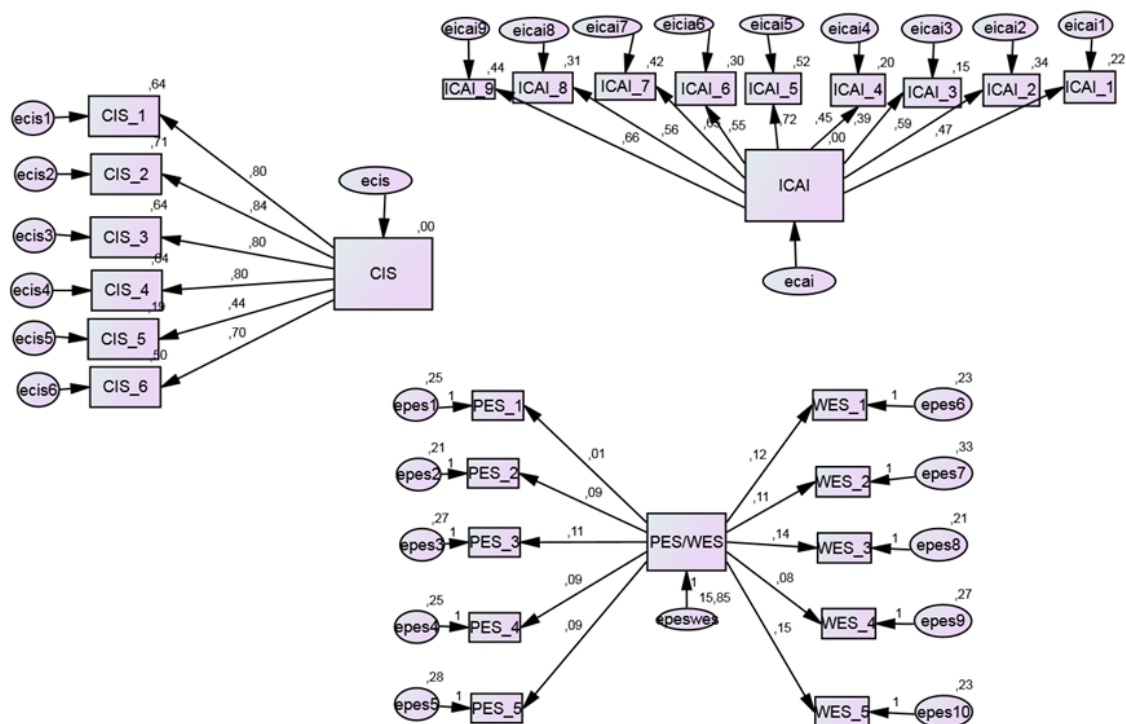
		ICAI						
		1	2	3	4	5	6	7
CIS	1	Slight	Slight	Slight	Slight	Poor	Poor	Slight
	2	Slight	Slight	Slight	Slight	Slight	Poor	Slight
	3	Slight	Poor	Slight	Poor	Slight	Slight	Poor
	4	Poor	Slight	Slight	Slight	Slight	Slight	Slight
	5	Slight	Poor	Slight	Slight	Slight	Poor	Slight
	6	Slight	Slight	Slight	Slight	Slight	Slight	Slight
	7	Slight	Slight	Slight	Slight	Slight	Slight	Slight

1 – Dental Technicians; 2 – Periodontologists; 3 – Orthodontists; 4 – Prosthodontists; 5 – OD/Endo;
6 – Students 4th Year; 7 – Students 5th Year

The comparison made between the indexes, based on the value of accuracy and Cohen' k, showed the highest correlation between the PES/WES and ICAI and the lowest correlation between the ICAI and the CIS. However, all indexes are very poor in precision. The internal consistency of each index was also calculated and it showed that the CIS has good internal consistency (Cronbach's $\alpha = 0.83$), followed by PES/WES (Cronbach's $\alpha = 0.81$) and finally ICAI (Cronbach's $\alpha = 0.73$).

3.7 – Aesthetic Predictive Factors

Diagram 1 Impact of the Parameters on the Final Score of the Indexes



These three path analysis allowed one to see which one contributed the most to each index. With the ICAI, the colour and translucency of the crown (0.52) was what influenced the index; with the CIS, crown colour match was the most determinant factor (0.71); with the PES/WES, crown volume (0.33) and root convexity/soft tissue colour and texture (0.28) were the most determinant factors. (Diagram 1)

3.8 – Aesthetic Outcome of Zirconia and Titanium Abutments

A comparison was made with scores obtained in 30 clinical assessments between titanium and zirconia abutments. They were classified as having an "Aesthetic" or "Poor Aesthetic" appearance according to the cut-point of the various indices used in this study. The CIS was not used in this comparison since in the experimental cut-point, all restorations were considered aesthetics.

As shown in the table below, the PES/WES and ICAI show that restorations made with zirconia abutments achieved the best aesthetic results while the worst results were obtained using titanium abutments. (Table XXIII)

Table XXIII Comparison Between Zirconia and Titanium

		Abutment Material			
		Zirconia		Titanium	
		n	%	n	%
<i>PES/WES</i>	Poor Aesthetic	2	28,6	5	71,4
	Aesthetic	11	47,8	12	52,2
<i>ICAI</i>	Poor Aesthetic	4	25,0	12	75,0*
	Aesthetic	9	64,3*	5	35,7

*The chi-square statistic is significant at the 0.05 level

4. DISCUSSION

Aesthetic outcomes are very important in anterior implant restorations. In addition to osseointegration aesthetics should also be included as a criterion of success of such restorations. But the analysis of this parameter should take into account not only the crown but also the adjacent soft tissues. The aesthetic evaluation is done using objective indexes, such as PES/WES, ICAI and CIS. However, the literature is still scarce on this subject. In addition to this objective assessment, it is also important to consider the patient's opinion. (subjective assessment).

Patient Satisfaction

All patients showed extreme satisfaction with the restoration (93% aspect of the gingiva; 96% aspect of the crown). However, we cannot draw large conclusions because we do not know how the case was initially, nor what the expectations of patients. In some situations the patients' expectations could be low and thus, the results achieved could be considered ideal. Moreover, in some cases (#3, #14 and #24) the degree of satisfaction with the appearance of the gingiva was lower than with the crown. This is due to the gingival biotype that the patient showed. A thin gingival biotype is more likely to experience a gingival recession and a rehabilitation in these patients is more sensitive (13, 20).

The fact that all patients repeated treatment if necessary not only demonstrates their satisfaction with the outcome but also with the selected treatment plan.

Protocol

During the study, we had some difficulties contacting patients and scheduling a visit, mainly due to the patients' lack of time and incompatibility with our agenda.

With regard to the analysis of photographs made by the observers, it was not possible to have the same lighting conditions for everyone. In order to assess this, we selected only three photos (frontal of restoration, frontal of contralateral tooth and occlusal of restoration), but it would have been very useful to include an occlusal photograph of the contralateral tooth and a frontal of the upper arch. The first would have been important in assessing the deficiency of the alveolar process and crown volume, and the second to complete the information given by the frontal photographs of the restoration and the contralateral tooth.

With regard to patient #5, the frontal photograph of the restoration does not clearly show the distal papilla and this can cause the observer error. As for patient #11, the frontal

photographs did not have the same magnification, leading the observer to believe that the contralateral tooth was larger than the restoration.

Comparison Between Observers Groups

In this study, none of the observer groups excelled in the aesthetic classification of patients evaluated. The means of all ratings were similar in all groups. This may suggest that everyone has the same aesthetic notions and/or that the rates are accessible and easy to understand. However, the index that showed fewer differences between the clinical evaluation and the evaluation made by the observers was the PES/WES. The group of dental technicians showed lower aesthetic scores when compared to other groups. In the group of Dental Technicians we can see that there wasn't much of a correlation because the standard deviation value is high and Cronbach's α is lower. In case #11, the correlation was greater between the groups. This is because the assessment of this case may have raised fewer questions than case # 5.

Comparison Between Indexes

In this study, the CIS demonstrated to be the index that can be used for all groups. It has good internal consistency. The qualification of aesthetic or poor aesthetic is given by the cut-point. However, the CIS cut-point used in this study is an experimental point calculated by Fisher's formula. Confirmation of the validity of the cut-point is essential and can be performed in a later study. To make the clinical validation of the cut-point calculated, an observer should evaluate several cases according to the CIS and then consider each of them as an aesthetic or poor aesthetic. With mean scores of the results obtained, once again one must use Fisher's formula to validate the cut-point or not.

The rating obtained with ICAI is nearest PES/WES. However it should be noted that some parameters in ICAI are evaluated on a 5-point scale and others based on a 3-point scale. Also, assigning a score of 5 at a major discrepancy assumes that the results are not very homogeneous. It would be interesting in a subsequent study to use mod-ICAI that classifies the major discrepancies with a score of 2 rather than 5.

When a comparison was made between the aesthetic indexes and the clinical assessment done by the investigator, the PES/WES was the one which demonstrated more homogeneity and less variation between groups unlike other indexes (ICAI and CIS). However, to validate the clinical assessment made by the investigator it would be useful to

have another(s) investigator(s) on the same assessment. As a result it could be assigned a real value in the clinical evaluation.

Aesthetic Predictive Factors

Knowing of the factors that most influence each index is very important. Thus, the observer needs to know what parameters influence the aesthetic result the most and find the best treatment plan for each situation. The factors that were most influenced were: colour and translucency of the crown (ICAI), crown colour match (CIS), crown volume and root convexity/soft tissue colour and texture. However, it was not possible to list all the parameters of the indexes with each other due to the small sample size.

Aesthetic Outcome of Zirconia and Titanium Abutments

According to the results obtained in this study, zirconia abutments proved to provide more aesthetic results when compared to titanium abutments. However, it should be noted that in order to confirm this result, it is necessary to increase the sample size and the ideal would be to conduct a prospective study.

According to the literature on this matter some studies suggest that zirconia abutments have better aesthetic results compared to titanium abutments (12,15). However, many studies have suggested that the differences between the two types of materials in relation to the aesthetic result are not statistically significant (6, 17, 28, 29, 31).

When choosing the abutment material to be used in a restoration on implant, one must take into account not only the position of the implant but also the lip line and the gingival biotype of the patient.

The gingival biotype affects the results of periodontal treatment and implant placement, especially on the facial peri-implant mucosa levels compromising the desired aesthetic results. So, the evaluation of gingival biotype before the restorative procedure, allows a better prediction of the final aesthetic result. A thin biotype is most likely to experience gingival recession than a thick biotype. In a thin gingival biotype, it is ideal to use zirconia abutments and all-ceramic crowns. In a thick gingival biotype titanium abutments and metal-ceramic crowns can be used (7).

The lip line is also essential to obtain pleasing aesthetic results. Ideally, there should be some exposure of a part of the gingiva. A full exposure of mucosa is associated to a more sensitive rehabilitation. A preliminary assessment of the patient and the treatment plan must

be performed by a multidisciplinary team which may include prosthodontists, periodontologists and orthodontists.

5. CONCLUSIONS

The mesial papilla was the parameter that raised the most doubts among the observers during this study.

The factors that most influenced aesthetic results are: colour and translucency of the crown (ICAI), crown colour match (CIS), crown volume and root convexity/soft tissue colour and texture (PES/WES).

The protocol that was carried out in this study in order to evaluate aesthetics, can be used in future rehabilitations. Thereby, it will be possible to obtain a record of all cases making it easier for future use.

According to this study, the zirconia abutments have better aesthetic results when compared to titanium abutments. However, more studies need to be conducted and it would be ideal to have a prospective randomized clinical trial prospective.

6. STUDY LIMITATIONS AND FUTURE PERSPECTIVES

Study Limitations

- Lack of information of the initial situation of the patient and the surgical procedures performed, for example, implant position and materials used in the restoration;
- Lack of availability of patients to go to control visit;
- Number of photographs of the patient that were provided to the observer so as to optimize the assessment;
- Finding the same conditions to evaluate the photographs with the same light source. In this study it was not possible because the assessment was done in several rooms;
- The CIS cut-point is experimental;
- The number of cases evaluated: it's necessary to have more cases for the same number of observers.

Future Perspectives

- Make the assessment of diagnostic casts in order to achieve a more objective assessment of the analysis using photographs or clinical analysis through aesthetic indexes;
- Create a group of observers of students of 3th year, since they are familiar with the preclinical stage;
- Consider not only the parameters evaluated in aesthetic indexes but also the opinion of the patient;
- Perform this clinical protocol in future restorations in order to obtain complete records of the clinical cases;
- Confirm the validity of the cut-point calculated for CIS.

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8. ACKNOWLEDGMENTS

Ao meu orientador, Professor Doutor João Paulo Tondela por me ter ajudado na realização deste trabalho e por todos os conhecimentos que me transmitiu durante este tempo.

Ao meu co-orientador Professor Doutor Fernando Guerra por toda a simpatia e transmissão de conhecimentos ao longo destes anos.

À Dra. Catarina Costa por toda a ajuda preciosa que me deu e todo o apoio em todos os momentos deste trabalho. Sem ela este trabalho não seria possível. Obrigada também por toda a paciência que teve comigo.

Ao Dr. Cristiano Alves pelos conselhos que me deu e pela disponibilidade e apoio demonstrados na realização deste trabalho.

À Professora Doutora Margarida Pocinho por toda a ajuda na análise estatística.

À Dra. Anabela Vítor por todo o tempo que disponibilizou para me ajudar.

A todos os meus amigos que durante este tempo sempre me apoiaram e foram indispensáveis e essenciais em todo o meu percurso académico. Obrigada por tudo.

Aos meus pais e irmã por todo o apoio e compreensão durante este tempo.

9. ANNEX

9.1 Annex 1: Informed Consent

FORMULÁRIO DE INFORMAÇÃO E CONSENTIMENTO INFORMADO

TÍTULO DO PROJETO DE INVESTIGAÇÃO:

Avaliação dos resultados estéticos de restaurações unitárias sobre implantes com pilares metálicos e cerâmicos com recurso a índices estéticos objetivos – estudo retrospectivo.

PROTOCOLO Nº:

INVESTIGADOR COORDENADOR:

Susana Alexandra Teixeira Rosa

Dr. João Paulo dos Santos Tondela

Prof. Doutor Fernando Alberto Deométrio Rodrigues Alves Guerra

CENTRO DE ESTUDO:

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Telefone: 969928722

NOME DO PACIENTE: _____

É convidado(a) a participar voluntariamente neste estudo visto ser portador de uma reabilitação unitária sobre um implante no setor anterior estético, com pilar protético metálico/cerâmico e uma coroa metalocerâmica/total cerâmica, tendo o dente contralateral natural.

Este documento tem o nome de consentimento informado e tem como objetivo descrever todo o estudo, os seus procedimentos e os possíveis riscos e benefícios. Ao participar poderá contribuir para melhorar o conhecimento relativamente aos resultados estéticos de diferentes materiais utilizados nos pilares e coroas, assim como a sua perceção por profissionais das variadas especialidades de Medicina Dentária.

Uma cópia deste Consentimento Informado vai-lhe ser entregue por forma a rever e solicitar aconselhamento de familiares e amigos. O investigador ou qualquer membro da sua equipa estará disponível para esclarecer qualquer dúvida que tenha.

Depois de compreender o estudo e de não ter qualquer dúvida, deverá tomar a decisão de participar ou não no estudo. Caso queira participar, deverá assinar este documento. Depois de assinado por si e pelo investigador, ser-lhe-á entregue uma cópia deste documento. Se não quiser participar não haverá qualquer tipo de penalização nos cuidados que irá receber.

1. INFORMAÇÃO GERAL E OBJETIVOS DO ESTUDO

O estudo irá decorrer na Área de Medicina Dentária da Faculdade de Medicina da Universidade de Coimbra, em colaboração com o Prof. Doutor Fernando Alberto Deométrio Rodrigues Alves Guerra, o Dr. João Paulo dos Santos Tondela e o Dr. Cristiano Gabriel Azevedo Pereira Teixeira Alves, com o objetivo de avaliar os resultados estéticos de restaurações unitárias sobre implantes com pilares metálicos e cerâmicos, através de índices estéticos objetivos.

Este é um estudo clínico onde serão avaliados parâmetros clínicos, fotografias, impressões para obtenção de modelos de estudo e radiografias. Não será feita nenhuma alteração na sua medicação ou tratamentos habituais.

Este estudo foi aprovado pela Comissão de Ética da Faculdade de Medicina da Universidade de Coimbra (FMUC) de modo a garantir a proteção dos direitos, segurança e bem-estar de todos os doentes ou outros participantes incluídos e garantir prova pública dessa proteção.

Como participante neste estudo beneficiará da vigilância e apoio do seu médico, garantindo assim a sua segurança.

2. PROCEDIMENTOS E CONDUÇÃO DO ESTUDO

2.1 Procedimentos

Inicialmente, será efetuada uma breve observação oral, de modo a averiguar os níveis de higiene oral. Se estes forem insatisfatórios, será executada uma higienização sumária. Caso este procedimento não seja necessário, ser-lhe-ão tiradas fotografias não identificadas, para posteriormente se proceder à sua avaliação estética. É de salientar que se a higienização for realizada, e devido ao facto de comprometer a coloração dos tecidos moles (parâmetro a avaliar), as fotografias serão realizadas numa consulta posterior. Segue-se a análise dos parâmetros clínicos, tais como, avaliação do índice de placa bacteriana assim como os parâmetros que constam nos índices estéticos. Estes últimos exigem uma análise observacional. De seguida serão efetuadas impressões parciais e totais de ambas as arcadas. Numa eventual segunda consulta, será efetuada uma radiografia do implante e as fotografias, pela razão mencionada anteriormente.

2.2 Calendário de Visitas/Duração (exemplo)

Este estudo consiste numa visita única ou dupla com duração de cerca de 1 hora (no máximo).

Descrição dos Procedimentos

Serão realizados os seguintes procedimentos/exames:

Observação Oral

Fotografias

Análise Clínica

Impressões de Estudo

Radiografias

2.3 Tratamento de Dados/Randomização

Os dados serão arquivados pelos investigadores, preservando a identidade do doente. Serão alvo de análise por terceiros. Trata-se de uma amostra de conveniência.

3. RISCOS E POTENCIAIS INCONVENIENTES PARA O DOENTE

Todos os procedimentos são usualmente efetuados em qualquer consulta de controlo de uma reabilitação com implantes. Destes, as radiografias poderão ser o que apresenta maior risco, devido à radiação utilizada. Como será apenas realizada uma radiografia, os riscos que advêm do efeito cumulativo de radiação são minimizados, sendo estes já por si reduzidos. Para além disso, o doente será protegido por um colete de chumbo, funcionando como um escudo contra a radiação.

4. POTENCIAIS BENEFÍCIOS

Este estudo efetua uma avaliação pormenorizada de todos os fatores que contribuem para o sucesso de uma reabilitação unitária sobre implantes e compara os resultados estéticos de dois tipos de materiais. Assim, vai permitir monitorizar e controlar a reabilitação efetuada, avaliando o sucesso a prazo do mesmo. Para além disso, melhora o conhecimento das divergências entre os materiais, contribuindo para uma melhor informação dos Médicos Dentistas nos cuidados clínicos a prestar a doentes com situações idênticas à sua. Pelo facto de utilizar vários índices e de efetuar a comparação entre eles e por vários profissionais das diversas áreas da Medicina Dentária, poderá auxiliar na determinação do índice com maior validade e conhecer as diferenças na perceção da Estética consoante a área. Finalmente, como também implica a recolha da análise estética por parte do doente, possibilitará aos profissionais apreender os aspetos aos quais o doente dá mais importância numa reabilitação desta natureza.

5. NOVAS INFORMAÇÕES

Sempre que exista uma nova informação que seja relevante para a sua condição ou que possa influenciar a sua vontade de participar neste estudo, será informado.

6. TRATAMENTOS ALTERNATIVOS

Este trata-se de um controlo e não de um tratamento.

7. SEGURANÇA

Este estudo não é segurado por nenhuma identidade, visto não se justificar.

8. PARTICIPAÇÃO/ABANDONO VOLUNTÁRIO

É inteiramente livre de aceitar ou não participar neste estudo. Pode retirar o seu consentimento em qualquer altura sem qualquer consequência para si, sem precisar de explicar as suas razões, sem qualquer penalidade ou perda de benefícios e sem comprometer a sua relação com o investigador que lhe propõe a participação neste estudo. Ser-lhe-á pedido para informar o investigador se decidir retirar o seu consentimento.

Também o investigador pode decidir terminar a sua participação neste estudo se entender que não é do melhor interesse para a sua saúde continuar nele. A sua participação pode também ser terminada se não estiver a seguir o plano do estudo, por decisão administrativa ou decisão da Comissão de Ética. Se surgir alguma destas situações o médico do estudo falará consigo sobre elas.

9. CONFIDENCIALIDADE

Sem violar as normas de confidencialidade, serão atribuídos a auditores e autoridades reguladoras acesso aos registos médicos para verificação dos procedimentos realizados e informação obtida no estudo, de acordo com as leis e regulamentos aplicáveis. Os seus registos manter-se-ão confidenciais e anonimizados de acordo com os regulamentos e leis aplicáveis. Se os resultados deste estudo forem publicados a sua identidade permanecerá confidencial.

Ao assinar este Consentimento Informado autoriza este acesso condicionado e restrito.

Em qualquer momento pode exercer o seu direito de acesso à informação. Pode também ter acesso à sua informação médica diretamente ou através do seu médico neste estudo. Tem também o direito de se opor à transmissão de dados que estejam cobertos pela confidencialidade profissional.

Os registos médicos que o identificarem e o formulário de consentimento informado que assinar serão verificados para fins do estudo pelo promotor e/ou por representantes do promotor, e para fins regulamentares pelo promotor e/ou pelos representantes do promotor e agências reguladoras noutros países. A Comissão de Ética responsável pelo estudo pode solicitar o acesso aos seus registos médicos para se assegurar de que o estudo está a ser realizado de acordo com o protocolo. Não pode ser garantida confidencialidade absoluta devido à necessidade de passar a informação a essas partes.

Ao assinar este consentimento informado, permite que as suas informações médicas neste estudo sejam verificadas, processadas e relatadas conforme for necessário para finalidades científicas legítimas.

Confidencialidade e tratamento de dados pessoais

Os dados pessoais dos participantes no estudo, incluindo a informação médica ou de saúde recolhida ou criada como parte do estudo, (tais como registos médicos ou resultados de testes), serão utilizados para condução do estudo, designadamente para fins de investigação científica. Ao dar o seu consentimento à participação no estudo, a informação a si respeitante, designadamente a informação clínica, será utilizada da seguinte forma:

1. Os investigadores e as restantes pessoas envolvidas no estudo recolherão e utilizarão os seus dados pessoais para as finalidades acima referidas.
2. Os dados do estudo, associadas às suas iniciais ou a outro código que não o(a) identifica diretamente (e não ao seu nome) serão comunicados pelos investigadores e restantes pessoas envolvidas no estudo ao promotor do estudo, que os utilizará para as finalidades acima descritas.
3. Os dados do estudo, associados às suas iniciais ou a outro código que não permita identificá-lo(a) diretamente, poderão ser comunicados a autoridades de saúde nacionais e internacionais.
4. A sua identidade não será revelada em quaisquer relatórios ou publicações resultantes deste estudo.
5. Todas as pessoas ou entidades com acesso aos seus dados pessoais estão sujeitas a sigilo profissional.
6. Ao dar o seu consentimento para participar no estudo, autoriza o promotor ou empresas de monitorização de estudos especificamente contratadas para o efeito e seus colaboradores e/ou autoridades de saúde, a aceder aos dados constantes do seu processo clínico, para conferir a informação recolhida e registada pelos investigadores, designadamente para assegurar o rigor dos dados que lhe dizem respeito e para garantir que o estudo se encontra a ser desenvolvido corretamente e que os dados obtidos são fiáveis.
7. Nos termos da lei, tem o direito de, através de um dos médicos envolvidos no estudo, solicitar o acesso aos dados que lhe digam respeito, bem como de solicitar a retificação dos seus dados de identificação.
8. Tem ainda o direito de retirar este consentimento em qualquer altura através da notificação ao investigador, o que implicará que deixe de participar no estudo. No entanto, os dados recolhidos ou criados como parte do estudo até essa altura que não o (a) identifique poderão continuar a ser utilizados para o propósito de estudo, nomeadamente para manter a integridade científica do estudo, e a sua informação médica não será removida do arquivo do estudo.
9. Se não der consentimento, assinando este documento, não poderá participar neste estudo. Se o consentimento agora prestado não for retirado e até que o faça, este será válido e manter-se-á em vigor.

10. COMPENSAÇÃO

Este estudo é da iniciativa do investigador e, por isso, se solicita a sua participação sem uma compensação financeira para a sua execução, tal como também acontece com os investigadores. No entanto, como se trata de uma consulta de controlo da reabilitação protética que possui, será cobrada a taxa moderadora em vigor aquando da realização da consulta.

11. CONTACTOS

Se tiver alguma dúvida relativamente aos seus direitos como participante deste estudo, deve contactar:

Presidente da Comissão de Ética da FMUC,
Azinhaga de Santa Comba, Celas – 3000-548 Coimbra
Telefone: 239 857 707
E-mail: comissaoetica@fmed.uc.pt

Se tiver alguma dúvida sobre este estudo deve contactar:

Investigador Principal: Susana Alexandra Teixeira Rosa
Morada: Rua Sr. dos Aflitos nº47, Charneca, 3250-264 Maçãs de D. Maria
Contacto Telefónico: 969928722

NÃO ASSINE ESTE FORMULÁRIO DE CONSENTIMENTO INFORMADO A MENOS QUE TENHA TIDO A OPORTUNIDADE DE PERGUNTAR E TER RECEBIDO RESPOSTAS SATISFATÓRIAS A TODAS AS SUAS PERGUNTAS

CONSENTIMENTO INFORMADO

De acordo com a Declaração de Helsínquia da Associação Médica Mundial e suas atualizações:

1. Declaro ter lido este formulário a aceito de forma voluntária participar neste estudo.
2. Fui devidamente informado(a) da natureza, objetivos, riscos, duração provável do estudo, bem como do que é esperado da minha parte.
3. Tive a oportunidade de fazer perguntas sobre o estudo e percebi as respostas e as informações que me foram dadas. A qualquer momento posso fazer mais perguntas ao médico responsável pelo estudo. Durante o estudo e sempre que quiser, posso receber informação sobre o seu desenvolvimento. O médico responsável dará toda a informação

importante que surja durante o estudo que possa alterar a minha vontade de continuar a participar.

4. Aceito que utilizem a informação relativa à minha história clínica e os meus tratamentos no estrito respeito do segredo médico e anonimato. Os meus dados serão mantidos estritamente confidenciais. Autorizo a consulta dos meus dados apenas por pessoas designadas pelo promotor e por representantes das autoridades reguladoras.
5. Aceito seguir todas as instruções que me forem dadas durante o estudo. Aceito em colaborar com o médico e informá-lo(a) imediatamente das alterações do meu estado de saúde e bem-estar e de todos os sintomas inesperados e não usuais que ocorram.
6. Autorizo o uso dos resultados do estudo para fins exclusivamente científicos e, em particular, aceito que esses resultados sejam divulgados às autoridades sanitárias competentes.

Eu posso exercer o meu direito de retificação e/ou oposição.

7. Aceito que os dados gerados durante o estudo sejam informatizados pelo promotor ou outrem por si designado.
8. Tenho conhecimento que sou livre de desistir do estudo a qualquer momento, sem ter de justificar a minha decisão e sem comprometer a qualidade dos meus cuidados médicos. Eu tenho conhecimento que o médico tem o direito de decidir sobre a minha saída prematura do estudo e que me informará da causa da mesma.
9. Fui informado que o estudo pode ser interrompido por decisão do investigador, do promotor ou das autoridades reguladoras.

Nome do Participante: _____

Assinatura: _____ **Data:** __/__/____

Nome de Testemunha/Representante Legal: _____

Assinatura: _____ **Data:** __/__/____

Confirmo que expliquei ao participante acima mencionado a natureza, os objetivos e os potenciais riscos do estudo acima mencionado.

Nome do Investigador: _____

Assinatura: _____ **Data:** __/__/____

9.2 Annex 2: VAS (Visual Analog Scale)

AVALIAÇÃO DOS RESULTADOS ESTÉTICOS DE RESTAURAÇÕES UNITÁRIAS SOBRE IMPLANTES COM PILARES METÁLICOS E CERÂMICOS COM RECURSO A ÍNDICES ESTÉTICOS OBJETIVOS – ESTUDO RETROSPETIVO

Com este documento, pretende-se obter a sua opinião relativamente aos resultados estéticos alcançados com a reabilitação efetuada.

Questão 1

Numa escala de 0 – 10, como classifica a sua satisfação relativamente ao aspeto da gengiva (cor, textura, posição) sendo 0 extremamente insatisfeito(a) e 10 extremamente satisfeito(a). Desenhe uma cruz (X) sobre a linha abaixo no local que corresponder à sua resposta.

0 10

Questão 2

Numa escala de 0 – 10, como classifica a sua satisfação relativamente ao resultado estético da coroa (cor, forma, tamanho), sendo 0 extremamente insatisfeito(a) e 10 extremamente satisfeito(a). Desenhe uma cruz (X) sobre a linha abaixo no local que corresponder à sua resposta.

0 10

Questão 3

Recomendaria o tratamento? (tendo em conta o resultado estético obtido)

Sim Não

Questão 4

Repetiria o tratamento? Se não, porquê?

9.3 Annex 3: Clinical Assessment

AVALIAÇÃO DOS PARÂMETROS ESTÉTICOS NUMA REABILITAÇÃO COM IMPLANTES

Nome do Doente: _____

Posição do Implante: _____

Data: ___/___/_____

- PES/WES (Belser et Al. 2009)

PAPILA MESIAL	AUSENTE	INCOMPLETA	COMPLETA
PAPILA DISTAL	AUSENTE	INCOMPLETA	COMPLETA
NÍVEL DOS TECIDOS MOLES	DISCREPÂNCIA MAJOR	DISCREPÂNCIA MINOR	SEM DISCREPÂNCIA
CONTORNO DOS TECIDOS MOLES	DISCREPÂNCIA MAJOR	DISCREPÂNCIA MINOR	SEM DISCREPÂNCIA
DEFICIÊNCIA PROCESSO ALVEOLAR/COLORAÇÃO E TEXTURA DOS TECIDOS MOLES	DISCREPÂNCIA MAJOR	DISCREPÂNCIA MINOR	SEM DISCREPÂNCIA
FORMA DO DENTE	DISCREPÂNCIA MAJOR	DISCREPÂNCIA MINOR	SEM DISCREPÂNCIA
VOLUME DO DENTE	DISCREPÂNCIA MAJOR	DISCREPÂNCIA MINOR	SEM DISCREPÂNCIA
COR (MATIZ/VALOR)	DISCREPÂNCIA MAJOR	DISCREPÂNCIA MINOR	SEM DISCREPÂNCIA
TEXTURA SUPERFICIAL	DISCREPÂNCIA MAJOR	DISCREPÂNCIA MINOR	SEM DISCREPÂNCIA
TRANSLUCIDEZ	DISCREPÂNCIA MAJOR	DISCREPÂNCIA MINOR	SEM DISCREPÂNCIA

- ICAI (Meijer et Al. 2005)

DIMENSÃO MD DA COROA	MUITO AUMENTADA	AUMENTADA	SEM DESVIO	DIMINUÍDA	MUITO DIMINUÍDA
POSIÇÃO DO BORDO INCISAL DA COROA	MUITO AUMENTADA	AUMENTADA	SEM DESVIO	DIMINUÍDA	MUITO DIMINUÍDA
CONVEXIDADE VESTIBULAR DA COROA	MUITO AUMENTADA	AUMENTADA	SEM DESVIO	DIMINUÍDA	MUITO DIMINUÍDA
CONTORNO VESTIBULAR DA SUPERFÍCIE DA MUCOSA	MUITO AUMENTADA	AUMENTADA	SEM DESVIO	DIMINUÍDA	MUITO DIMINUÍDA
COR E TRANSLUCIDEZ DA COROA		DESVIO MAJOR	SEM DESVIO	DESVIO MINOR	
SUPERFÍCIE DA COROA		DESVIO MAJOR	SEM DESVIO	DESVIO MINOR	
POSIÇÃO DA MARGEM VESTIBULAR DA MUCOSA PERIIMPLANTAR		DESVIO MAJOR	SEM DESVIO	DESVIO MINOR	
POSIÇÃO DA MUCOSA INTERDENTÁRIA		DESVIO MAJOR	SEM DESVIO	DESVIO MINOR	
COR E SUPERFÍCIE DA MUCOSA VESTIBULAR		DESVIO MAJOR	SEM DESVIO	DESVIO MINOR	

- CIS (Dueled et Al. 2009)

MORFOLOGIA DA COROA	EXCELENTE	SUB-ÓTIMO	MODERADO	INSATISFATÓRIO
COR DA COROA	EXCELENTE	SUB-ÓTIMO	MODERADO	INSATISFATÓRIO
SIMETRIA/HARMONIA	EXCELENTE	SUB-ÓTIMO	MODERADO	INSATISFATÓRIO
DESCOLORAÇÃO DA MUCOSA	EXCELENTE	SUB-ÓTIMO	MODERADO	INSATISFATÓRIO
PAPILA DISTAL	EXCELENTE	SUB-ÓTIMO	MODERADO	INSATISFATÓRIO
PAPILA MESIAL	EXCELENTE	SUB-ÓTIMO	MODERADO	INSATISFATÓRIO

AVALIAÇÃO DOS PARÂMETROS ESTÉTICOS NUMA REABILITAÇÃO COM IMPLANTES

Nome do Doente: _____

Processo: _____

Posição do Implante (Assinalar no esquema)

Data: __/__/____

- Linha Labial:

Nenhuma Exposição das Papilas

Exposição das Papilas

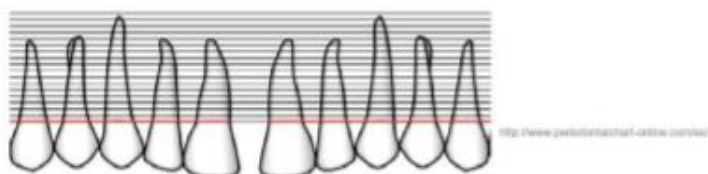
Exposição Total da Margem Gengival

- Biótipo Gengival

Espesso

Médio

Fino



Dente	15			14			13			12			11			21			22			23			24			25		
PD (mm)	D	P	V	M	D	P	V	M	D	P	V	M	D	P	V	M	D	P	V	M	D	P	V	M	D	P	V	M		
BOP (%)																														
PI (%)																														
MORUOIDE																														

- Procedimentos Anteriormente Executados

Data da cirurgia:

Protocolo de carga:

Tipo de implante:

Regeneração Óssea Sim Não

Provisório Sim Não

Split Crest Sim Não

Retenção Cimentada Aparafusada

9.4 Annex 4: Patient Assessment

Table XXIV Patient #1

Patient	A.A.M
Implant Position	14
Abutment	Zirconia
Crown	Ceramic
Retention	Cemented
Year of Rehabilitation	2008
Lip Line	Exposure of Papillae
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	4 mm
PES/WES (Clinical)	12
ICAI (Clinical)	3
CIS (Clinical)	9
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	10/10



Table XXV Patient #2

Patient	A.C.B.
Implant Position	14
Abutment	Titanium
Crown	Metaloceramic
Retention	Screwed
Year of Rehabilitation	2006
Lip Line	Full Exposure of Mucosa Margin
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	2 mm
PES/WES (Clinical)	17
ICAI (Clinical)	3
CIS (Clinical)	7
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	10/10



Table XXVI Patient #3

Patient	A.F.
Implant Position	14
Abutment	Titanium
Crown	Metaloceramic
Retention	Cemented
Year of Rehabilitation	2009
Lip Line	No Exposure of Papillae
Gingival Biotype	Thick
BOP (Implant)	No
PD (Implant)	3 mm
PES/WES (Clinical)	17
ICAI (Clinical)	8
CIS (Clinical)	8
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	8.3/10



Table XXVII Patient #4

Patient	C.M.
Implant Position	12
Abutment	Titanium
Crown	Metaloceramic
Retention	Cemented
Year of Rehabilitation	2008
Lip Line	Exposure of Papillae
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	4 mm
PES/WES (Clinical)	17
ICAI (Clinical)	6
CIS (Clinical)	7
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	9.3/9.7



Table XXVIII Patient #6

Patient	M.C.G.
Implant Position	11
Abutment	Titanium
Crown	Metaloceramic
Retention	Cemented
Year of Rehabilitation	2011
Lip Line	Exposure of Papillae
Gingival Biotype	Medium-Thick
BOP (Implant)	Yes
PD (Implant)	3 mm
PES/WES (Clinical)	10
ICAI (Clinical)	21
CIS (Clinical)	14
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	8.3/9.2



Table XXIX Patient #7

Patient	M.H.T.
Implant Position	12
Abutment	Titanium
Crown	Metaloceramic
Retention	Screwed
Year of Rehabilitation	2012
Lip Line	No Exposure of Papillae
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	3 mm
PES/WES (Clinical)	10
ICAI (Clinical)	9
CIS (Clinical)	14
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	10/10



Table XXX Patient #8

Patient	M.I.F.
Implant Position	21
Abutment	Titanium
Crown	Metaloceramic
Retention	Screwed
Year of Rehabilitation	2008
Lip Line	Exposure of Papillae
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	2 mm
PES/WES (Clinical)	15
ICAI (Clinical)	9
CIS (Clinical)	10
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	7.6/8.8



Table XXXI Patient #9

Patient	M.L.B.
Implant Position	24
Abutment	Zirconia
Crown	Ceramic
Retention	Screwed
Year of Rehabilitation	2008
Lip Line	Exposure of Papillae
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	3 mm
PES/WES (Clinical)	18
ICAI (Clinical)	1
CIS (Clinical)	9
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	10/10



Table XXXII Patient #10

Patient	M.N.A.
Implant Position	22
Abutment	Titanium
Crown	Metaloceramic
Retention	Cemented
Year of Rehabilitation	2010
Lip Line	Exposure of Papillae
Gingival Biotype	Medium-Thick
BOP (Implant)	Yes
PD (Implant)	4 mm
PES/WES (Clinical)	10
ICAI (Clinical)	9
CIS (Clinical)	10
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	9.7/10



Table XXXIII Patient #12

Patient	R.A.V.
Implant Position	21
Abutment	Zirconia
Crown	Ceramic
Retention	Cemented
Year of Rehabilitation	-
Lip Line	Full Exposure of Mucosa Magin
Gingival Biotype	Thick
BOP (Implant)	Yes
PD (Implant)	8 mm
PES/WES (Clinical)	19
ICAI (Clinical)	1
CIS (Clinical)	6
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	10/10



Table XXXIV Patient #13

Patient	R.J.M.
Implant Position	21
Abutment	Zirconia
Crown	Ceramic
Retention	Cemented
Year of Rehabilitation	2011
Lip Line	Exposure of Papilla
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	2 mm
PES/WES (Clinical)	17
ICAI (Clinical)	13
CIS (Clinical)	10
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	8.8/9.7



Table XXXV Patient #14

Patient	R.J.P.
Implant Position	14
Abutment	Zirconia
Crown	Ceramic
Retention	Screwed
Year of Rehabilitation	2010
Lip Line	No Exposure of Papilla
Gingival Biotype	Thick
BOP (Implant)	No
PD (Implant)	3 mm
PES/WES (Clinical)	18
ICAI (Clinical)	0
CIS (Clinical)	7
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	8.3/10



Table XXXVI Patient #15

Patient	R.M.L.
Implant Position	21
Abutment	Titanium
Crown	Metaloceramic
Retention	Cemented
Year of Rehabilitation	2012
Lip Line	Exposure of Papilla
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	2 mm
PES/WES (Clinical)	15
ICAI (Clinical)	4
CIS (Clinical)	10
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	10/8.8



Table XXXVII Patient #16

Patient	S.B.
Implant Position	21
Abutment	Zirconia
Crown	Ceramic
Retention	Screwed
Year of Rehabilitation	-
Lip Line	Exposure of Papilla
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	1 mm
PES/WES (Clinical)	19
ICAI (Clinical)	2
CIS (Clinical)	7
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	10/10



Table XXXVIII Patient #17

Patient	A.J.F.A.
Implant Position	22
Abutment	Titanium
Crown	Metaloceramic
Retention	Screwed
Year of Rehabilitation	2015
Lip Line	No Exposure of Papilla
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	1 mm
PES/WES (Clinical)	16
ICAI (Clinical)	6
CIS (Clinical)	10
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	9.1/9.8



Table XXXIX Patient #18

Patient	E.M.P.R
Implant Position	12
Abutment	Zirconia
Crown	Ceramic
Retention	Screwed
Year of Rehabilitation	2013
Lip Line	Full Exposure of Mucosa Margin
Gingival Biotype	Medium-Thick
BOP (Implant)	Yes
PD (Implant)	3 mm
PES/WES (Clinical)	11
ICAI (Clinical)	8
CIS (Clinical)	13
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	9.8/9.8



Table XL Patient #19

Patient	N.C.H.
Implant Position	23
Abutment	Titanium
Crown	Metaloceramic
Retention	Screwed
Year of Rehabilitation	2013
Lip Line	Exposure of Papilla
Gingival Biotype	Medium-Thick
BOP (Implant)	Yes
PD (Implant)	1 mm
PES/WES (Clinical)	14
ICAI (Clinical)	6
CIS (Clinical)	13
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	9.9/9.9

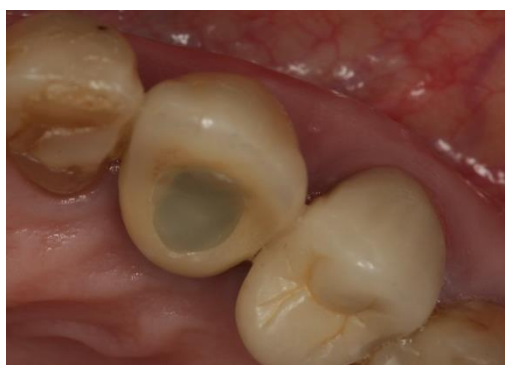


Table XLI Patient #20

Patient	I.M.R.P.
Implant Position	13
Abutment	Titanium
Crown	Ceramic
Retention	Cemented
Year of Rehabilitation	2008
Lip Line	Full Exposure of Mucosa Margin
Gingival Biotype	Medium-Thick
BOP (Implant)	Yes
PD (Implant)	2 mm
PES/WES (Clinical)	17
ICAI (Clinical)	2
CIS (Clinical)	10
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	10/10



Table XLII Patient #21

Patient	I.M.R.P.
Implant Position	21
Abutment	Titanium
Crown	Ceramic
Retention	Cemented
Year of Rehabilitation	2008
Lip Line	Full Exposure of Mucosa Margin
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	2 mm
PES/WES (Clinical)	13
ICAI (Clinical)	5
CIS (Clinical)	11
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	8.9/10



Table XLIII Patient #22

Patient	A.D.
Implant Position	23
Abutment	Titanium
Crown	Metaloceramic
Retention	Screwed
Year of Rehabilitation	2011
Lip Line	Exposure of Papilla
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	2 mm
PES/WES (Clinical)	15
ICAI (Clinical)	8
CIS (Clinical)	15
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	8.8/9.1



Table XLIV Patient #23

Patient	B.F.
Implant Position	11
Abutment	Titanium
Crown	Metaloceramic
Retention	Screwed
Year of Rehabilitation	2014
Lip Line	Exposure of Papilla
Gingival Biotype	Thick
BOP (Implant)	Yes
PD (Implant)	5 mm
PES/WES (Clinical)	16
ICAI (Clinical)	6
CIS (Clinical)	13
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	9.9/10



Table XLV Patient #24

Patient	N.C.M.T.
Implant Position	21
Abutment	Zirconia
Crown	Ceramic
Retention	Screwed
Year of Rehabilitation	2012
Lip Line	Full Exposure of Mucosa Margin
Gingival Biotype	Thick
BOP (Implant)	No
PD (Implant)	3 mm
PES/WES (Clinical)	12
ICAI (Clinical)	5
CIS (Clinical)	9
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	8.5/9.9



Table XLVI Patient #25

Patient	M.A.R.
Implant Position	14
Abutment	Titanium
Crown	Metaloceramic
Retention	Cemented
Year of Rehabilitation	2010
Lip Line	Exposure of Papilla
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	2 mm
PES/WES (Clinical)	11
ICAI (Clinical)	7
CIS (Clinical)	10
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	9.5/9.4



Table XLVII Patient #26

Patient	A.E.B.
Implant Position	11
Abutment	Zirconia
Crown	Ceramic
Retention	Cemented
Year of Rehabilitation	2010
Lip Line	Full Exposure of Mucosa Margin
Gingival Biotype	Medium-Thick
BOP (Implant)	No
PD (Implant)	2 mm
PES/WES (Clinical)	14
ICAI (Clinical)	9
CIS (Clinical)	10
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	9/9.3



Table XLVIII Patient #27

Patient	A.E.B.
Implant Position	21
Abutment	Zirconia
Crown	Ceramic
Retention	Cemented
Year of Rehabilitation	2010
Lip Line	Full Exposure of Mucosa Margin
Gingival Biotype	Medium-Thick
BOP (Implant)	Yes
PD (Implant)	2 mm
PES/WES (Clinical)	15
ICAI (Clinical)	4
CIS (Clinical)	9
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	9/9.3



Table XLIX Patient #28

Patient	V.M.B.R.
Implant Position	12
Abutment	Zirconia
Crown	Ceramic
Retention	Cemented
Year of Rehabilitation	2010
Lip Line	No Exposure of Papilla
Gingival Biotype	Thin
BOP (Implant)	Yes
PD (Implant)	2 mm
PES/WES (Clinical)	16
ICAI (Clinical)	1
CIS (Clinical)	10
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	9.4/9.3



Table L Patient #29

Patient	V.M.B.R.
Implant Position	22
Abutment	Zirconia
Crown	Ceramic
Retention	Cemented
Year of Rehabilitation	2010
Lip Line	No Exposure of Papilla
Gingival Biotype	Thin
BOP (Implant)	Yes
PD (Implant)	3 mm
PES/WES (Clinical)	18
ICAI (Clinical)	2
CIS (Clinical)	9
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	9.5/9.3



Table LI Patient #30

Patient	J.R.
Implant Position	22
Abutment	Zirconia
Crown	Ceramic
Retention	Screwed
Year of Rehabilitation	2014
Lip Line	Exposure of Papilla
Gingival Biotype	Thin
BOP (Implant)	No
PD (Implant)	1 mm
PES/WES (Clinical)	10
ICAI (Clinical)	7
CIS (Clinical)	16
Would you recommend the treatment?	Yes
Would you repeat the treatment?	Yes
VAS (Gingiva/Crown)	8.8/8.8



9.5 Annex 5: Photo Analysis

Análise de Fotografias

O meu nome é Susana Rosa e sou aluna do 5º ano do Mestrado Integrado em Medicina Dentária da Faculdade de Medicina da Universidade de Coimbra.

No âmbito da minha tese de mestrado cujo título é “Evaluation of the aesthetic outcome of implant single-unit restorations with titanium and zirconia abutments and reproducibility of aesthetic indexes according to observer dental specialization – a retrospective study”, peço a vossa colaboração para a avaliação de fotografias intra-orais de restaurações unitárias sobre implantes recorrendo a três índices estéticos objetivos (PES/WES, ICAI e CIS). Assim, o meu objetivo com este trabalho é avaliar as diferenças na classificação da estética que existem entre Médicos Dentistas/Estomatologistas com formação (ou prática dedicada) em diferentes áreas da Medicina Dentária, alunos do Mestrado Integrado em Medicina Dentária, das Pós-Graduações da Área da Medicina Dentária da FMUC e de técnicos de prótese dentária. A duração desta avaliação é de aproximadamente 10 minutos. A informação recolhida é confidencial sendo usada para fins estatísticos.

Peço ainda que responda às seguintes questões:

1 – Grau de Formação Académica:

Médico Dentista: _____

Estomatologista: _____

Aluno MIMD: _____

Aluno Pós-Graduação: _____

Técnico de Prótese Dentária: _____

2 – Área de Formação/Prática Dedicada ou Especialização (Apenas para Médicos Dentistas/Estomatologistas)

Dentisteria Operatória: _____

Odontopediatria: _____

Endodontia: _____

Prostodôncia Removível: _____

Cirurgia Oral: _____

Prostodôncia Fixa: _____

Periodontologia: _____

Reabilitação Oclusal: _____

Ortodontia: _____

Outra: _____

3 – Ano de Formatura/Ano que Frequenta/Anos de Trabalho (Técnico de Prótese)

4 – Conhecia os índices estéticos usados? (Sim/Não)

PES/WES: _____

ICAI: _____

CIS: _____

Agradeço a disponibilidade e colaboração.

Com os melhores cumprimentos,

Susana Rosa

AVALIAÇÃO DOS PARÂMETROS ESTÉTICOS NUMA REABILITAÇÃO COM IMPLANTES

Número da Fotografia: _____

Data: __/__/____

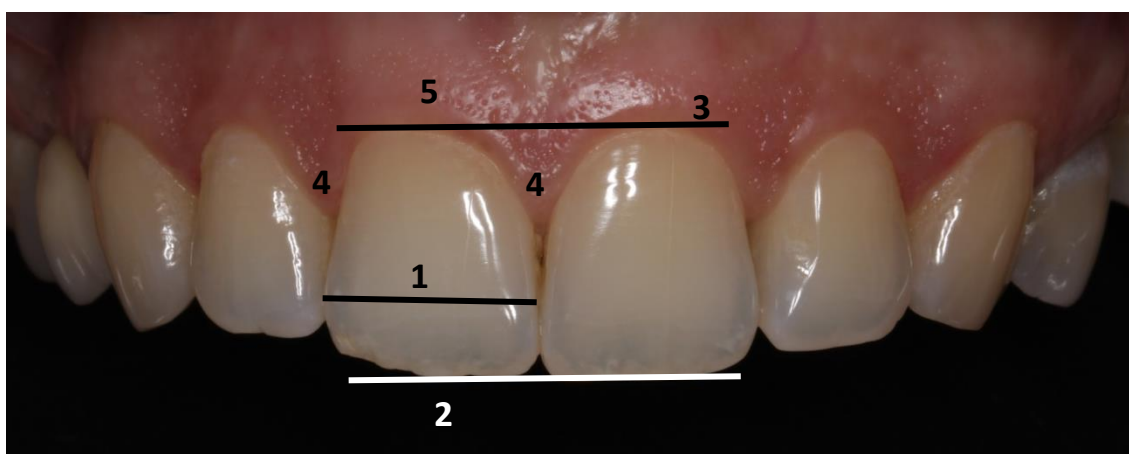
- PES/WES (Belser et al. 2009)

PES			
Papila Mesial (1)	Ausente	Incompleta	Completa
Papila Distal (2)	Ausente	Incompleta	Completa
Nível dos Tecidos Moles (3)	Discrepância Major	Discrepância Minor	Sem Discrepância
Contorno dos Tecidos Moles (4)	Discrepância Major	Discrepância Minor	Sem Discrepância
Deficiência Processo Alveolar/Coloração e Textura dos Tecidos Moles (5)	Discrepância Major	Discrepância Minor	Sem Discrepância
WES			
Forma do Dente	Discrepância Major	Discrepância Minor	Sem Discrepância
Volume do Dente	Discrepância Major	Discrepância Minor	Sem Discrepância
Cor (matiz/valor)	Discrepância Major	Discrepância Minor	Sem Discrepância
Textura Superficial	Discrepância Major	Discrepância Minor	Sem Discrepância
Translucidez	Discrepância Major	Discrepância Minor	Sem Discrepância



- ICAI (Meijer et Al. 2005)

ICAI					
Dimensão MD da Coroa (1)	Muito Aumentada	Aumentada	Sem Desvio	Diminuída	Muito Diminuída
Posição do Bordo Incisal da Coroa (2)	Muito Aumentada	Aumentada	Sem Desvio	Diminuída	Muito Diminuída
Convexidade Vestibular da Coroa	Muito Aumentada	Aumentada	Sem Desvio	Diminuída	Muito Diminuída
Contorno Vestibular da Superfície da Mucosa	Muito Aumentada	Aumentada	Sem Desvio	Diminuída	Muito Diminuída
Cor e Translucidez da Coroa		Desvio Major	Sem Desvio	Desvio Minor	
Superfície da Coroa		Desvio Major	Sem Desvio	Desvio Minor	
Posição da Margem Vestibular da Mucosa Periimplantar (3)		Desvio Major	Sem Desvio	Desvio Minor	
Posição da Mucosa Interdentária (4)		Desvio Major	Sem Desvio	Desvio Minor	
Cor e Superfície da Mucosa Vestibular (5)		Desvio Major	Sem Desvio	Desvio Minor	



- CIS (Dueled et Al. 2009)

Morfologia da Coroa (1)	Excelente	Sub-ótimo	Moderado	Insatisfatório
Cor da Coroa	Excelente	Sub-ótimo	Moderado	Insatisfatório
Simetria/Harmonia	Excelente	Sub-ótimo	Moderado	Insatisfatório
Descoloração da Mucosa (2)	Excelente	Sub-ótimo	Moderado	Insatisfatório
Papila Mesial (3)	Excelente	Sub-ótimo	Moderado	Insatisfatório
Papila Distal (4)	Excelente	Sub-ótimo	Moderado	Insatisfatório



9.6 Annex 6: Explanation of the Indexes

Pink Esthetic Score (PES)/White Esthetic Score (WES)

O PES avalia os tecidos peri-implantares através de cinco parâmetros:

- Papila mesial;
- Papila distal;
- Nível dos tecidos moles;
- Contorno dos tecidos moles;
- Deficiência do processo alveolar/Coloração e textura dos tecidos moles.

O WES avalia a restauração coronária sobre o implante segundo cinco parâmetros:

- Forma do dente;
- Volume do dente;
- Cor (matiz/valor);
- Textura superficial;
- Translucidez.

A avaliação é feita tendo como referência o dente contralateral, no caso de incisivos e caninos, e o dente adjacente quando se trata de pré-molares.

PES			
Papila Mesial	Ausente	Incompleta	Completa
Papila Distal	Ausente	Incompleta	Completa
Nível dos Tecidos Moles	Discrepância Major	Discrepância Minor	Sem Discrepância
Contorno dos Tecidos Moles	Discrepância Major	Discrepância Minor	Sem Discrepância
Deficiência Processo Alveolar/Coloração e Textura dos Tecidos Moles	Discrepância Major	Discrepância Minor	Sem Discrepância
WES			
Forma do Dente	Discrepância Major	Discrepância Minor	Sem Discrepância
Volume do Dente	Discrepância Major	Discrepância Minor	Sem Discrepância
Cor (matiz/valor)	Discrepância Major	Discrepância Minor	Sem Discrepância
Textura Superficial	Discrepância Major	Discrepância Minor	Sem Discrepância
Translucidez	Discrepância Major	Discrepância Minor	Sem Discrepância

Implant Crown Aesthetic Index (ICAI)

O ICAI avalia nove parâmetros, sendo que quatro dizem respeito aos tecidos peri-implantares e cinco à restauração coronária sobre o implante. Tal como o PES/WES, este índice usa como referência o dente contralateral em incisivos e caninos e o dente adjacente em pré-molares.

Os primeiros quatro parâmetros são avaliados como: Muito Aumentada, Aumentada, Sem Desvio, Diminuída e Muito Diminuída. Os restantes cinco são avaliados como: Desvio Major, Sem Desvio e Desvio Minor.

ICAI					
Dimensão MD da Coroa	Muito Aumentada	Aumentada	Sem Desvio	Diminuída	Muito Diminuída
Posição do Bordo Incisal da Coroa	Muito Aumentada	Aumentada	Sem Desvio	Diminuída	Muito Diminuída
Convexidade Vestibular da Coroa	Muito Aumentada	Aumentada	Sem Desvio	Diminuída	Muito Diminuída
Contorno Vestibular da Superfície da Mucosa	Muito Aumentada	Aumentada	Sem Desvio	Diminuída	Muito Diminuída
Cor e Translucidez da Coroa		Desvio Major	Sem Desvio	Desvio Minor	
Superfície da Coroa		Desvio Major	Sem Desvio	Desvio Minor	
Posição da Margem Vestibular da Mucosa Periimplantar		Desvio Major	Sem Desvio	Desvio Minor	
Posição da Mucosa Interdentária		Desvio Major	Sem Desvio	Desvio Minor	
Cor e Superfície da Mucosa Vestibular		Desvio Major	Sem Desvio	Desvio Minor	

Copenhagen Index Score (CIS)

O CIS avalia a mucosa peri-implantar e a restauração coronária segundo seis parâmetros que são classificados como: Excelente, Sub-ótimo, Moderado e Insatisfatório. Neste índice, e tal como nos anteriores, o dente usado como referência é o contralateral em incisivos e caninos e o adjacente em pré-molares.

- Morfologia da Coroa: avaliada segundo a anatomia, textura superficial, contorno, pontos de contacto, altura e largura.

Excelente – não há diferença nos parâmetros;

Sub-ótimo: dois dos parâmetros não estão corretos.

- Cor da Coroa: avaliada de acordo com matiz, croma, valor e translucidez.

- Simetria/Harmonia: avaliada segundo a linha média e o longo eixo do dente.

- Descoloração da Mucosa:

Sub-ótimo: coloração ligeira;

Moderado: coloração notória;

Insatisfatório: é possível ver o pilar.

- Papilas Mesial e Distal:

Excelente: papila preenche o espaço interproximal;

Sub-ótimo: papila preenche pelo menos metade do espaço interproximal;

Moderado: papila preenche menos de metade do espaço interproximal;

Insatisfatório: ausência de papila.

Morfologia da Coroa	Excelente	Sub-ótimo	Moderado	Insatisfatório
Cor da Coroa	Excelente	Sub-ótimo	Moderado	Insatisfatório
Simetria/Harmonia	Excelente	Sub-ótimo	Moderado	Insatisfatório
Descoloração da Mucosa	Excelente	Sub-ótimo	Moderado	Insatisfatório
Papila Mesial	Excelente	Sub-ótimo	Moderado	Insatisfatório
Papila Distal	Excelente	Sub-ótimo	Moderado	Insatisfatório