ESTHETIC REHABILITATION THROUGH CAD/CAM TECHNOLOGY - CASE REPORT

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(Abstract): With the progress of dental materials and techniques, CAD/CAM system currently allows the manufacture of high precision prosthetic restorations. Zirconia is an ideal base for porcelain because the bonding process between the zirconia and the porcelain is stronger than it is with porcelain and metal. This means that the porcelain is less likely to fracture away from a zirconia base. Zirconia can also be colored to match teeth and it is translucent, mimicking the natural look of teeth far better than any crown with a metal base could. The aim of this article is to describe a case of oral rehabilitation, involving CAD/ CAM technology for full dental crowns, using zirconia as framework. Keywords: DENTAL CROWNS, ZIRCONIA FRAMEWORK, CAD/CAM TECHNOLOGY.

The popularity of metal-ceramic restorations is largely due to its qualities- high mechanical resistance and reasonable esthetics. Among others, such restorations have some color disadvantages, the metal infrastructure being difficult to be completely masked by the opaque layer (1, 2). Since the esthetic expectations in dentistry are growing, research in the field of materials for all-ceramic restoration and dental implants was intensified (3). In the last years, zirconia based ceramics became an optimal alternative in the prosthetic rehabilitation due its mechanical and optical properties (4, 5, 6). With the progress of dental materials and techniques, Computer-Aided Design/Computer-Aided Manufacturing (CAD/CAM) system currently allows the manufacture on fixed prosthesis, implants (7,8) and became a reality in dental practice. Zirconia framework is esthetically and biologically better accepted than the metal framework, and is very well tolerated by patients. It is a fact that systems based on zirconia present beyond the esthetic factors, high strength and radiopacity, plaque accumulation reduction and low thermal conductivity (9, 10). The aim of this article is to describe a case of oral rehabilitation, involving CAD/CAM technology for dental full crowns, using zirconia as framework material.

CASE REPORT
A 38-year-old female patient came to the dental clinic with esthetic problems, determined by an inappropriate aspect of the metal-ceramic crown on the tooth 2.1. The prosthetic device was poorly cervical fitted and had an improper color appearance. After
clinical and Rx examination, we decided to replace the restoration with a metal-free full crown based on a zirconia framework. The old crown was removed and the patient was provisionally protected with a preformed acrylic temporary crown. The impression was registered, using the wash-technique, then, the temporary crown was cemented with Temp Bond. Based on the impression, the dental technician created two dental casts: one for scanning and the other for the final adaptation and tray-in of the prosthetic device. For the zirconia infrastructure realization, the Schütz Dental Tizian CAD-CAM system was used. The first step consists in a highly accuracy optical impression of the model, by scanning the plaster model inside the Tizian Smart-Scan chamber (fig. 1).

![Fig. 1. Scanning the model in the Tizian Smart-Scan chamber](image)

The results of the scanning process were viewed on the monitor, in profile and in section, to check the accuracy of each detail. After scanning, the information was stored in the database, in order to create a virtual model (fig. 2). For designing the framework through software, the opposite arch and occlusal relationship should also be scanned, allowing the mounting of the 3D models in the program.

![Fig. 2 Building the virtual prosthetic restoration](image)

The design of prosthetic piece was obtained virtually (the CAD phase) and sent to the milling machine, in order to manufacture the framework by milling the ceramic blocks (CAM phase). The IPS e.Max system used was zirconia infiltrated with lithium-disilicate glass ceramic. The framework includes esthetics, mechanical performance, economic feasibility and utilization. The zirconia framework must be veneered with another ceramic system, the Tizian ceramic (Schutz Dental) being used because it offers a very dense surface, the hardness values are very similar to those of natural enamel, is very gentle on the antagonists and is color-stable during time (fig. 3).
The external polished surfaces were first cleaned in deionized water, and subsequently by ultrasound in butanone and ethanol. The final try-in of the restoration was realized on the model and in the oral cavity, as well (fig. 4). The final setting of the crown was done with self-curing resin cement for zirconia, RelyX™ Unicem (3M Espe Dental).

**DISCUSSION**

The current popularity of metal-ceramic restorations declined as a result of certain disadvantages: structural weakness, risk of errors due to the complexity of the fabrication procedure, esthetic inconveniences. The emergence of new materials and technologies open the way to achieving dental restorations with longevity over time and well accepted by patients. All-ceramic crowns based on zirconia frameworks have advantages of their mechanical and optical properties; in addition, zirconia crowns are manufactured using CAD/CAM technology, 10, 11), which allows shortening of working time, after the elimination of many laboratory steps. Zirconia is an ideal base for porcelain because the bonding process between the zirconia and the porcelain is stronger than it is with porcelain and metal. This means that the porcelain is less likely to fracture away from a zirconia base. Zirconia can also be colored to match teeth and it is translucent, mimicking the natural look of teeth far better than any crown with a metal base could. The metal free crown is long lasting, easier to wear and more durable than other crowns (12, 13).

**CONCLUSIONS**

Our clinical experience demonstrates that metal ceramic prosthesis is not always very well accepted by the patients because of some color disadvantages. Zirconia is a modern possibility to replace the metal frame in porcelain crowns and bridges and fulfill the purpose of restoring function and simultaneously ensure fundamental esthetics requirements on oral rehabilitation.

The CAD-CAM technology allowed our
prosthesis realization in a very short time, as result of eliminating a lot of laboratory steps, because zirconium dental restorations are made by cutting a solid block of zirconia with very high accuracy. The clinical exam demonstrated very good esthetic and functional results and after six months there are no biological or mechanical complications. Because of the absence of internal metal structure, light passes through similar to the natural tooth and it is reflected in the same way, which is very important, especially for front tooth restorations. Being a biocompatible material, it is very well accepted by the body and there is no risk of allergic reaction and because is thermo-insulating, the temperature variations are not transmitted to the dental pulp, thereby decreasing the risk of a possible future pulp inflammation.

So, we concluded that zirconia crown technology is an exceptional therapeutic solution, aesthetical and mechanically speaking. Also, in the future, zirconium will be a convenient solution for the dental labs because the technology is fast and accurate.

REFERENCES