



ALL-CERAMIC SINGLE TOOTH PROSTHETIC RESTORATION – TECHNOLOGICAL ASPECTS

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Abstract: All-ceramic fixed prosthetic restorations present a special aesthetic; they perfectly reproduce the texture, translucency and natural shades of the teeth, being a first choice for restoring not only the front teeth, but also those in the lateral area. In this material, several aspects are presented, regarding the technology for the obtaining of fully physiognomic, all-ceramic single-tooth fixed prosthetic restorations, mainly insisting on the stages carried out in the dental laboratory, but without omitting the clinical stages as well.

INTRODUCTION

Teeth can present different problems, from the presence of coronal destruction caused by carious processes, which are the most common, to problems of colour, fractures or malposition's. All these situations can be solved with the help of all-ceramic restorations.(1-3)

All-ceramic fixed prosthetic restorations present a special aesthetic, they perfectly reproduce the texture, translucency and natural shades of the teeth, being a first-choice choice for restoring not only the front teeth, but also those in the lateral area.(4-10)

AIM

In general, multiple teeth prosthetic restorations can attack the tissues with which they come into contact (and here we are talking about neighbouring teeth, periodontium, edentulous ridge etc.), compared to single-tooth prosthetic restorations, which require a conservative grinding of the teeth due to the lack of metal, and if they are performed correctly, they will protect these tissues.(1-3,11-14)

Thus, this material will present several aspects, in terms of the technology for the obtaining of fully physiognomic, all-ceramic fixed single-tooth prosthetic restorations, mainly insisting on the stages carried out in the dental laboratory, but without omitting the clinical stages, without that these types of prosthetic work could not be performed.

MATERIALS AND METHODS

The rapid evolution in the last decade of the technological processes for the manufacture of all-ceramic fixed prosthetic restorations, has allowed these types of restorations so that, from an aesthetic point of view, when the preparation for the manufacture of the future restoration is carried out, strength and durability are not sacrificed.

All-ceramic fixed prosthetic restorations are strong enough to withstand the masticatory forces naturally exerted by the teeth. Practically, these types of prosthetic restorations are addressed to all patients, regardless of age.

For prophylactic reasons, all-ceramic single-tooth fixed prosthetic restorations are chosen in favour of multiple teeth ones. Next, 3 clinical situations will be presented in which representative single-tooth prosthetic restorations were made, making a comparative study in this sense. The manufacturing methods of these all-ceramic fixed prosthetic restorations were the classic ones, described in the specialized literature.

RESULTS

1 - Obtaining an all-ceramic onlay by pressing technique

A 30-year old female patient, came to the dental office with thermal discomfort caused by a coronary destruction, at the level of the 6-year-old molar in quadrant 4. Following the intraoral evaluation and the analysis of the radiographs, the dentist, together with the patient decided as a prosthetic treatment plan, the fabrication of an all-ceramic inlay, because: it reduces the risk of secondary caries, it shows very good resistance to masticatory pressures, it shows good colour stability, the aesthetic appearance is special, it is possible to achieve a superior restoration of contact points with neighbouring teeth (figures no 1-4).

Figure no. 1. Impression of the prepared tooth made with silicone materials in double consistency



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Next, the casting of the sectional working model using class IV die stone was made. This operation was followed by mounting the working model and the antagonist model in a simulator, taking into account the previously determined intermaxillary relationships. The wax pattern of the future all-ceramic single-tooth prosthetic restoration was then made on the working model.

Figure no. 2. The working sectional model mounted in the simulator, on which the wax pattern of the future prosthetic restoration was made



After investing the wax pattern, the actual manufacture of the fully physiognomic prosthetic restoration made of pressed ceramic was carried out, according to the instructions recommended by the manufacturer.

Figure no. 3. Onlay of pressed ceramics on the working model after de-vesting and processing



Figure no. 4. The final appearance of the Onlay (after applying the glaze) on the working model



2 - Obtaining an all-ceramic crown by pressing technology

A 38-year old male patient, presented in the dental office with coronary destruction on 1.4. Following the anamnesis, the intraoral examination and the radiographs, it was decided as a treatment plan, an all-ceramic crown restoration at the level of 1.4. After the preparation corresponding to the

future prosthetic restoration was made, the impression of the prosthetic field was made (figures no. 5-9).

Figure no. 5. Prosthetic field impression made with addition silicone in two consistencies.



Figure no. 6. The working model with the dental abutment mobilized, prepared for creating the wax pattern.



Figure no. 7. The wax pattern of the single-tooth esthetic prosthetic restoration



After the investing of the wax pattern, it was passed to the next stage, pressing of the ceramics, according to the instructions recommended by the manufacturer.

Figure no. 8. Fully physiognomic dental crown made of pressed ceramic after de-vesting and processing. Checking the contact points using articulating paper



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Figure no. 9. The final appearance of the fully physiognomic crown obtained by the pressing process on the working model (after applying the glaze)



3 - Obtaining of all-ceramic dental veneers by pressing technology

A 40-year old male patient, presented to the dental office with minimal coronary destruction on 2.1 and dental dyschromia on the rest of the upper frontal group. Following the anamnesis, the patient's intraoral consultation and the analysis of the radiographs, the dentist, together with the patient, established the treatment plan: veneer restorations for 1.3, 1.2, 1.1, 2.2, 2.3 with pressed ceramic caps on which to layer ceramic and all-ceramic crown with pressed ceramic cap, on which the ceramic will be layered. After the functional impression of the prosthetic field was made with the help of silicone condensation materials, the working model was obtained, using class IV die stone. After mounting the working model and the antagonist model in the articulator, the abutments were sectioned (figures no. 10-16).

Figure no. 10. Mobile abutments prepared obtaining the wax pattern - labial view



Figure no. 11. Mobile abutments prepared for obtaining the wax pattern - palatal view



Figure no. 12. Wax pattern of veneers with the sprue rods attached



Figure no. 13. The wax pattern of ceramic coping for tooth 2.1 with the sprue rod attached



After the investing the wax patterns, it was moved to the pressing stage of the ceramic to obtain the high-strength ceramic substructure.

Figure no. 14. Appearance of high-strength ceramic substructures after de-vesting and surface preparation



Figure no. 15. Stratification of dentin and enamel ceramic layers



All-ceramic single-tooth prosthetic restorations made of pressed ceramic represent an alternative to mixed metal-ceramic prosthetic restorations. Although, the technology of obtaining complete physiognomic single-tooth prosthetic restorations from pressed ceramic is more expensive and more laborious compared to that of metal-ceramic single-tooth prosthetic restorations, patients are quite receptive to this new

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technology, even if the strength of all-ceramic prosthetic works, especially in the lateral areas, it can be quite deficient during masticatory processes or even during certain functional movements.

Figure no. 16. The dental veneers and the all-ceramic crown made using pressing technology of ceramic in the final stage (after applying the glaze) on the working model



DISCUSSIONS

All-ceramic restorations, for one or multiple teeth, are used more and more, tending to almost completely replace porcelain fused to metal restorations.(15,16,17) Whether it is about inlays, onlays, veneers or dental crowns, the improvement of the materials from which they are made, has allowed their use in increasingly complex cases, in which porcelain fused to metal restorations were generally used, both in the frontal and lateral areas of dental arches.(18)

Prosthetic restorations in the frontal area are mainly aim to restore the aesthetic function. The classic alternatives represented by porcelain fused to meta restorations have as their main disadvantages the need to mask the color of the metal alloy used (19,20,21) as well as the local irritations caused by the different component elements of the alloys in contact with the soft tissues in the oral cavity.(22) The use of opaque substances does not completely solve the unaesthetic appearance of the alloy both at the level of the gingival margin and at the level of the labial face of the tooth.

The lateral area of the arches imposes as a major factor the restoration of the masticatory function and, secondarily, the aesthetic one. Ceramic by nature is a brittle material that presents problems in use in areas with high masticatory forces.(23,24,25) Technological advances have led to obtaining materials with properties that satisfy both masticatory forces and aesthetic demands, whether we are talking about the creation of an onlay or a dental crown.

Through the clinical examples from this material, it is possible to observe the wide use of ceramic materials in all-ceramic single-tooth restorations. In the lateral area, restorations such as onlays or dental crowns, mainly require resistance to masticatory forces but also aesthetics, especially when we talk about restorations made at the level of the mandible or at the level of the upper premolars. In the frontal area, where aesthetics is the main restored function, the use of all-ceramic restorations leads to obtaining clearly superior results to porcelain fused to metal restorations, with colour stability over time and a natural appearance of the restored teeth. The realization of connected crowns, especially in the frontal area, is contraindicated, the aesthetics is obtained much more easily by the creation of individualized crowns, which give a natural volume and superior aesthetics.

CONCLUSIONS

At the end of this material, some important conclusions for current practice should be underlined.

There is a diversity of materials and techniques used

to make all-ceramic restorations, and the choice of a certain type of restoration must take into account certain factors, including: strength, aesthetic appearance, abrasiveness of the material, clinical requirements.

Pressed dental ceramics are an excellent option for restoring teeth, restoring the beauty of the natural smile.

These types of all-ceramic fixed prosthetic restorations made of pressed ceramics satisfy most of the criteria of aesthetics, compatibility, preservation of the dental structure, durability and strength.

All-ceramic fixed restorations present a special aesthetic, they perfectly reproduce the texture, translucency and natural shades of the teeth, being a first choice for restoring not only the front teeth, but also those in the lateral area.

These types of prosthetic works take precedence in the choice of restoration decisions, and the statistics from the last decade presented in the specialized literature prove this.

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