

IPS Empress II: A Reference in the Aesthetic Restoration of Anterior Teeth

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Article History

Received: 18.09.2021

Accepted: 03.11.2021

Published: 10.11.2021

Abstract: Faced with the new aesthetic requirements of the patient population, new "cosmetic" ceramic materials have been developed with the aim of replacing the metal framework of prosthetic restorations, especially in the anterior sector. IPS Empress, a ceramic reinforced with leucite, seems to meet the specifications for aesthetic restorations. The material allows the production of single crowns without metal framework, with translucency and aesthetic rendering close to the natural tooth. When the principles of preparation and the bonding, which contributes to the strengthening of the ceramic, are well followed, the system offers a valid alternative to traditional ceramic-metal crowns.

Keywords: Anterior crown, IPS empress, esthetics, laboratory protocol.

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INTRODUCTION

Current patient demand is mainly based on aesthetic, biocompatibility and longevity criteria. The ceramic-metal prosthesis has long been the most clinically acceptable synthesis between "beauty" and "solidity". However, the presence of a metallic infrastructure, particularly in the anterior sector, constitutes a barrier to the circulation of light and contributes to darkening the surrounding gingival tissues. As a result, several all-ceramic processes have been developed to replace the metal framework of prosthetic restorations. The optical and mechanical properties of ceramics, combined with new manufacturing techniques and the improvement of bonding and surface treatments, make them today the reference material in fixed prosthesis. Among these systems, IPS empress has made a significant impact on the dentistry industry. Highly aesthetic and resistant, IPS empress monolithic restorations have now become an alternative to metal-ceramic restorations offering a comparable survival rate.

Le système ips empress II

IPS Empress has revolutionized the processing procedures for ceramic materials for

over 15 years. With the many advantages offered by leucite-reinforced glass-ceramic, such as its aesthetic properties, its precision of adaptation, IPS Empress excites both dental professionals and patients. The IPS Empress 2 consists of 2 new ceramic materials which are distinct in their composition and their use: The IPS Empress consists of a lithium disilicate material which will be used for the fabrication of the framework (which allows a relative opacity compared with IPS Empress 1) and an IPS ERIS low fusion ceramic, based on fluoroapatite crystals which will be used in the layering phase. The fluoroapatite crystals contained in IPS Eris further improve the mimicry of ceramic to dental tissue, the effect of translucency and light reflection. This is made possible in the work of the prosthetist by the multiplicity of colors available allowing a precise layering technique.

Durability of Empress restorations

A review of the literature concerning the clinical performance of IPS Empress restorations by noting the clinical trials published on Medline for 2 years allowed us to retain the following information. In a total of 6 clinical trials investigating the

Citation: Sihem HAJJAJI *et al* (2021). IPS Empress II: A Reference in the Aesthetic Restoration of Anterior Teeth. *Glob Acad J Dent Oral Health*; Vol-3, Iss-5, pp- 74-79.

performance of IPS-Empress inlays, the survival rate of the oral restoration varied from 96% over 4 years^{1 / 2} and 91% over 7 years. For crowns, the success rate varied from 98% to 99% respectively over 3 to 3 1/2 years.

For inlays and crowns the primary cause of failure was material fracture. The authors state that when performing Inlay-Onlay restorations with IPS Empress, dentists should advise patients of a failure rate of 5-10% due to fracture that could occur within 5 years. For crowns, practitioners should also mention a possible fracture over 3 years to 3 1/2 years of 1.3 to 8%. But given that during the study more crowns were placed anterior than posterior, these conclusions would be more applicable for anterior restorations.

Aesthetic considerations

The reflection of light and likewise the translucent or opaque character of a system is directly related to the number and composition of the charges in the ceramic. This makes the Empress frame translucent.

Translucency: this is the material's ability to let light pass through it. The notion of translucency is involved in the assembly of the enamel layers. For the IPS Empress II system, it should be noted that this translucent layer is not a monochrome transparent layé. In fact, in the translucency of the incisal layers, it is possible to use different shades.

IPS Empress II ingots are available in 12 shades and available in 7 degrees of translucency. This range makes it possible to meet all needs, even the most precise. The ingots are available in 6 TC shades (Transparent Colored). It is not necessary to characterize the elements made with these ingots because, without additional coloring, they integrate perfectly. The 6 other shades are particularly designed for the realization of inlays and veneers. The final tooth shade is obtained by the complementarity of the colors emanating from the residual tooth, the color of the ingot, the stains and layering masses used as well as that of the bonding composite.

However, due to the translucency of IPS Empress, the shade may be completely distorted if an attempt is made to place a restoration on a devitalized tooth or metal inlay-core or in the case of discolored living teeth. The Empress system will therefore be used mainly for living unstained teeth.

CLINICAL CASE

A 26-year-old patient consults for restoration of the 11 fractured due to trauma from an early age (Fig. 1a, b, c). The clinical examination

shows a good general condition, sufficient hygiene, a hermetic and waterproof endodontic treatment on the 11. Examination of the occlusion reveals the absence of para functions, interference and prematurity. Our prosthetic decision was in favor of an IPS Empress II system all-ceramic crown.

Preparation techniques

The preparation techniques are simple and therefore easily achievable in general practice. We start with the aesthetic reconstruction of the tooth; the evaluation of the residual walls is in favor of a bonded fiber coronal reconstruction.

The preparation guidelines and the minimum reduction thicknesses for an all-ceramic crown are close to those recommended for a conventional fixed prosthesis (fig. 2). A shoulder-type cervical preparation with a rounded internal angle 1.5 mm deep is made. The incisal part is reduced by 2mm and the axial areas by 1mm.

The provisional prosthesis completes this first session. The temporary crown should restore aesthetics and function (fig. 3). It must be tested in the mouth for better integration into the patient's oral context.

Impression taking

The deflection of the marginal gingiva is ensured by two cords of different diameter. A small diameter cord is placed at the bottom of the sulcus. It will remain in place when taking the impression. A wider cord is placed on the previous one. It will be removed just before the impression. This technique keeps the gingiva at bay and saves an area beyond the preparations.

The preparation axis being vertical, its impression is taken with a commercial impression tray using the technique of double mixing of silicones by addition (fig. 4).

Laboratory steps

The impression is cast in hard plaster and the positive unitary model (MPU) is prepared in a conventional manner. Two spacer coats are applied to the stump up to a maximum of 1 mm from the preparation limit in order to provide the necessary space for the bonding composite (fg.5).

The wax model of a volume corresponding to that of the dentinal mass is modeled (fig. 6). The homothetic form provides mechanical support at all points to the layering ceramic and will allow a fair distribution of the dentin color in the restoration. The model, fitted with a pouring rod, is placed on a cone of specific cylindrical shape (fig. 7a, b). The

latter will serve as a guide and support for the ceramic during the injection phase.

The model is then delicately removed from the MPU and coated in a cylinder (fig.8.a, b). Once the setting time for the coating has elapsed, the cylinder is removed from the mold (fig. 9), the IPS Empress II (Medium Opacity) glass-ceramic is injected under pressure, according to the manufacturer's recommendations, to make the crown framework (fig. 10.a, b, c). Different colors of ingots are available to press the dentin mass with different degrees of saturation (from the lightest to the most saturated) (fig. 11).

Once the injection cycle is complete, the screed is removed from the mold, chemically treated and then scraped before being tried in the mouth (fig.12.a, b, c).

Clinical test

The clinical trial is limited to checking the marginal adaptation, the absence of over or under-contours and the shade of the framework (fig. 13a,

b). The shade taken uses the universal Chromascope shade guide (fig. 14).

Stratification

The stratification is done in a "conventional" way (fig.15.a, b). In the present case, the shade of the crown is obtained by the single ingot of glass-ceramic. Only a layer of glaze is applied to the pressed ceramic to give it the final shine.

Placement of customary prostheses

The crown is bonded with Multilink Automix® dual bonding composite. Etching treatment of the intrados is carried out with hydrofluoric acid. A silane is then applied with a brush for 30 seconds.

At the same time, the tooth is cleaned, rinsed, dried and then isolated from moisture. It is coated with a self-etching, self-curing adhesive. Multilink Automix® composite glue is applied directly into the crown with the automix syringe. Once the crown is in place, light-curing is carried out (40 seconds per side). We finish by eliminating the excess (fig. 16).



Fig-1.A: initial case, b: removal of the composite resin, c: cleaning of the intracoronary cavity



Fig-2 : Reconstitution of the stump and peripheral preparation



Fig-3: Provisional prosthesis

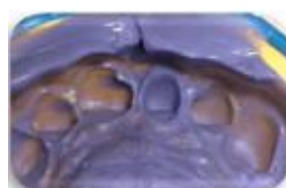


Fig-4: Imprint



Fig-5: Plaster model + spacer varnish



Fig-6: Wax model



Fig-7.a: Fixing the model on the casting rod, b: placing in cylinder



Fig-8.a, b: investment



Fig-9: Unmolding the cylinder



Fig-10.a, b, c: injection under pressure of the glass ceramic in a special oven



Fig-11: Ceramic ingots

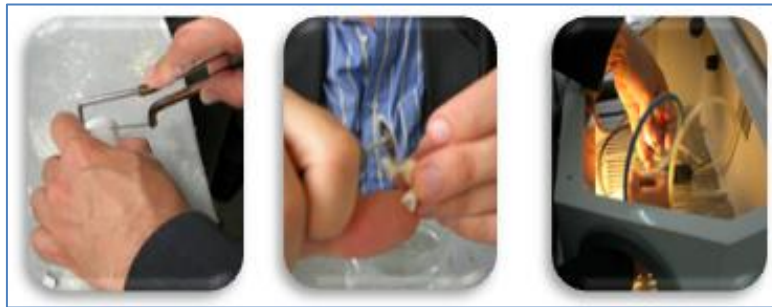


Fig-12.a, b, c: After cooling the prosthetic parts are removed from the mold, the coating is removed by sandblasting with glass beads



Fig-13.a, b: Try-in of the coping on the model then in the mouth and reassessment of the color



Fig-14: choice of shade



Fig-15.a, b: layering of the ceramic



Fig-16: final result after bonding

CONCLUSION

The aesthetic demand of our patients obliges the practitioner to increasingly seek restorative techniques capable of restoring a natural appearance to the teeth. The Empress II material has, for the past fifteen years, been able to provide esthetic restorations considered to be among the best compared to other "all-ceramic" materials, with translucency and esthetic rendering as close as possible to the natural tooth. In addition to technological advances, the clinical outcome depends on the technical and artistic skills of the practitioner and prosthetist, as well as good communication between the various protagonists.

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