



Restorative Dentistry Associated with a Prosthesis on Unitary Implant in Aesthetic Rehabilitation: Case Report

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Abstract

The increase in the demand of patients in search of aesthetic rehabilitative treatments has provided the development of several techniques for rehabilitation, especially when referring to the anterior teeth. With the evolution of restorative materials and adhesion procedures, ceramics have been used in corrections and dental reconstructions with high predictability of success, as it can reproduce the dental structure with naturalness. This clinical case report was used for aesthetic rehabilitation, free metal crown on implant in dental element 21 and to help achieve excellent results were also used direct restorations with composite resins in elements 11 and 22.

Keywords: Aesthetic Rehabilitation; Implant Prosthesis; Metal Free Crowns; Composite Resins

Introduction

The loss of a single tooth, anterior region, can compromise not only aesthetics and function, but can also affect the individual's psychological and social life. Until the mid-1980s, the only prosthetic-aesthetic options in anterior teeth were the metaloceramic and metaloplastic crowns [1]. With the growth and development of aesthetic dentistry, it has become possible to perform metal-free restorations on implant-supported prostheses, metal-free prostheses, which are a viable alternative for restorative treatment, when aesthetics are desired, allowing a natural and harmonious smile, combined with the reliability of the restorative material [2]. They are made entirely of ceramics, which have been used more frequently because they are made of synthetic materials that most resemble natural teeth, in addition to presenting physical, biological and optical properties, which allow the maintenance of color over time, also presenting resistance to abrasion, stability in the buccal environment and biocompatibility with the peri-implant tissues [3,4].

In the early years of modern implantology, the main concern was tissue health and implant survival, but an increasing appreciation of aesthetics, which is as important to the success of final restoration as of health, has been the focus of implant rehabilitation [5]. This has been notable throughout implant placement, where aesthetics play an important role, especially in the anterior region of the maxilla, making it highly challenging and complex, due to the need to obtain a result not only functional, but also aesthetically [6], since adjacent natural teeth provide an immediate comparison with the artificial crown [7]. Thus, for unit losses in anterior region, the osseointegrated implant has been the most indicated by the professionals, due to its functionality and durability. However, the success of a single tooth implant in the aesthetic area depends not only on the restored function but also on the harmonious integration of the restoration with the general appearance of the patient [8].

Garber and Belser [9] (1995) reported that restoration, especially on upper incisors, is a challenge for oral rehabilitation. And to be considered successful, an implant-supported restoration must achieve a harmonious balance between functional, biological and aesthetic aspects.

Some factors, related to aesthetic implants, are closely related to the pillars, which over time have undergone great transformations, seeking suitable aesthetic solutions, and those totally ceramic provide the aesthetic similar to the natural tooth, as well as the personalization that allows the realization of the emergency profile [10]. The use of a zirconia pillar provides resistance and aesthetics in addition to biocompatibility with the peri-implant tissues and the direct application of porcelain when the indication falls on a screwed prosthesis, offering an excellent option for aesthetics in implantology [11]. In this way, the success of implant-supported restorations is based not only on osseointegration but also on obtaining aesthetic results similar to natural and healthy soft tissue teeth.

In 2005, the IPS e.max ceramic system was launched by Ivoclar Vivadent [12]. At present, this system of pure ceramics is considered innovative, proving to be an excellent option for aesthetic and functional rehabilitations since they present high mechanical resistance and are highly aesthetic, capable of reproducing with naturalness the dental structure [13], which is a major challenge because it is an area where the interface between the restorative material and the tooth structure is often visible. According to Baratieri [14] (2002) considering the anterior teeth, some basic principles such as color, shape, size, texture and brightness are fundamental for the composition of a harmonious smile.

The aesthetic properties of the composite resins are closely related to the optical interaction of light with the restoration [15]. When light energy collides with some object, for example, enamel, dentin and restoration, three main phenomena are created: reflection, transmission and absorption [16]. Unlike ceramics, composite resins are not inert in the buccal medium. It is common to observe the loss of color combination between restorations of composite resins and dental structures over time [17]. Besides the sorption of water, other factors contribute to the color change of the composite resins, among them: the size of the particles of charge and the surface roughness [18].

In restorations of anterior teeth with composite resins, there are some optical properties that seem to be more important: fluorescence, opalescence, color and translucency [19]. According to

Fahl Jr. [20] (1999) and Baratieri [21] (1995), translucent resins serve as an artificial enamel, and opaque resins as an artificial dentin. Thus, we must determine the area of application of each type of composite resin, following characteristics of mechanical and optical behavior of the natural tooth, as well as the thickness of these layers, in order to enhance the aesthetic result and putting in use all the possibilities currently offered by composites [22,23]. According to Busato [24,25] (1996, 2002) dentistry is constantly evolving, one of its goals is to perform restorations that do not need to be repaired and remain viable for years in the individuals cavity.

However, in the search for aesthetic excellence, there will often be a need to complement a rehabilitation procedure with restorative dentistry, so the purpose of this article is to report a clinical case in which aesthetic result was obtained by means of a rehabilitation with prosthesis on implant associated with restorative treatment with composite resins in adjacent teeth.

Case Report

A 40 year old systemically healthy, non-smoker female patient presented to the department of APCD (Paulista Association of Dental Surgeons) Implant Prosthodontics of the Araraquara, reporting the intention of undergoing a cosmetic rehabilitation treatment involving a prosthesis on a single implant. The patient appeared at the initial consultation with the implant already installed and osseointegrated in the region of the tooth 21 and wearing a removable partial denture. During the clinical examination, the presence of extensive, poorly adapted dental restorations with replacement need in elements 11 and 22 was observed, as well as an unsatisfactory periodontal condition of all remaining teeth due to the accumulation of subgingival salivary calculus (Figure 1 and 2).



Figure 1: Elements 11 and 22 presenting ill-adapted restorations and and subgingival calculus in the lower region.



Figure 2: Elements 11 and 22 with extensive maladaptive restorations and unsatisfactory periodontal condition.

After removal of the implant healer, it was noted that the gingival tissue around the implant was inflamed. And the implant was a 4.3 mm wide internal platform hexagon (Figure 3). The impression transfer was placed in position and the periapical radiographic examination was performed, proving perfect adaptation of the transference to the implant head (Figure 4).

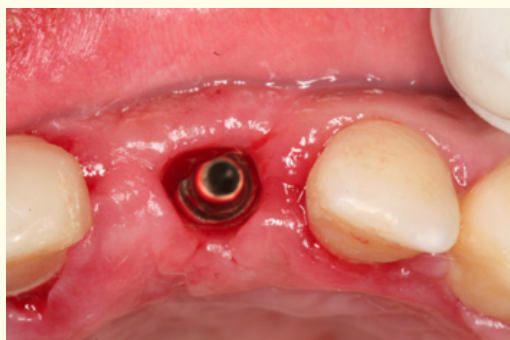


Figure 3: Implantation internal hexagon of platform long of 4.3 mm.

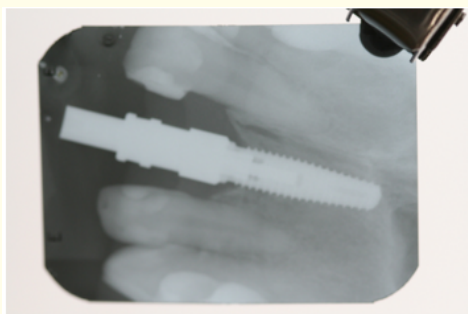


Figure 4: Periapical radiography, proving adaptation of the transference to the implant head.

The molding was done by the open tray technique with condensation silicone (dense and fluid paste), obtaining the study model with the implant analogue and the artificial gingiva (Figure 5), in order to plan the future implant prosthesis.



Figure 5: Model of study with implant analogue and artificial gingiva.

The pillar used was UCLA (Figure 6) for making a provisional crown on provisional implant in the model and waxing diagnosis of the neighboring tooth, made in the laboratory. In the office, the silicone matrix was made to guide the replacement of the ill-adapted restorations according to waxing diagnosis (Figure 7).



Figure 6: Pillar UCLA.



Figure 7: Crown over provisional implant, waxing of the neighboring tooth, positioned in the silicon matrix.

After the installation of the provisional crown, the restorative treatment was performed on elements 11 and 22 with the Four Seasons resin (Ivoclar) (Figure 8 and 9). After adjustment of the composite resins, the provisional crown was removed to start the final rehabilitation treatment in element 21. Because it was an aesthetic area, the lithium disilicate e.max customized pillar was chosen. The aesthetic abutment was installed, observing the pillar adaptation and conditioning of the gingival tissue (Figure 10). The color was then selected using the Vita color scale, the coping test and the intermaxillary duralay record for transfer molding were performed (Figure 11-13), obtaining the transfer model, thus enabling the ceramic application coverage in the laboratory. The provisional fixation of element 21 was installed again, until the cementation of the metal-free crown on the implant, with resinous cement, allowing the aesthetic rehabilitation associated with the prosthesis and denture, and also the adequate gingival reconditioning (Figure 14).



Figure 8: Temporary crown in position.



Figure 10: Incisal view of the installed aesthetic pillar of the IPS e.max system.



Figure 11: Election of porcelain color using the VITA color scale.



Figure 9: Elements 11 and 22 with finished resin restorations Four Seasons (Ivoclar), with the temporary crown in place.



Figure 12: Proof of coping of the e.max system and intermaxillary registration with duralay.

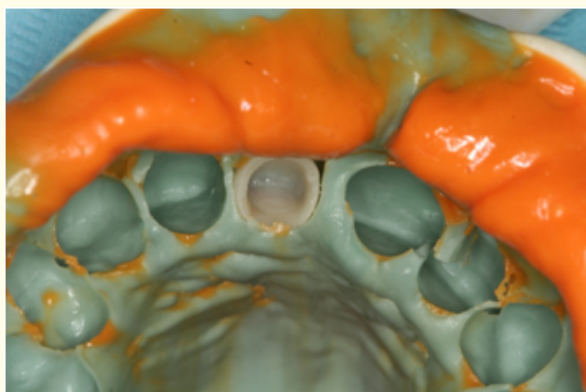


Figure 13: Transfer molding.



Figure 14: Satisfactory aesthetic rehabilitation, associating prosthesis on unit implant in element 21 and restorative dentition in elements 11 and 22. Note the appropriate gingival conditioning.

Discussion

The installation of implants aims to favor the creation of esthetic and functional prostheses where the future prosthesis can have a natural and harmonic profile of the teeth and their surrounding tissues [26-28]. According to Furhauser, *et al.* [29], Korkouta, *et al.* [6], Chow and Wang [30] in modern implantology, the success of implant-supported restorations in aesthetic zones, such as the anterior maxilla, is based not only on osseointegration, but also on obtaining favorable aesthetic results, similar to natural teeth and with tissues moles.

The purpose of implant-supported restorations is to rehabilitate the patient with prostheses that fulfill all conditions of the natural dentition, according to Takey, *et al.* [31], Grunder, *et al.* [32], Nowzari [33] the ideal emergence profile, presence of papilla, ideal contour of the gingiva around the implant with gingival margin stability, dimension and contour of the prosthetic crown and patient satisfaction are essential requirements to recover the harmony of the implant with adjacent structures.

The great advantage of using a cemented prosthesis, such as the one used in the present clinical case, is the complete aesthetics (both buccal and palatal), because there is no screw hole in the prosthetic crown, in addition to a better stress distribution. The direct cementation of crowns on pillars produces prostheses very similar to natural teeth, a situation desired to maintain an adequate relationship between the gingiva and the prosthetic crown. However, they present a great disadvantage to the difficulty of removal of the connections without risk of fracture of the crown at the moment of removal [34].

In the resolution of this clinical case, we opted for prosthetic restoration and aesthetic improvement through a single implant-supported crown, using the IPS e.max system (Ivoclar Vivadent), since it is proven to be more esthetically effective than zirconia due to its durability, strength and translucency, making the lithium disilicate based system advisable for previous restorations [35].

The use of individual crowns in the anterior segment is still a challenge due to the inherent difficulties of ensuring color, shape and texture matching with adjacent teeth. The use of the free metal system in the restoration of individual crowns in the anterior region is indicated because it can provide strength and reliability combined with high aesthetic characteristics [2].

Lima, *et al.* [36] concluded in their clinical report that metal-free ceramic crowns can promote an excellent restorative option, provided that the clinical protocol is strictly followed.

Pieger, *et al.* [37] concluded that unitary crowns made of lithium disilicate indicate excellent short-term survival rates, but the evidence for medium-term survival is limited, yet most of the reported failures were in the posterior region.

In studies using a systematic review, it is stated that the IPS e.max press (Ivoclar Vivadent) was introduced in 2005 as a better pressed ceramic material compared to IPS Empress II. This porcelain system is also composed of a pressed glass-ceramic lithium disilicate battery and its physical properties and translucency are improved through a different burning process [3].

In bibliographic research carried out by Rezentti, *et al.* [35] on the clinical evolution of vitreous ceramic prostheses and lithium disilicate dentures in a period of up to eight years showed data on the use of resin cement to cement lithium disilicate (IPS e.max Press) crowns, where it presented satisfactory results when evaluating parameters such as: plate index, depth of probing, bleeding at probing and the success rate presented a survival rate close to 8 years.

In his final considerations, the author also reports that there is a possibility of restoring aesthetics using IPS e.max Press crowns, since they are excellent aesthetic and functional alternatives, thus providing the clinician's satisfaction with compliance with the requirement of the patient.

As for the cementation stage of the metal free prosthesis, there are particular and essential characteristics for the success of the rehabilitation treatment. The choice of cement should be based on scientific knowledge since several cementitious agents and several possibilities of surface treatment, these related to the composition of the ceramic [38]. The selection by a dual resin cement allows dual activation when there is an association between the processes of chemical activation and photoactivation, thus allowing a significant positive result of the physical and mechanical properties, avoiding limitations on the performance of the retention of the prosthetic pieces when compared with the cements of unique and traditional activation [39].

Based on the comparative studies and the results observed, Freitas, *et al.* [40], it was possible to conclude that a restoration system with a smaller Young's modulus shows a higher stress concentration on the cemented crown-pillar when in contact with a high modulus of elasticity. Thus, the IPS e.max Press system provides higher stress concentration in the resin cement layer than the Procera AllCeram system, suggesting that the resin cement layer presents lower risk of failure when the Procera crown is used.

According to Baratieri, *et al.* [41] the improvement of the technique of acid etching in enamel and dentin and the appearance of new adhesive systems, together with the constant development and scientific improvement of composite resins, enabled the dental surgeon to perform aesthetic restorations on anterior teeth in the most diverse clinical indications with safety, efficiency and preservation of healthy dental structure.

In the case of the present work, the composite resin 4 seasons (Ivoclar Vivadent) was used in elements 11 and 22, which is a composite of the microhybrid type, and because it has reduced particles, it has a higher polishing maintenance capacity. According to Fahl [20], the use of this type of resin material associates excellent mechanical properties (such as fracture and wear resistance) with optimum surface smoothness, thus maximizing aesthetic properties.

As a facilitator of the shape restoration, the silicone matrix guide initially recommended by Baratieri, *et al.* [42] and according to Kreia, *et al.* [43], the use of the silicon matrix establishes a

predictability regarding the size and shape of the teeth, promoting a faster workload, as well as the stratification of the restoration in composite layers with different colors, as in this clinical case. The integration of the restoration with the patient's gums, lips, smile and face is fundamental in the aesthetic success of the restorative procedure. The size of a tooth is relevant not only to dental aesthetics, but also to facial aesthetics. Although teeth should be in proportion to each other, they must also be in proportion to the face, as a large variation in tooth size in relation to the face may adversely affect the achievement of optimal esthetics.

Another fact to be considered is the longevity of composite resin restorations. However, the dental literature does not have an agreement between the authors. This is due to the fact that many variables affect the longevity of these restorations, according to Hunter [44] (1985), the type of dentition according to Maryniuk [45] and Qvist and Strom [46] the location and size of the restoration; and according to Drake, *et al.* [47] the indications, the type of material and the adhesion of the restorative material to the tooth.

Thus, the success to obtain longevity for restorations made in composite resin in anterior teeth are highly dependent on the knowledge and the correct accomplishment of the protocols of adhesion, photoactivation, insertion and polishing, that is, all the operative steps present their importance.

Conclusion

It is concluded through this clinical case report that it is possible the success of aesthetic rehabilitation using the IPS e.max ceramic system in the confection of the implant-supported unitary crown, associating the restoration with composite resins in the adjacent teeth. This interrelationship can be an excellent alternative for aesthetic and functional rehabilitation, provided that the clinical protocol is strictly followed.

Conflict of Interest

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

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