Novas tecnologias e propriedades clínicas em ODONTOLOGIA

Emanuela Carla dos Santos
(Organizadora)

Atena Editora
Ano 2022

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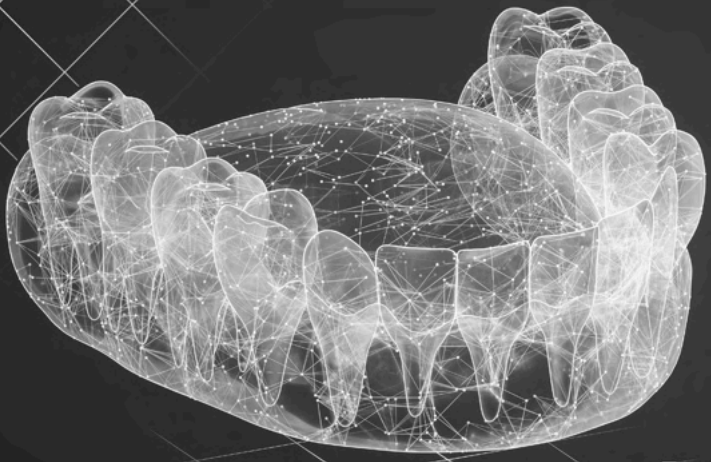

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APRESENTAÇÃO

A expansão do conhecimento é alcançada pela busca de soluções para os problemas do cotidiano. Essa busca incessante traz inúmeros benefícios e hoje é movida pela tecnologia.

Em Odontologia, a incorporação de novas tecnologias no planejamento e manejo de cada caso tem aperfeiçoado a prática clínica, tornando os procedimentos mais rápidos, seguros e menos invasivos.

Neste novo E-book a Atena Editora traz uma sequência de artigos que apresentam as novidades na área. Espero que tenha um ótimo momento de leitura!

Emanuela Carla dos Santos

SUMÁRIO

CAPÍTULO 14

STANDARDS GUIDELINES IN ORAL REHABILITATION

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ABSTRACT: This study had the objective of identifying the lines and references used in dentistry, to make a predictable outcome. A bibliographic search was performed in the primary health databases PUBMED (www.pubmed.gov) and Scholar Google (www.scholar.google.com.br), in which articles published from 1994 to 2022 were collected. Laboratory studies, case reports, systematic reviews, and literature reviews, which were developed on living individuals, were included. Therefore, articles that did not use reference lines, perception, and aesthetic standards in dentistry studies with greater validity and reproducibility, were not included. According to the methodological analysis, it was observed that the average publication of articles in the period from 1994 to 2022 in the Pubmed database was 0.40 with a standard deviation of 0.69. While in Google Scholar, the average was 1.60 and the standard deviation was 4.61. Thus, it is possible to verify that there was a significant variation in the number of articles in the two databases. In many cases, segmented facial references, lip lines, dental exposure, and interdental spaces,

are used. All are part of one whole. One of the great difficulties of rehabilitation is the lack of references or the lack of guides.
KEYWORDS: Dentistry, Esthetics, Esthetic, Dental.

1 | INTRODUCTION

The reproduction of the natural has always been a challenge in which not only dentists suffer, but also other areas that involve aesthetics. And much is written about it, as it is fundamental and one of the most important forms of communication and expression (Matos et al., 2020). With that, the human being has always looked for ways or mechanisms to facilitate this work, and to make the execution and reproduction more natural in a simpler way, forming patterns. The Greeks discovered the magical proportions that organized everything in nature, even the blooming of flowers known as golden proportions. Renaissance painters rediscovered these ideal proportions and patterns that they applied in their works, being seen as more beautiful paintings. (Mendes; Bonfante, 1994)

The standards have also followed the entire history of dentistry. The smile is no longer just a dental factor and has become a facial/dental set. The whole face forms a mechanism together with the smile, representing a fundamental aspect in the composition of an individual's beauty. (Suzuki et al., 2011) Considering three basic elements of facial expression: the eyes, facial muscles, and the oral cavity. (Telles, 2010) The observer is attracted according to the harmony of the smile and the face of the observed. Therefore, the reference standards of what is beautiful were developed according to the shape of the face, personality, lips, biotype, (Borges et al., 2020) coincident facial and dental midline, wing line of the nose coincident with the positioning of the canine, proportional facial thirds, and perpendicular vertical and horizontal lines.

It is of fundamental importance for the dental surgeon and the rehabilitator to aim to reproduce the natural, and the advancement in the field of aesthetic dentistry has provided increasingly innovative methods for the construction of a functional and harmonious smile. (Diógenes et al., 2020) It was identified that the disharmony between facial and dental esthetics (low dental esthetics and high facial esthetics) was the reason for the increased visual attention to the mouth, leading to an in-depth study of the synchrony of the face with the smile (Matos et al., 2020). The integration of digital media with dentistry is constant and all specialties have been innovating, being the new trend in the last decade. (Borges et al., 2020) The set formed in this integration allowed for more visually attractive facial aesthetics. (Baker et al., 2020)

Thus, the present aims to describe, through a literature review, the main points, lines, and standards of references used in oral rehabilitation.

2 | METHODOLOGY

2.1 Source Selection

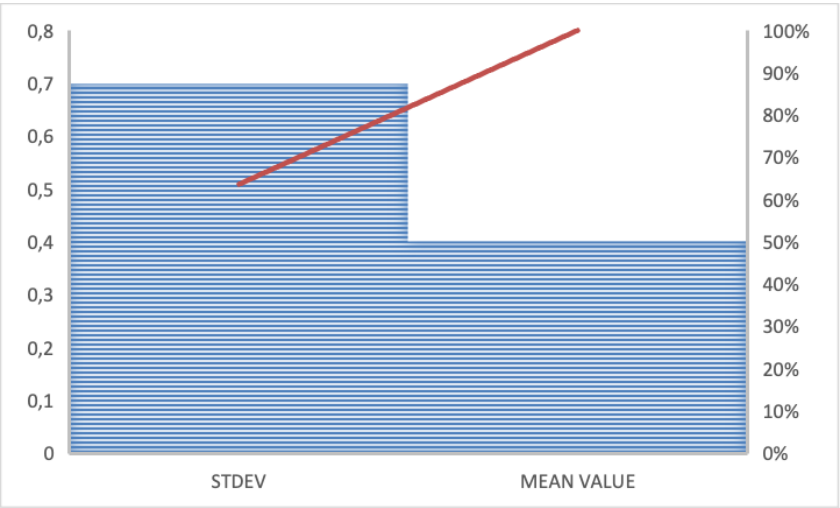
A bibliographic search was performed in the main health databases PUBMED (www.pubmed.gov) and Scholar Google (www.scholar.google.com.br), in which articles published from 1994 to 2022 were collected. In the first stage, the list of retrieved articles was examined by reading the titles and abstracts. In the second stage, the studies were selected by reading the full contents. Two authors (JDMM and HCC) performed stages 1 and 2. Experimental clinical, laboratory studies, case reports, systematic reviews, and literature reviews, which were developed on living individuals, were included. Therefore, articles that did not deal with the use of reference lines, perception, and aesthetic standards in dentistry studies with greater validity and reproducibility.

2.2 Data Source

Through bibliographic research, 20 articles were selected, 4 articles from PUBMED (www.pubmed.gov) and 16 from Scholar Google (www.scholar.google.com.br) (Chart 1) (Table 1). The following titles of specific medical subjects and keywords were used: Dentistry (DeCS / MeSH Terms); Esthetics (DeCS / MeSH Terms); Esthetics, Dental (DeCS / MeSH Terms); Facial Expression (DeCS / MeSH Terms).

Database	Mean Value ± St. Dev	Total Studies (1955-2022)
Pubmed	0.40 ± 0.69	4
Google Scholar	1.60 ± 4.61	16

Table. 1 – Mean value ± standard deviation of the number of studies in the primary health databases.



Graph. 1 – Cumulative chart of articles, related to mean value and standard deviation.

3 | RESULTS

According to Table 1, it can be seen that the primary articles of the last decade were listed, taking as reference the author, theme of the work, year, and the standards commonly used in the scientific community.

Author	Article	Year	Standards
Suzuki et al.	Evaluation of the influence of the amount of gingival exposure on smile static	2011	Smile gingival display
Camara CA	Aesthetics in orthodontics: six horizontal smile lines	2010	cervical line incisal line Line of contact points papillary line range of connectors tooth exposure
Camara CA	Analysis of smile aesthetics using the SmileCurves digital template	2020	upper lip line cervical line Line of contact points; incisal line; lower lip line connector space
Borges et al.	Dental reanatomization and its importance in static smile results: case report	2020	smile line Medium line Positioning the incisal edge Gum contour; Zenith Papillary Triangle interdental contact teeth texture shape and contour Spaces between teeth
Matos et al.	Aesthetic analysis of the patient: factors to consider in orofacial harmonization	2020	Golden Ratio
Gontijo et al.	Smile harmonization through periodontal surgery and direct composite resin restorations: case report	2020	Clinical crown augmentation diastema closure
Guedes et al.	Perspective of aesthetic dentistry aligned with digital dentistry: a literature review	2021	All facial and dental patterns related to the Golden Ratio
Melo et al.	The importance of restorative testing (mockup) and digital planning through digital smile design (dsd) in achieving predictable and harmonious dental aesthetic procedures: literature review	2019	interpupillary line commissure to the other occlusal plane incisal plane gingival contour Medium line lip curl buccal corridor
Souza et al.	Aesthetic and functional rehabilitation with prefabricated composite resin veneers – case report	2020	Height/width ratio presence of diastema facial proportions

Table. 1 – Main articles of the last decade.

3.1 Face analysis

The face directly interferes with dental aesthetics, being a key for aesthetic planning, classified according to geometric figures to facilitate communication and all planning development. Photographs allow you to assess the harmony between vertical and horizontal lines. The main vertical lines: midline of the face that ideally should coincide with the midlines of teeth, and when this does not occur, we identify an asymmetry between them in which the direction and magnitude of the discrepancy may vary. The other vertical line is the nose wing line (tangential to the nose wing) and coincides with the placement of the canine. The main horizontal facial lines are the horizontal interpupillary line (passing through both pupils), the horizontal line of the labial commissure (passing through the labial commissures), and the horizontal line of the incisal edge. (Cardoso; Decurcio, 2015; Matos et al., 2020)

Figure 1 – (1) Midline, (2) canine nose wing, (3) interpupillary line, (4) commissure to commissure, (5) incisal edges

3.2 Midline

The midline is perpendicular to the ground (horizon) formed by the union of the soft tissue reference points: glabella, nose tip, nasal filter, and the chin tip. Divides the face into two hemispheres: right and left. The hemispheres are similar, but not identical. The hemispheres can be very different to the point where taking one hemisphere mirror and the other part and uniting it can even look like another person. The dental midline is located between the mesial surfaces of the maxillary and mandibular central incisors, this line must be coincident with the midline, it is even accepted that the dental midline is not coincident with the midline as long as it is parallel to the midline. The sloping dental midline generates

considerable esthetic discomfort. The dental midlines must be coincident with each other, when this is not the case, it is essential to identify which one is asymmetric about the facial midline (maxillary, mandibular, or both), in which direction, and to what magnitude the discrepancy exists. (Mondelli, 2003; Matos et al., 2020).

Figure 2 -(a) Patient's natural midline, (b) mirrored right side, (c) mirrored left side.

3.3 Nose Wing Line

A vertical line parallel to the midline, passes through the wing of the nose and coincides with the positioning of the canine, more precisely with the distal third, and may be aligned with the tip of the canine. Aesthetically, the positioning of this line with the mesial of the canine is considered inadequate, in the same way, it is unacceptable for the canine to be completely anterior to the positioning of this line (Matos et al., 2020).

Figure. 3 -Canine nose wing line.

3.4 Interpupillary Line

The line joining the center of one pupil to the other is generally parallel to the ground (horizon) and the other horizontal lines and is perpendicular to the midline. An anatomical reference is of paramount importance. Through the relationship between the interpupillary line and the incisal edge, the harmony of the smile with the face can be observed. In this way, the smile follows the eyes as illustrated in Figure 4. If these lines are not presented similarly, there will be disharmony and an important negative highlight for the smile (Matos et al., 2020).

3.5 Line Commissure to Commissure

The line runs from one commissure to the other, very close to the occlusal plane. Ideally, this line should be the same as the interpupillary line, parallel to the incisal edge line, being perpendicular to the midline and the wing line of the canine nose (Matos et al., 2020).

3.6 Incisal Edge Line

The incisal faces of the dental elements are different from each other according to the tooth group, in general, the incisal faces together with the occlusal faces form a rectilinear plane called the occlusal plane or line of incisal edges. It passes through the incisal edge of the central ones, parallel to the interpupillary lines, commissure to commissure, and perpendicular to the midline (Matos et al., 2020).

Figure. 4 -(1) Interpupillary line, (2) Commissure-to-commissure line, and (3) incisal edge line.

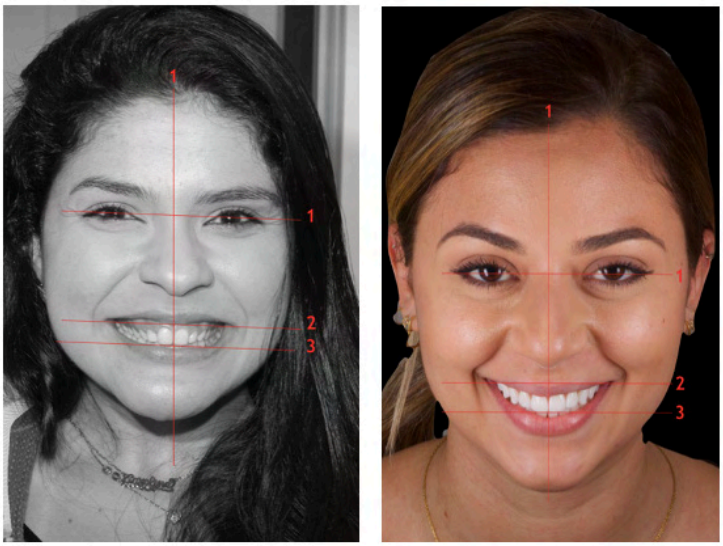


Figure. 5 -In the image on the left the horizontal lines are parallel to each other, but not perpendicular to the midline. In the image on the right, the horizontal lines are parallel to each other and perpendicular to the midline.

3.7 Lip Analysis

When talking about white aesthetics, we cannot forget the association with red aesthetics, emphasizing not only the gums but also the lips. Both the upper and lower lips significantly interfere with the beauty of the smile. Individually, each lip will influence the

dentolabial set, and, together, they will create designs that will determine the apparent tooth exposure. (Camara, 2010; Matos et al., 2020).

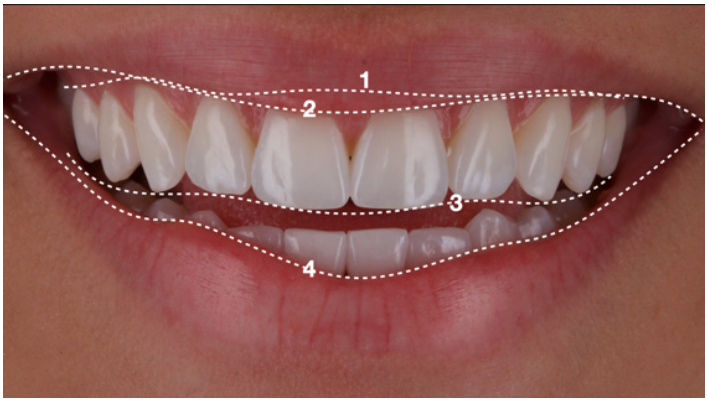


Figure. 6 -(1) Dental zenith line, (2) Upper lip line, (3) Incisal edge line of (all teeth), (4) Lower lip line.

The lip removal that occurs during the smile will allow the exposure of dental and gingival structures according to this act. This distance can be called “labial unveiling” since it will be this unveiling that will allow aesthetic dental work to be shown, as it provides the evaluation of the white (teeth) and pink (gum) aesthetic relationship with each other and with the lips. The three-dimensional relationship that these structures have with each other is what will or will not cause the pleasantness effect (Camara, 2010; Matos et al., 2020). The greater or lesser dental exposure will be influenced by labial unveiling and all factors intrinsic to it. Therefore, before starting the evaluation of the upper and lower lip lines, it is necessary to observe all the other factors that interfere with the smile (Camara, 2010; Matos et al., 2020).

Figure. 7 -The image (a) high smile, (b) medium smile, (c) low smile.

During the aging process, the lips assume a lower position, contributing to a reduction in the exposure of the maxillary anterior teeth and an increase in the exposure of the mandibular anterior teeth. It is known that women have a more marked upper incisal line than men, and both the curvatures formed by the upper incisal line and the lower lip when

smiling tend to be flatter with increasing age (Seixas; Camara, 2010; Matos et al., 2020). In the group of dentists, in addition to having a significant prevalence of the harmonious gingival plane option, there is a significant prevalence of the harmonious smile option and low percentage rates in the group of lay patients who demonstrate that there is no perception of the change in the gingival plane from this level of manipulation. Thus, dentists who understand the changes know that they can be corrected and can be interpreted as a treatment failure (Fei et al., 2011; Matos et al., 2020).

3.8 Smile Analysis

From this perspective, there are six horizontal lines of the smile that meet this purpose. The analysis of these lines facilitates the understanding of the intrinsic characteristics of the smile and gives each professional a better view of their chances of success. However, we know that, in the evaluation of the smile, it is not enough just to observe these six lines, many other factors must also be taken into account. Buccal corridor, number of teeth exposed in the smile, frontal, oblique, and profile facial analysis, and the relationship between the resting position and speech with the smile are factors that should also be observed for a better diagnosis of oral aesthetics. (Camara, 2010; Matos et al., 2020).

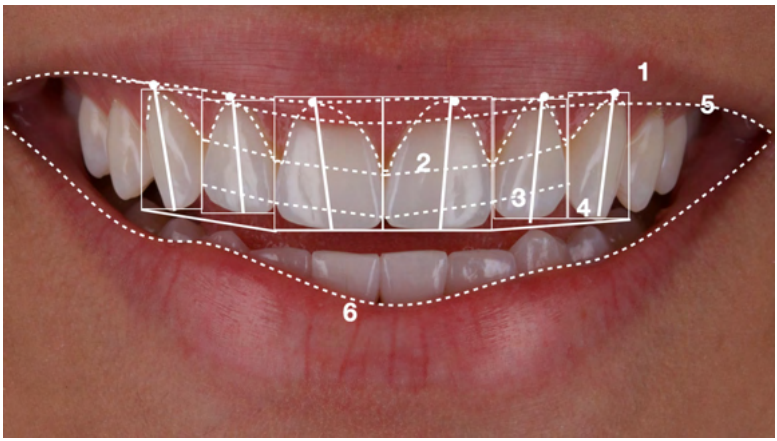


Figure. 8 -The six horizontal smile lines – (1) cervical line, (2) papillary line, (3) point of contact line, (4) incisal line, (5) upper lip line, and (6) lower lip line.

3.9 Mouth runner

Buccal corridors are spaces that appear between the buccal surface of the upper teeth and the inner mucosa of the soft tissues that form the corner of the mouth and the cheeks (Mondeli, 2003; Camara, 2010; Matos et al., 2020). It can be classified as broad, normal, and narrow. In a wide buccal corridor, the space between the buccal surfaces and the mucosa is very evident and wide, with a generous black space causing a sensation of

few elements in the oral cavity, with up to 8 teeth in the field of vision. A buccal corridor is considered normal when the spaces between the teeth and the mucosa are balanced with a field of vision of 9 to 10 teeth. In the narrow, the space between the buccal surfaces and the internal mucosa is narrow, causing the narrowing or even the absence of this black space, causing the impression of many teeth in the oral cavity, with a field of view of 11 to 12 elements.

Figure. 9 -Oral corridor.

3.10Long dental axis and gingival zenith

The long dental axis is the inclinations and angulations of the teeth. The gingival zenith is the highest gingival point. Most of it is more distal to the center of the tooth and may be coincident with the long axis of the tooth (Mondeli, 2003; Camara, 2010; Matos et al., 2020). The alteration of the zenith can optically influence the perception of the long axis of the tooth. The positioning of the most aesthetic gingival zenith is the zenith of the central one coincident with that of the canine and the one of the lateral one below both. It is acceptable that central, lateral, and canine are on the same line. But it is unacceptable that the zenith of the lateral is higher than the central and canine (Mondeli, 2003; Camara, 2010; Matos et al., 2020).

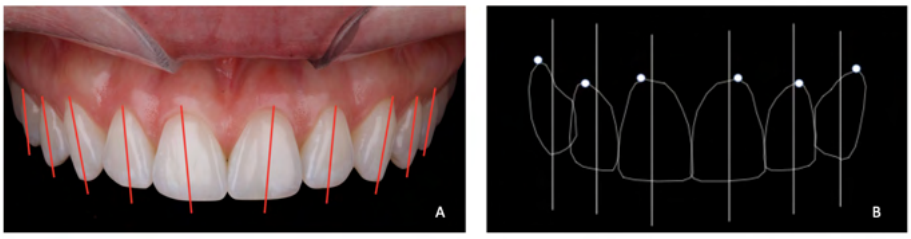


Figure. 10 -Long dental axis (a); the relationship of the zenith located distally to the center of the tooth (b).

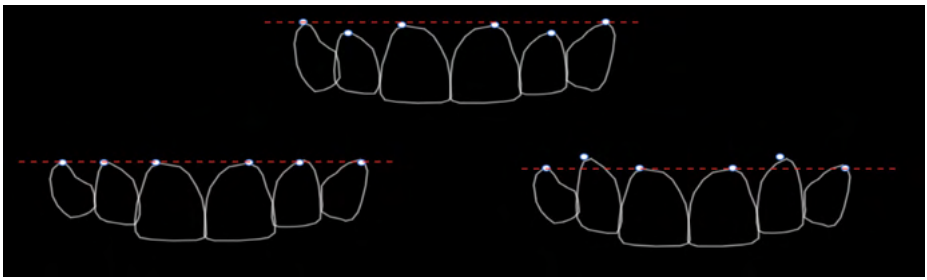


Figure. 11 -Positioning of the most aesthetic zenith (a); aesthetically acceptable positioning (b); unsightly positioning (c).

3.11 Dental proportion

Despite the different sizes and shapes of the teeth, they maintain a certain proportion to each other, both in terms of dimensions and dental positioning. Regarding the proportion of width and length, we use the maxillary central incisor as a reference, the ideal is that its width is 70% to 80% of its height, for example, if the central incisor is 10 mm high, the ideal its width is 8mm. On the other hand, the dental positioning and the visibility relationship of the elements in their order have the frontal view of the smile as a reference. (Mondeli, 2003; Matos et al., 2020) The maxillary central incisor has 100% of its face visualized in a frontal view, following the golden ratio 60% of the visibility will now be from the next element in this case the maxillary lateral incisor. Following the same reasoning, 60% of the visibility of the lateral will now be the positioning of the canine (Matos et al., 2020; Soares et al., 2021).

Figure. 12 -The image on the left and the height-to-width ratio. On the right, is the relation of dental visibility according to the frontal view.

All these standards are respected references within dentistry, but the aesthetic standards imposed by society have directly influenced dental planning. However, when thinking about prosthetic work, there must also be a return of function, along with aesthetics. For this reason, dentistry has become multidisciplinary, that is, it is necessary to integrate all areas (implantology, surgery, periodontics, prosthesis, orthodontics, among others) to have correct and effective planning (Teixeira, 2018; Matos et al., 2020).

Dental surgeons must have the ability to analyze the patient's entire facial complex, not just the oral cavity, and develop the ability to return aspects and functionality to the patient that will generate self-confidence, self-esteem, comfort, and naturalness. Dental surgeons must also take into account the patient's age, gender, personality, and cultural principles.

4 | DISCUSSION

The smile represents a fundamental aspect in the composition of an individual's beauty. For this reason, we can see the growing appeal of modern society in the search for beautiful and healthy smiles (Suzuki et al., 2011; Matos et al., 2020). Dentistry, in turn, provides increasingly whiter and symmetrical smiles in search of the perfect fit between factors that go beyond what is merely seen with the naked eye (Matos et al., 2020; Guedes et al., 2021). With globalization, the internet, and technology, people end up having greater access to information, as well as to what is new, trends, and consequently to beauty standards that change according to generations, community, and social groups. Forming aspects that are acceptable or required within a given group.

However, some characteristics are fundamental and have been considered aspects of protection and survival since the beginning. For example, tall men, with wide chins that generate a sign of security, and women with full breasts and wider hips that show an idea of procreation without intercurrences increase the chance of survival of the species. This is similar to beauty, there is a common standard of beauty, accepted by all generations, communities, and social groups (Matos et al., 2020).

One of the most acceptable standards is the golden ratio. Even if used alone, the golden ratio can be a guide to seeking better harmony regarding the rehabilitation of anterior teeth. However, it is important to point out that its use is not consensual, and research shows that it is often not perceived as the most aesthetic parameter. (Diógenes et al., 2020; Matos et al., 2020) Aiming at a more dental aspect, smile esthetics has the following references: shape, color, texture, gingival contour, and ideal occlusion for the harmony of the maxillomandibular complex. In general, patients aged between 36 and 49 years old, who are considered adults, value the smile more in interpersonal relationships. They associate social contact and attachment to a positive professional image. (Ribeiro et al., 2015; Matos et al., 2020) Self-image helps to organize the individual's perception and experiences of

interactions with others and with the environment (Telles, 2010; Matos et al., 2020). When looking in the mirror or photos, individuals, through their perceptions, make their judgment of what is pleasant in their image, starting with the face and soon after the lips and mouth. The face and the smile are considered their business card; their initial presentation can be pleasant or unpleasant according to the observer as they start with the face and then the lips and mouth. This synchrony benefits the impression of effective social relationships and social well-being. (Melo et al., 2019; Matos et al., 2020)

5 | FINAL CONSIDERATIONS

It can be concluded from this study that in many cases, segmented facial references, lip lines, dental exposure, interdental spaces, etc. are all part of one whole. One of the great difficulties of rehabilitation is the lack of references or the lack of guides. This can lead to the errors of rehabilitative treatments becoming increasingly complex and perpetuated, be they anterior, posterior, or both. However, dentists must, above all, have training for the initial assessment of the patient, which goes beyond the analysis restricted to the mouth, including a complete analysis of occlusal harmony and patient expectations. Today, with digital methods, there is an infinite possibility of alternatives and techniques that can be presented to the patient even before the proposed treatment begins. Analyzing each other -patient, professional and technical - thus enables optimization of time and work, making clinical-laboratory communication easier. Facial proportions are still present even if it is only in one direction, thus becoming essential standards for good rehabilitation. More randomized controlled clinical studies are needed comparing these types of aesthetics with long-term evaluation and less risk of biases to corroborate the data found in this review. More studies are also needed to evaluate the influence of aesthetic design and golden proportion on clinical implications.

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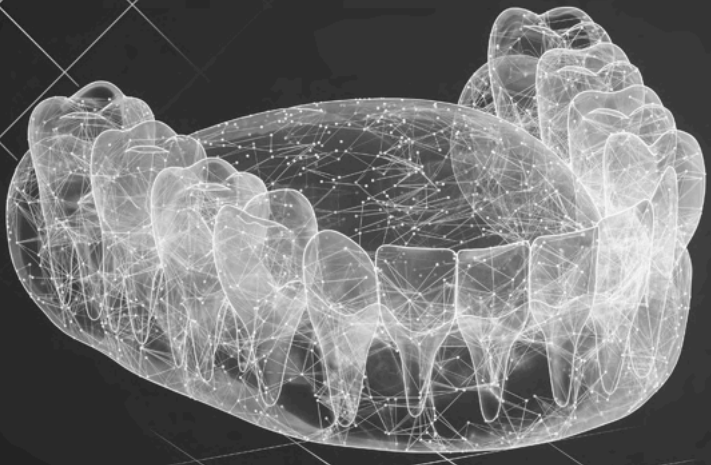
ÍNDICE REMISSIVO

Novas tecnologias e propriedades clínicas em ODONTOLOGIA



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