TECHNOLOGICAL ASPECTS IN ESTHETIC CERAMIC BRIDGES

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ABSTRACT:

The evolution of fixed prosthodontics through continuous and explosive development of the materials and technologies has exceeded the expectations of many specialists, clinicians and researchers. In the last years it provides to practitioners a huge number of possibilities and methods for morphological and functional dental rehabilitation. For a long time metal ceramic restorations were considered the optimal therapeutic solution due to their special properties (biocompatibility, mechanical resistance, chemical and dimensional stability). The emergence of new materials with superior aesthetic characteristics did changed the therapeutic strategies, and patients's aesthetic demands have greatly increased; therefore, we cannot speak today of a functional rehabilitation without a physiognomic recovery as close to perfection. Zirconia materials and pressed ceramic are now two treatment options preferred by patients and practitioners.Our paper aims to present the possibility of functional restoration rehabilitation with pressed ceramic bridges, highlighting the particularities of this method and the importance of the technological factor in getting a prosthetic construction that ensures an optimum oral rehabilitation.Choosing the best material in order to achieve fixed prosthesis is still a subject of controversy, even for specialists, and more studies are necessary to improve the properties of materials and current technologies.
Key words: esthetic restorations, press ceramic, technological steps

Introduction

The aesthetic demands of the patients had highly increased in last decades, so, today we cannot realize a functional rehabilitation without taking into consideration the physionomic parameter. The variety of dental materials induced new dental technologies, so that it was necessary for technicians to achieve new details specific to each method, according to the advantages, disadvantages and indications related to each clinical situation [1,2].

The fixed veneered metal ceramic rehabilitations represent a current used treatment solution, due to their advantages: high mechanical resistance, optimal aesthetic aspect, good clinical longevity, excellent biocompatibility.

All these objectives can be achieved if we correctly appreciate the clinical and technological particularities of these prosthetic constructions: the preparation of the abutments, the design of the metallic framework, the conditioning of the infrastructure surface, the appropriate selection of the ceramic material and the correct layering and sinterization of porcelain. The mechanical limits of dental ceramic imposed the association with metallic frameworks in order to assure the optimal resistance.

Metal ceramic rehabilitations are still a widely prosthetic solution in dental practice due to their accessible technology and optimal aesthetic results. The continuous researches in biomaterials field allowed the development of new classes of ceramics, very similar to dental tissues from the aesthetic and mechanical point of view [3,4,5].

Zirconia is an alternative to the metal ceramic rehabilitation. This material has a similar resistance to the metal but is aesthetic and biocompatible. All ceramic rehabilitations are highly aesthetic, with natural translucency and opalescence, good clinical tolerance, minimal preparation of the buccal surface [6,7,8].

Our paper surveyed the possibilities of aesthetic rehabilitation using pressed ceramic bridges, with the specific algorithm with details concerning the technological steps important in achieving optimal aesthetic and functional standards.

Materials and methods

We surveyed a patient, 35 years old, who presented masticatory and aesthetic complains. After the clinical examination we established a therapeutic strategy that was represented by all ceramic bridges with retainers on 1.1, 1.2, 1.3, 1.5,1.6, 1.7, 2.1, 2.2, 2.3, 2.4,2.6 and pontic on 1.5, 2.5 on the upper arch, and retainers on3.5, 3.6, 3.7, 4.5, 4.7 and pontic on 4.6 on the lower arch.

We prepared the abutments and we registered the impressions (fig.1).

Fig.1 The impressions

The technician received the impressions and poured the working casts with removable dies, using the Pindex technology and hard stone. The casts were mounted into a articulator using the bite registration (fig.2).

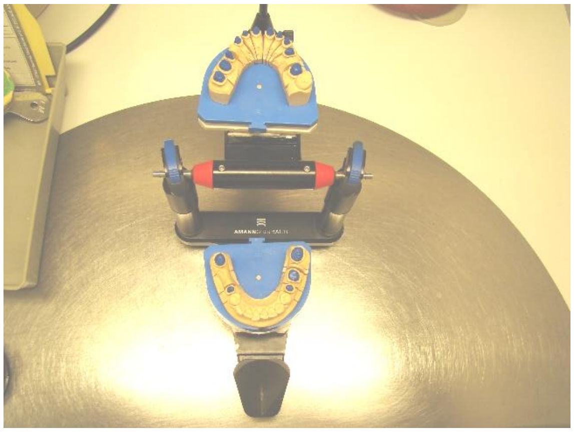

Fig.2 Mounting of the casts into articulator

The technician carved the wax pattern for the framework using white wax. The preparation for investment used injection sprues with a bigger diameter in comparison to the casting sprues.

The sprues were placed in the direction of flow of the ceramic and at the thickest part of the wax-up in order to achieve unimpeded flow of the viscous ceramic material. The spruing angle to the wax object is axial and to the investment ring base 60 ° (fig.3).

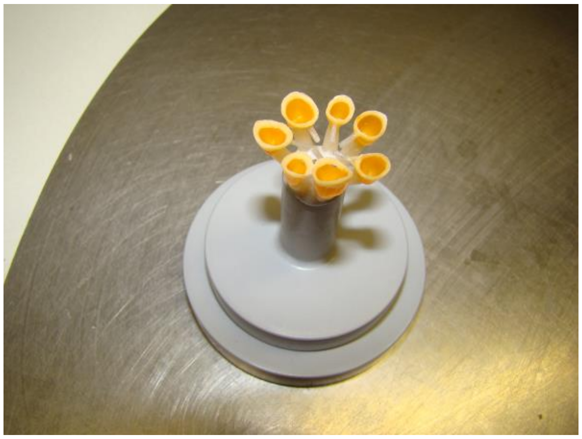

Fig.3 The wax pattern fixed in the injection device

We carefully positioned the silicone ring on the investment ring base without damaging the wax constructions. We prepared the investment material (IPSPressVEST): we filled the liquid into the mixing cup, than we added the powder. The investment material was mixed with a spatula for 20 seconds until even wetting of the powder is achieved. The paste was introduced at the vacuum mixer, at room temperature, with one minute speed, at 350 rotation/min; processing time was 6 min (fig.4)

Fig.4 Preparation of the investment material

The investment material was poured into the wax pattern, and after that into the investment ring, slowly and carefully, in order to avoid the air bubble formation (fig.5).

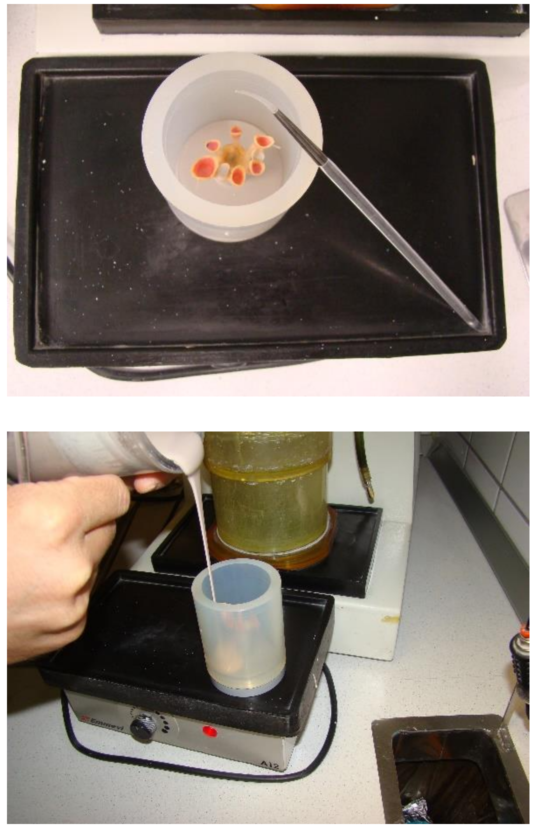

Fig.5 Investment stage

A higher material temperature or a longer mixing time shortens the processing. Some aspects are influencing the setting expansion of the investment material such as temperature of the investment material and the liquid, residual water in the mixing cup, atmospheric humidity.

After the investment, the setting time was one hour. The next step was preheating, as follows: we removed the ring gauge and ring base with a turning movement, and we pushed the investment out of the silicone ring. We placed the investment ring into the cool preheating furnace, in the rear part of the preheating furnace, with the opening facing down and at an angle of 45°. For this prosthetic construction we used IPS e.max ceramic ingots, made of monolithic lithium disilicate. The ingots and AlOx plungers were introduced in the investment ring and positioned in the furnace

Once the preheating cycle has been completed, we removed the investment ring from the preheating furnace, we placed the hot ceramic ingot into the hot investment ring and we placed the hot AlOx plunger into the hot investment ring. Then we introduced the completed investment ring central the hot press furnace and we selected the press program. Ceramic ingots are softened by heat and pressed into the refractory mold using the special injector.

After the program was completed we removed the investment ring from the furnace immediately and placed it on the cooling grid to allow a cooling at the room temperature (fig.6)

Fig 6 The injection of the ceramic into the mold

After cooling to room temperature (after approximately 60 minutes) the next step was divesting. First, the investment ring was broken and after the rough divestment was carried out with glass polishing beads at 4 bar pressure. (fig.7)

Fig.7 Sandblasting

After sandblasting, we cut the sprues and we checked the framework on the cast and inside the oral cavity. We surveyed the space necessary for the layers of the ceramic used for veneering. (fig.8)

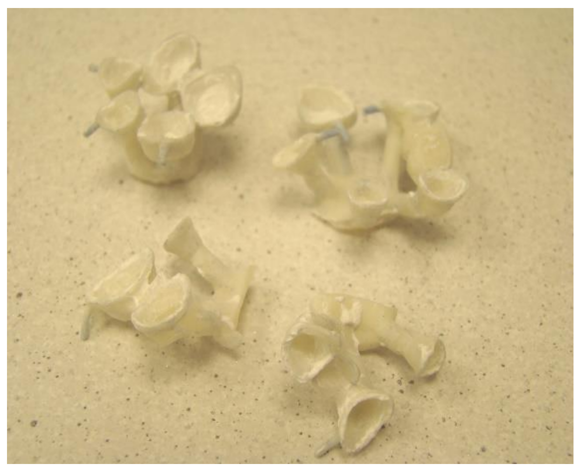

Fig.8 Mechanical finishing

After checking of the ceramic framework, we can start adding the ceramic layers, for veneering, depending on the color that was set. The first stage was to apply the liner on to the pressed ceramic framework, and then, the ceramic layers, step by step. (Fig.10) The reconstruction was intraoral verified and it was applied the final coat (the glaze) and the bridge was sent to the dental office for cementation (fig.9, fig.10).

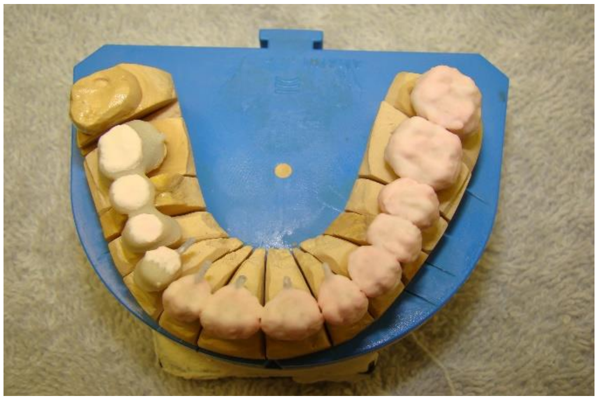

Fig.9 Veneering

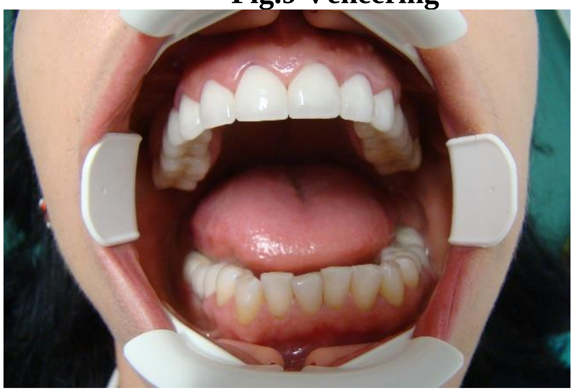

Fig.10 Final aspect of the prosthetic construction

Discutions

There is an increasing demand for all-ceramic crowns to improve esthetics parameters and to avoid intraoral use of dental alloys. The ceramic heat-pressed method is easily handled, creates less porosity than the conventional powder slurry method, produces consistent quality, and avoids firing shrinkage [9,10, 11]

IPS e.max press lithium disilicate glass-ceramic, used in our case, offers high resistance, accuracy of fit, a high level of esthetics, even for the patients with devitalized tooth or metal post build-ups.

Pressed ceramic porcelains are at least two times stronger than classic feldspar based porcelain, because the material is cast under heat and constant pressure, which increases the tightness of the particles and makes the material denser; so, pressed ceramic restorations are more durable and resistant to fracture. Pressed ceramic porcelain is less abrasive to opposing teeth than traditional feldspar porcelain. Numerous studies show that many feldspar based materials are far more aggressive against natural dentition and causes far more wear and damage [12, 13]. Pressed ceramic restorations which utilize lower-fusing porcelains are much closer in abrasiveness to natural tooth enamel. The survival rate of these prosthesis is comparable to that of metal ceramics and better than that of other ceramic systems [14,15,16, 17].

The all-ceramic option allows dentists to create a more natural looking, because these ceramics have optical properties similar with the natural teeth.

All-ceramic constructions have a very good biocompatibility and do not induce inflammatory reactions.

Our article revealed the importance of the accuracy of the technological steps for an optimal clinical acceptance.

Conclusions

The aesthetic rehabilitation represents the main goal of the fixed prosthetic treatment, the all ceramic systems being the best options.

There is a permanent evolution of dental materials, the actual ceramics being mechanical and optic satisfactory with a natural appearance.

In the last few decades, there have been tremendous advances in the mechanical properties and methods of fabrication of ceramic materials. While porcelain-based materials are still a major component of the market, there have been trends to replace metal ceramics systems with all ceramic systems. Advances in bonding techniques have increased the range and scope for use of ceramics in dentistry.

Knowing the characteristics, advantages and disadvantages of each prosthetic dental material alowes an appropriate therapeutic solution specific to each clinical case.

The contribution of the dental laboratory is essential for the final success.

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