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Anterior sector : Choice between composite and ceramic restoration. Narrative review.

Faculdade de Ciências da Saúde

Universidade Fernando Pessoa

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Thesis presented to the Faculty of Health Sciences

of Fernando Pessoa University

as part of the requirements for obtaining

the degree in Dentistry

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ABSTRACT

Introduction: The restoration of damaged anterior teeth aims to repair the tooth by meeting biological and functional requirements, but also to obtain an aesthetic restoration that fits naturally into the harmony of the patient's smile. However, the choice of restorative material is not always a simple decision.

Objective: The main objective of this thesis is to compare composite and ceramic restorations, in relation to their main indications, characteristics, advantages and disadvantages, in order to find the best choice for the patient and the dentist.

Methodology: The narrative review conducted for this study was based on Pubmed, ScienceDirect, Scielo, NCBI, ResearchGate, and University library research, in English, Portuguese and French. 44 articles were used in the writing of this work.

Conclusion: Today, the most appropriate restorative materials for anterior teeth are composite resins and ceramics. Even if composite restorations offer very good possibility, they often give way to ceramic restorations in the case of extensive coronal tissue loss, uncontrolled parafunctions, or in situations where the aesthetic requirement is high.

Keywords: “Anterior restoration”, “Composite”, “Ceramic”.

RESUMO

Introdução: A restauração dos dentes anteriores deteriorados visa reparar o dente, satisfazendo os requisitos biológicos e funcionais, mas também obter uma restauração estética que se enquadre naturalmente na harmonia do sorriso do paciente. No entanto, a escolha do material restaurador nem sempre é uma decisão simples.

Objectivo: O principal objectivo desta tese é comparar restaurações compostas e cerâmicas, em relação às suas principais indicações, características, vantagens e desvantagens, a fim de encontrar a melhor escolha para o doente e o dentista.

Metodologia: A revisão narrativa realizada para este estudo foi baseada na pesquisa da Pubmed, ScienceDirect, Scielo, NCBI, ResearchGate, e biblioteca universitária, em inglês, português e francês. 44 artigos foram utilizados na escrita deste trabalho.

Conclusão: Hoje, os materiais restauradores mais apropriados para dentes anteriores são as resinas compostas e a cerâmica. Mesmo que as restaurações compósitas ofereçam muito boas possibilidades, muitas vezes dão lugar a restaurações cerâmicas em caso de perda extensa de tecido coronal, parafunções não controladas, ou em situações em que a exigência estética é elevada.

Palavras-chave: "Restauração anterior", "Compósito", "Cerâmica".

ACKNOWLEDGEMENTS

I would like to thank my teacher, Joana Domingues, for the trust she put in me, her help, her patience and her sympathy.

I would also like to thank all the teachers who, through their lessons, advice and criticism, have helped me learn this beautiful profession.

I thank all my friends, my clinic partner, and my girlfriend who made these years of study exceptional.

To my family, my father and my brothers, who have always been there for me, in good times as well as in more difficult moments. They have always accompanied me with their help and love. I would never have succeeded without you.

And finally I would like to thank the most important person, my mother, who accompanied me at the beginning of my studies with all her encouragement and all her love but who is no longer here to see my success. I hope you are proud of me.

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I. INTRODUCTION

Modern restorative dentistry takes the natural intact tooth as its reference point, it is called biomimetics. Within the framework of the biomimetic concept, the restoration of damaged anterior teeth aims at repairing the tooth by mimicking the characteristics of a natural tooth in terms of biomechanical and functional imperatives, but also at obtaining an aesthetic restoration that fits naturally into the harmony of the patient's smile. It is now possible, thanks to the improvement of current biomaterials (composite and ceramic) to meet these objectives. (Zafar, M. S. et al. 2020).

The dentist has several aesthetic therapeutic techniques for the restoration of anterior teeth. The direct technique allows the operator to reconstruct the missing part of the tooth in the oral cavity by adding small increments of composite materials, which can be done in a single session. The indirect technique involves the preparation of the tooth beforehand and the creation of a ceramic piece in the laboratory. This technique therefore requires at least two sessions. (Azeem, R. A. et al. 2018), (ADA Council on Scientific Affairs, 2003).

As the treatment strategies are very varied and more numerous every day, it is difficult for the dentist to choose the best material by combining tissue economy and functional imperatives. But there seems to be a consensus among all professionals that in permanent teeth, non-invasive or minimally invasive dentistry should be the first choice in order to follow a therapeutic gradient from the less invasive options to prosthodontic treatments. (Toupenay, S. et al. 2018).

The purpose of this thesis is to discuss about restorations in composite resin and ceramic in the anterior sector. To evaluate the interests and limitations of each and establish decision criteria to guide the dentist to make the "right choice".

1. Materials and Methods

For the implementation of this narrative literature review, a search for scientific articles was performed using the following search engines: Pubmed, ScienceDirect, Scielo, NCBI and ResearchGate, with language limitation in Portuguese, English and French. The search was completed with the use of university libraries. The inclusion criteria considered articles published between 2003 and 2022, made available at no additional cost, with full text available, under the typology of randomized controlled trials, systematic reviews, narrative reviews and clinical cases. Articles were excluded after reading the title or the abstract, which were not interesting for the topic, resulting in a total of forty-four articles. The following keywords were used: " Anterior

restoration", "Composite", "Ceramic".

II. DEVELOPMENT

1. Composites resins

1.1 The development of composite resins

1.1.1 History

The introduction of composite resins in dentistry took place more than fifty years ago with self-cure polymethyl methacrylate (PMMA) with quartz particles added for strengthening. (Zhou X. et al. 2019).

In the early 1960's, Dr. Rafael Bowen replaced the monomethacrylate (MMA) with dimethacrylate monomers, mainly Bis-GMA. These materials became popular for clinical use in the early 1970's and for decades, the Bis-GMA dimethacrylate molecule remained the main backbone for dental composites. (Bayne, S. C. et al. 2019).

Today, composite resins are used daily in dental practice for caries restoration, pit and fissure sealing, cavity bottoms, coronal reconstructions, cements for single or multiple prostheses, orthodontic appliances … (Ferracane, J. L., 2011).

1.1.2 Composition

The composite is composed of (Ferracane, J. L., 2011) :

- An organic resinous matrix, which represents 24 to 50% of the volume of the composite, whose components are :
    - A matrix resin which is the chemically active component. It is composed of different monomers. The most used are Bis-GMA, its derivatives like Bis-EMA or Bis-PMA or polyurethane monomers.
    - Thinners such as TEGDMA, UDMA ... They are necessary to obtain a good viscosity in dental practice.
    - Inhibitors that allow the conservation of composite resins to avoid spontaneous polymerization.

- A polymerization agent, camphoroquinone, which is the most widely used photo-initiator. It will be activated by the light of the photo-polymerizing lamp by absorbing its photons. The photo-initiator can be coupled with a chemical agent starting the chemopolymerization.

- Inorganic fillers, which are usually made of silica and heavy metal glasses. They increase the strength and modulus of elasticity and reduce the polymerization shrinkage, the coefficient of thermal expansion and the water absorption.
- A coupling agent, silane, which allows to chemically attach the fillers to the matrix. (Chen M. H. 2010).

1.2 Evolution

1.2.1 Hybrid Composites

Since their introduction into dentistry, the composition of composite resins has changed significantly over time. The reduction in filler size has been one of the most important changes. The figure 1 below shows the evolution of dental resins from the 1950s to the present day (Bayne S.C. 2013).

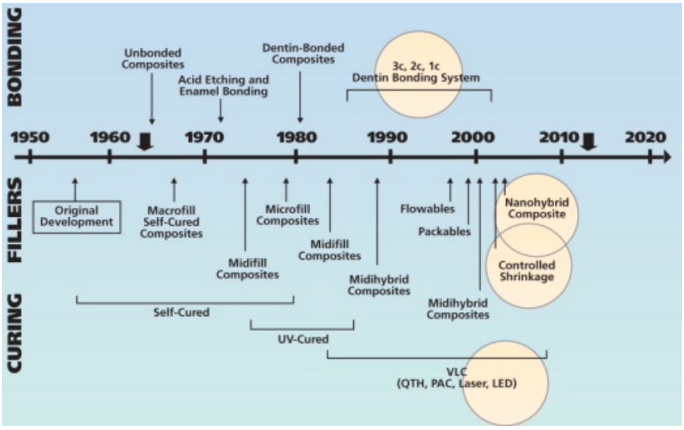

Figure 1 : Evolution of dental composites. (Bayne S.C. 2013)

In fact, the initial macrofilled materials, containing fillers of 10 to 50 µm, were very strong but difficult to polish, resulting in the impossibility of obtaining a smooth surface. Progressively, improvements have made it possible to obtain smaller particles to create a group of composites

named hybrids. (Ferracane, J. L., 2011).

Hybrid composites represent 95% of the composites currently on the market, all viscosities included. They have been marketed since the 1980s and contain a mixture of particles of different sizes and types. The aim of this composition is to optimize the volume of matrix available by incorporating a greater number of fillers and thus to improve the properties of the composite. (Miletic V. 2018).

Due to the diversity of this family, it has been subdivided according to the average size of the fillers.

- Macro-hybrid composites

Commonly called "hybrid composites", it is a mixture of silica particles and fillers whose diameter varies from 1 to 10 µm. They have very good mechanical and physical properties, but are not very aesthetic. It is for this reason that their market portion is constantly decreasing in the face of the arrival of nanotechnologies. Clinically, they are mainly used for corono-radicular reconstructions that require excellent mechanical properties without aesthetic needs. (Miletic V. 2018).

- Micro-hybrid composites

They represent today the majority of composites with 90% of the market share of which 50% is for medium viscosity microhybrid composites. These composites have fillers with an average size between 0.4 and 1 µm in diameter. (Miletic V. 2018).

Microhybrid composites are generally considered to be the universal composites since they can be used in both the anterior and posterior sectors, thanks to their combination of strength and ease of polishing. Progressively, the reduction in size of the fillers has therefore allowed for more effective polishing, enhanced esthetics, and better wear resistance. (Ferracane, J. L., 2011).

- Nanohybrid composites

This recent class of composites contains fillers with an average size of less than 0.4 µm. Their composition is very similar to the micro-hybrid class, except that they additionally contain particles between 1 and 70 nm. They therefore retain the mechanical properties of micro-hybrid composites while improving aesthetics. (Miletic V. 2018).

1.2.2 Clinical Perspective

Manufacturers have subsequently incorporated nanofillers into composite resins. The objective was to obtain a material that could be used for the restoration of the anterior and posterior sector. They will be used in areas subject to high stresses and must therefore have adequate mechanical strength as well as sufficient aesthetic properties. Generally, it is difficult to distinguish nanohybrids from microhybrids. Their mechanical properties, such as bending strength and modulus of elasticity, tend to be similar, or nanohybrids are slightly inferior to microhybrids. (Ilie, N. et al. 2009).

However, a study of Alzraikat H. et al. (2018) reports that nanocomposites would not significantly outperform hybrid composites in terms of strength and hardness. In terms of sorption and solubility, nanocomposites would have lower values than hybrid composites, which would influence their clinical performance. This study concludes that the performance of nanocomposites is clinically acceptable for a period of 1 to 10 years, but that it is not possible to conclude that their performance is superior to hybrid composites. (Alzraikat H. et al. 2018).

The percentage change of microhardness and color change is significantly higher in nanohybrid compared to microhybrid composites. This shows a higher strength of microhybrid composites compared to nanohybrid. (Barve, D. et al. 2021).

Polymerization shrinkage of composite resins is also an important clinical issue. It creates contraction stress within the material that can be responsible for marginal maladjustment, microfractures, loss of sealing, postoperative sensitivity and secondary caries. (Kaisarly, D. et al. 2016).

Nowadays, for composite materials, polymerization shrinkage still exists. Recently, a silorane based composite resin has been developed. The chemical process of its polymerization is different from that of other composite resins. Because of their arrangement, the shape of these molecules limits the phenomena of chemical shrinkage during polymerization. However, clinical experience is still insufficient to confirm a major advance in the clinical repercussions. (Maghaireh, G. A. et al . 2017).

There is also an important point to know if there is an interest, between the different composites, regarding the aesthetics and the biomimicry of the natural tooth. Indeed, these two points are particularly important in the anterior area visible during the smile. Today, it is suggested that the use of nanohybrid composites would allow, through the reduction of the size of the fillers, a better distribution of the pigments which would confer to the material the potential to improve the continuity between the dental structures and these particles and thus to provide a more stable and

natural optical restoration. (Sulaiman, T. A. et al. 2021).

To synthesize, macrohybrid composites have good mechanical and physical characteristics. However, their wear resistance is limited, they can be aggressive to the antagonist, promote plaque retention and are not esthetic. Microhybrid composites have a higher physical strength than nanohybrids. They have the advantage of good aesthetics and a longer duration in relation to the microhardness and color change. However, polymerization shrinkage is always present with this type of composite. Nanohybrid composites have improved mechanical properties. They provide the best aesthetic result. However, the clinical experience with this material is still insufficient and some properties can be improved. (Miletic V. 2018), (Barve, D. et al. 2021), (Maghaireh, G. A. et al . 2017), (Sulaiman, T. A. et al. 2021).

1.3. Indications of composite resins in the anterior sector

It is possible to restore anterior teeth using the direct technique in the most conservative way possible while achieving good esthetic and functional results. These types of restorations do not require excessive preparation of the teeth. This means that little or no healthy tissue is removed during the procedures, as preparations are limited to the treatment surfaces that will receive the composite material. In this perspective, the application of composite is one of the most conservative therapies. (Decerle N. et al. 2011).

The indications for the use of composite resin in the anterior sector vary according to the circumstances. They can be divided into three groups :

- Restoration of tooth structure and contour.
- Changes to tooth form and enhancement of esthetics.
- Combination restorations.

The first group includes restorations whose initial purpose is not to modify the original shape of the tooth. These are cases of restorations of caries, trauma or wear (erosion, attrition or abrasion).

In the second group, the goal of the treatment is to change the shape of the tooth, as in the case of dyschromias, dysplasias, diastema corrections or tooth position.

A third group of restorations that will combine the first two, which will both repair and modify the shape of the tooth and the aesthetics. (Hickel, R et al., 2004).

1.4. Advantages and limitations of composite resins

It is possible to obtain very satisfactory aesthetic results with this technique. Composite restorations can be done in one visit, without the need for laboratory fees, which reduces the cost. In case of fractures they can be repaired or replaced quickly. (B. Korkut et al., 2016).

Utilisation of composite allows great tissue preservation since it requires very little (or no) preparation of the tooth. And today, according to G. Tirlet et al. (2009) a treatment that does not privilege the principle of tissue preservation, whatever the apparent result, cannot be considered successful.

On the other hand, there are known limitations to the use of composite resin. This technique requires high standards from the dentist. The addition of large amounts of composite can have a detrimental effect on gum health, manifesting as gingival inflammation and periodontal destruction. Restorations involving the incisal edge are subject to high masticatory loads and shear forces with the possibility of fracture. Class IV restorations have twice the failure rate of Class III restorations, which do not involve the incisal edge. (Heintze et al. 2015).

The wear of the composite depends mainly on 3 factors : the structure of the material, the conditions under the material comes in contact with the abrasive agent, and the environment of the material in relation with the nature of the surface. Depending on the mechanism of action, wear can be categorized as : abrasive, adhesive, fatigue, and corrosive. (Dionysopoulos, D. et al. 2021).

In a study by K. E. Ahmed, S. Murbay (2015), they followed 100 patients with 772 anterior composite restorations, with a follow-up period between 5 months and 10 years. The survival rates of anterior composites were around 90% at 2.5 years and 50% at 5 years. B. Korkut and C. Türkmen (2021), have shown in a study on the longevity of direct diastema closure on 216 restorations, that the mean survival duration was 46.2 months. Patients with a high expectation of long-term survival may not be convinced by the longevity.

Moreover, the color of composite resins is not inert and stable as for ceramics, it depends a lot on the quality of finishing and polishing, and can be avoided by frequent controls. (B. Korkut et al., 2016). Diamantopoulou S. et al. (2022) clearly state in their study that after restoring 636 vital anterior teeth, the studied resin composite systems (Essentia, Enamel Plus HRi and IPS Empress Direct composite systems) does not fully match the color range of anterior teeth. All composite systems examined lack combinations with lightness values as high as the population's.

(Diamantopoulou, S. et al. 2022).

Relative to patients, there is a high failure rate when they have uncontrolled parafunctions such as bruxism, nail biting or Angle Class III malocclusion. (B. Korkut et al., 2016).

Van Dijken and Pallesen (2010) did a study of 14 years of follow-up and they have shown with the figure below (figure 2), the percentage of survival of a class IV restoration in patients with bruxism (in blue) and in patients without bruxism (in green). After 5 years, 40% of the restorations fractured in patients with bruxism versus 20% in patients without bruxism, which is half as much. After 10 years, only 50% of the restorations remained in patients with bruxism, compared to about 75% in the others. (Van Dijken et al. 2010).

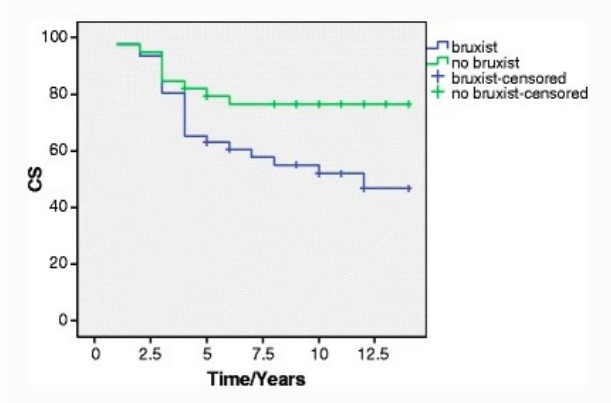

Figure 2 : Kaplan–Meier survival analysis of the 85 class IV restorations evaluated as a function of parafunctional habits of the participating patients. Bruxing versus non-bruxing patients. *CS* cumulative survival 0–100%. (van Dijken et al. 2010).

A dentist applying good methodology and using modern techniques and materials, can achieve a highly esthetic and more or less durable composite resin restoration that can fully satisfy the patient. However, anterior composite resin restorations have inconveniences in the case of extensive coronal loss, uncontrolled parafunctions, for patient with a high longevity expectancy and in situations where the aesthetic requirement is very high. (Diamantopoulou, S. et al. 2022), (B. Korkut et al., 2016), (B. Korkut et al., 2021).

2. Ceramic

2.1 The development of ceramic

2.1.1 History

At the beginning of the 18th century, Alexis Duchateau succeeded in replacing his ivory denture with porcelain. He introduced ceramics in dentistry. With the help of two Parisian dentists, Alexis Duchateau made a complete porcelain denture that lasted until the end of his life. The development of porcelain dentures was revolutionary in terms of esthetics and oral hygiene because the ivory-based dentures often using cadaver teeth that were all porous and eventually become badly stained and highly unhygienic. In 1886, Charles Land introduced inlays, onlays and crowns to dentistry, which led to the creation of esthetic and functional ceramic restorations. (Zhang, Y. et al. 2017).

One of the major evolution was to employ a 100% alumina core using a combination of digital processing and CAD-CAM technology. In the early 1990's, when this system became available, ceramic crowns and bridges for any location in the mouth became a possibility. The first zirconia-based dental ceramics also became possible with the advent of digital processing. (Bayne, S. C. et al. 2019).

While all-ceramic restorations were being developed, an alternative concept was introduced called resin-bonded ceramic. This process involved bonding thin, fragile ceramic veneers made from leucite-containing feldspathic ceramics to the tooth structure. Ceramic veneers became a highly effective clinical modality to esthetic. (Bayne, S. C. et al. 2019).

Figure 3 below shows the chronological evolution of dental ceramics. (Zhang, Y. et al. 2017).

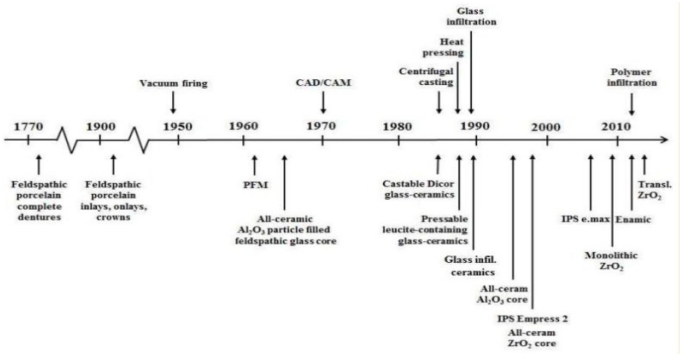

Figure 3 : The timeline of the development of dental ceramics and their processing technologies. (Zhang, Y. et al. 2017)

2.1.2 Composition

Dental ceramics are mainly composed with crystalline minerals and glass matrix. Crystalline minerals include feldspar, quartz, and alumina and perhaps kaolin as glass matrix. Feldspar is the lowest fusing component, which melts first and flows during firing, initiating these components into

a solid mass. Silica (Quartz) strengthens the fired porcelain restoration and remains unchanged at the temperature normally used in firing porcelain and this contribute stability to the mass during heating by providing framework for the other ingredients. Kaolin is used as a binder. It increases moldability of the unfired porcelain and imparts opacity to the finished porcelain product. Glass modifiers interrupt the integrity of silica network and acts as flux. Color pigments or frits provide appropriate shade to the restoration. Zr/Ce/Sn oxides, and Uranium oxide develop the appropriate opacity (Babu, P. J. et al. 2015).

2.1.3 Classification

Current dental ceramics can be divided into four groups.

- Feldspathic ceramics

It is the most translucent ceramic, which can be used for the realization of veneers, as well as inlays/onlays and single crowns. The mechanical properties of these feldspathic ceramics are however quite weak. A make-up of the ceramic after machining is necessary in order to reproduce the natural stratification of the tooth. (Valian A. et al. 2014)

- Glass ceramics

There are two main families of glass-ceramics: leucite-reinforced and lithium disilicate-reinforced. These last ones have the advantage of being more resistant to flexion than those reinforced with leucite, and also have the same optical characteristics as feldspathic ceramics. There are different levels of translucency and opacity depending on the needs: high and low translucency, high and medium opacity. They are the ceramics of choice for anterior veneer restorations, with superior mechanical properties to feldspathic ceramics, but with the same aesthetic advantages. (Fu, L. et al. 2020).

- Infiltrated ceramics

These are structural ceramics, dedicated to the realization of all-ceramic crowns or bridges. Once the ceramic has been machined in the machine tool, it is infiltrated with glass and finally undergoes a heat treatment. Here again, a choice is possible depending on the clinical situation and the desired optical properties. In Ceram Zirconia blocks, composed of 33% zirconia and 66% alumina. This ceramic has very good mechanical characteristics and is quite opaque. Then there are the In Ceram Alumina blocks, which are a little less opaque and mechanically satisfactory. They are a good

choice for a crown in the anterior sector. Finally, the In Ceram Spinell blocks, which have a good translucency and can therefore be used preferentially in the anterior sector. (Etienne O. et al. 2011).

- Polycrystalline ceramics

There are two distincts elements in this category of ceramics : pure alumina and pure zirconia. Alumina is semi-translucent and has good mechanical properties. Zirconia is opaque and has very good mechanical properties (better than alumina). They can be used for anterior and posterior crowns and bridges. (Etienne O. et al. 2011).

In their study, O. Etienne and J. Hajtò (2011), produced a table of selection criteria maximizing aesthetics while ensuring clinically proven safety. It shows that for an anterior crown, the best choices are lithium dissilicate, alumina, pure alumina and zirconia. For an anterior bridge, pure alumina and zirconia are preferred. And finally for veneers, feldspath, leucite and lithium dissilicate are the best choices. (Etienne O. et al. 2011).

2.2. Indications of ceramic in the anterior sector

The indications can be divided into three types (Magne, P. et al 2003)

- Type I: Teeth refractory to thinning.
    - Type IA: teeth strongly stained by tetracyclines.
    - Type IB: teeth refractory to internal and external thinning techniques.
- Type II: Major morphological changes. This group of indications are found in patients who are very demanding in terms of aesthetics.
    - Type IIA: conoidal teeth.
    - Type IIB: closure of diastemas and interdental black triangles.
    - Type IIC: elongation of the free edges and restoration of the incisal prominence.
- Type III: Large restorations
    - Type IIIA : important coronal fractures.
    - Type IIIB: extensive enamel loss.
    - Type IIIC : generalized congenital and acquired malformations.

2.3 Advantages and limitations of ceramics

Until now, the subgingival margin masked by the periodontium allowed for optimal esthetics, but was biologically incompatible with good periodontal health. Nowadays, thanks to technical progress and biomimicry between the ceramic and the dental substrate, the cervical margin becomes supra-gingival, leaving the periodontium free of any aggression. It shows a favorable gingival tissue response with a lowering incidence of plaque retention and also stability and good biocompatibility with respect to the pulp-denture complex. (Kassardjian, V. et al. 2016).

Ceramic restorations are therefore perfectly in line with the biomimetic principle, and the restored teeth regain a functional behavior identical to that of natural teeth in terms of stress transfer, which is not the case for teeth treated with large composite restorations. (Tirlet, G. et al. 2014).

Ceramic restorations allow for remarkable aesthetics due to the guidance of light through the ceramic. The structures of these materials are similar to enamel, including microcracks and opalescent particles in their frameworks, which provide more optical depth and brilliance. It becomes almost impossible to distinguish ceramic from natural dental tissue. (Manhart J. 2011).

The longevity of ceramic restorations are also a favorable point. Fradeani et al. show that ceramic veneers presented survival rates ranging from 96% to 98% at a 5-year evaluation. Similarly D'Arcangelo et al. reported that 119 porcelain veneers had a survival rate of 97.5% at a 7-year evaluation. (El-Mowafy, O. et al. 2018).

For anterior crowns, the results are also very high. In their study of 50-year, Olley R. C. et al. (2018), show that all anterior ceramic crowns and veneers survived and the only failures were for the metals Ceramic crowns (5% failure rate) up to the 50 year follow-up. This show a longevity far superior to composite restorations. (Olley, R. C. et al. 2018).

However, for a ceramic restoration, a preparation of the tooth is necessary, resulting in the removal of healthy tooth tissue. Full crown preparations require removal of 63 to 72% of tooth structure for front teeth. (Krump, M. et al. 2022). They are therefore more mutilating than direct composite restorations even though in some cases, due to the location of the tooth on the dental arch, no preparation is required for veneers "No Prep Veneers". (Farias-Neto, A. 2015).

Even if the ceramic has a very long longevity, the risk of fracture is not absent, and the restoration will not be as easy as with composite. It will be necessary to re-fabricate and replace the crown at a very high cost. A composite restoration is also possible but there would be a loss of all the

advantages that ceramic offers such as longevity or aestheticism. (Carrabba, M. et al. 2017).

Other conditions like poor oral hygiene and existing parafunctional activity, such as bruxism can lead to difficulties with this type of restorations. In a study by Faus-Matoses, V. et al. 64 patients including 40 with bruxism received 364 veneers. The overall survival rate was 93.7% after 3 years, 91% after 5 years, and 87.1% after 8 years. Patients with bruxism using an occlusal splint showed a survival rate of 89.1% after 7 years, while the survival rate in patients with bruxism using no occlusal splint was 63.9%. This study show that veneers may represent a suitable clinical solution for aesthetic restorations. This treatment may be a good option also for those patients affected by bruxism, as long as they regularly wear an occlusal splint. (Faus-Matoses, V. et al. 2020).

But there is also a choice to be made between ceramic veneers and full-coverage crowns. Full crown preparations require removal of 63 to 72% of tooth structure, while veneers require removal of only 3 to 30% of tooth structure. Ceramic veneers should be the first choice for tissue preservation but should only be chosen when bonding is a completely feasible option. There are several cases where it cannot be realized as for example in reduced enamel area, extensive composite restorations, dentin exposures, highly discolored teeth, when large amounts of enamel must be prepared to obtain the sufficient thickness and masking ability of the ceramic material or in significant teeth misalignments. In all these cases, full-coverage crowns seems to be the better treatment option. (Krump, M. et al 2022).

Dentists have several choices to make. Veneers are very economical in terms of dental tissue but they cannot satisfy all the treatment option. In some cases, they must leave room for crowns, who are more mutilating for the teeth than composites restorations. However, ceramic restorations provide better esthetics and mechanical strength in the long term when the limits of the composite resin restoration technique are reached. (Krump, M. et al 2022), (Manhart J. 2011), (Olley, R. C. et al. 2018).

III. DISCUSSION

With the evolution of dental materials, the restoration of the anterior sector leads to almost an impossibility to differentiate a natural tooth from a restored one. But the choice of the most appropriate material for restoring anterior teeth is often not an easy decision. (Haverroth Schünemann F. et al 2019).

On the one hand, the dentist must satisfy the aesthetic expectations of the patient and achieve a

perfectly integrated restoration in a visible area of the smile, which is a real challenge. On the other hand, the best clinical application for each is debatable because composites and ceramics share mutual indications. (Hickel, R et al., 2004), (Magne, P. et al 2003).

Tissue preservation, and therefore the choice of the least invasive technique possible in first intention, could be a possibility, to follow a therapeutic gradient from the less invasive options to the most one. (G. Tirlet et al., 2009), (Toupenay, S. et al. 2018).

But it is also necessary to take into account, for the choice of the restoration to be undertaken, the interests and limits of each technique as mentioned above.

The interests of the composite resins are its aesthetics, which thanks to the new resins can be very good, it is very conservative for the dental tissues and quick to perform and very economical for the patient. It will be also privileged during dental emergencies, and for the younger patients thanks to its easiness and rapidity of use. However, it will require frequent maintenance with color instability and plaque deposit giving a medium term result. (B. Korkut et al., 2016).

In order to obtain a satisfactory result with composites, experienced professionals, used to these methods and with modern equipment, are needed to obtain very satisfactory aesthetic results and a certain durability over time. However, it does not seem to be the most suitable material for patients with uncontrolled parafunctions, extensive coronal loss or high aesthetic demands, especially in the anterior region. The durability and strength of the material are also disadvantages of its use in the anterior region. (Diamantopoulou, S. et al. 2022), (B. Korkut et al., 2016), (B. Korkut et al., 2021).

For the ceramic, its interests will be the very high level of estheticism with a biocompatibility and a solidity that are very comparable to natural dental tissue and allow to have results on the very long term. (Kassardjian, V. et al. 2016), (Manhart J. 2011).

The price is one of the big disadvantages, as well as its lesser tissue conservation, longer procedures and the impossibility of repair. (Krump, M. et al 2022).

Veneers have the advantage of being "economical in terms of dental tissue" but they cannot be used every time. Crowns can replace them, but this is much more invasive for the tooth. There will be a 63% to 72% loss of dental tissue, which is not the case with composites. However, the aesthetic result is better as well as the longevity and the mechanical resistance in the daily use by the patients. (Krump, M. et al 2022), (Manhart J. 2011), (Olley, R. C. et al. 2018).

IV. CONCLUSION

It is now accepted that the most appropriate restorative materials for anterior teeth are composite resins and ceramics. Distinguishing natural teeth from restored teeth has never been so difficult. This shows the advancement of dental materials in restoring teeth in the esthetic region.

But each have their own indications, advantages and limitations.

Direct anterior composite restorations offer the possibility, thanks to the recent development of new composite resins, to create an aesthetic, conservative, functional, durable and economical restoration in a very short period of time. However, their implementation is all the more complex when the tissue loss is voluminous or when it is part of a global smile restoration. Thus, anterior composites often give way to ceramic restorations in the case of extensive coronal tissue loss, uncontrolled parafunctions, or in situations where the aesthetic requirement is high.

Today, ceramic restorations are the alternative of choice in the anterior region compared to composite restorations. Although more mutilating than composite resins, it is possible to have a very good tissue preservation thanks to the veneers.

Ceramics have the advantage of being biocompatible, of being able to restore remarkable aesthetics and of restoring the tooth's original mechanical properties.

The choice of an anterior restoration must therefore be based on a reasoning mainly based on tissue economy and a precise analysis of the initial clinical situation. Several factors related to the materials, the extent of tissue loss or the patient must be studied precisely in order to make a choice. Further comparative studies between composites and ceramics may help guide the dentist's decision towards the most appropriate material.

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