MINIMALLY INVASIVE BRIDGE INLAY-RETAINED - AN OPTION FOR FIXED DENTAL PROSTHESIS. CASE REPORT

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Nowadays different indirect restorations used to replace a single missing tooth in the posterior area, such as traditional full-coverage fixed dental prostheses, implant-supported crowns, and inlay-retained fixed dental prosthesis are available in dentistry (1). The minimally invasive bridges are considered a common substitute for conventional fixed prosthesis, to avoid full crowns applied on the non-affected abutments. This treatment is an efficient method to provide satisfactory aesthetics with minimal loss of dental tissue. The design of these devices is a viable option for treating a single tooth edentation.

Currently, there is a wide range of materials and technologies to solve a reduced partial edentation in the posterior area of the dental arches. When implant therapy is contraindicated or is not possible to be applied, minimally invasive devices becomes an optimal treatment option, because allow a higher preservation of healthy dental structure and the protection of periodontal tissue. There are some advantages of this reconstruction compared to a fixed prosthetic bridge, as the minimal teeth preparation, the protection of the vitality of the dental pulp, less periodontal irritation. In order to ensure an optimal adaptation and a longevity to these prosthetic constructions, a careful evaluation of the clinical situation is necessary. Inlay-retained bridges are indicated for patients with good oral hygiene and low caries susceptibility, with a minimum coronal tooth height of 5
mm, and parallel abutments. Contraindications include extensive crown defects, tooth mobility, parafunctions, the absence of enamel on the preparation margins (2, 3).

Modern materials currently available on the market such as ceramic systems or zirconium dioxide, allow the realization of such prosthetic constructions, with sufficient strength and longevity over time. The precision of these minimally invasive bridges and the variability of the materials and technologies that can be used, make patients to accept them as a treatment solution for reduced edentulous situations (4).

The purpose of this article is to describe clinical procedures related to the placement of minimally invasive bridge inlay-retained with a zirconia framework, subsequently veneered with ceramic.

Prosthetic restorations made of zirconia have a low weight, very good mechanical strength, excellent biocompatibility, appropriate color, close to dental tissues, low thermal conductivity, smooth surface, which is not favorable to adhesion of biofilm. CAD-CAM technology greatly reduces working time and allows a high-precision prosthetic appliance. All these advantages make our therapeutic solution a viable option for restoring the continuity of the dental arch in the posterior area (5).

**CASE REPORT**

A 32 year old female patient came to the dental clinic with esthetic problems, consequently to second upper premolar loss. After the clinical (fig. 1) and complementary examinations because the patient refused the implant solution, we chose as therapeutic strategy a minimally invasive bridge with inlay crown on the abutment 1.4 and 1.6 and pontic for 1.5.

On the very first stage, a zirconia framework was made, in order to ensure the optimal resistance of the bridge; subsequently ceramic veneered, to restore the aesthetic appearance.

We prepared the inlay cavities- mesio-occlusal, and disto-occlusal, on the abutment teeth and the impressions was registered for the upper and lower arches (fig. 2).

The impressions were sent to the dental laboratory, and the technician poured the
working casts. These are properly prepared and introduced into the scanning room. The first step consisted in a highly accuracy optical impression, registered by scanning, in order to gain a digital model (fig. 3). The design of the framework was realized using the software-design component and analyzed from the point of view of the occlusion relationships and of the restoration of morphological elements.

![Fig. 3. Working stone casts and scanning](image1)

The information were transmitted to the CAM component, in order to manufacture the framework, by milling the zirconia blocks (fig. 4). For the framework VITA YZ HT blanks were used, a solution for precise, efficient and true-to-shade zirconia reconstructions. The prosthetic piece was finished, sandblasted for 10 sec at a pressure of 2.7 bar, with 50µ alumina powder. Then the framework was checked on the model and into the oral cavity and because no adjustments were necessary, the dental technician did the ceramic veneering (fig. 5).

![Fig. 4. Milling the framework](image2)

![Fig. 5. Zirconia framework after finishing](image3)

The operation started with an oxidation in order to clean the framework and to provide a good chemical and mechanical bond of the components. Then the layers for dentin and enamel were applied, and sintered in vacuum (fig. 6). For veneering we used Vita VM 9 (Vita), a highly-esthetic, fine-structure feldspar ceramic, that is perfectly adapted for zirconia framework.

After processing and checking on the working cast and in to the oral cavity, the superficial ceramic layer, the glaze, was applied and sintered in normal atmospheric
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conditions (fig. 7). The final bridge is sent to the dental office for the final adaptation and cementation in to the oral cavity (fig. 8).

![Fig. 6. Application and sintering of ceramic layers](image)

![Fig. 7. Checking ang glaze application](image)

![Fig. 8. Final adaptation and cementation in to the oral cavity](image)

**DISCUSSION**

Minimally invasive bridges inlay-retained are considered a conservative therapeutic option, because the use of inlays as retainer element on the abutment teeth allows a minimum sacrifice of dental tissue. Preserving tooth structure is adequate to the overall health of the tooth and periodontal tissues. The use of minimally invasive bonded restoration induce less trauma and superior prognosis (5, 6) In the last years, the demand for esthetics and biocompatibility led to the use of zirconia CAD/CAM materials for fixed prosthodontics (7). New materials, with a very good mechanical behavior, currently available, allow the use of this type of prosthetic restoration on premolars and molars, in mesio-occlusal and disto-occlusal cavities. The realization of these bridges using CAD-CAM technologies has many advantages: the registration of a digital im-
pression and ordering the restoration online, quickly and easily maximum precision for all results combined with easy handling, extremely wide range of applications and material versatility, high flexibility and future security due to open CAD/CAM interfaces, a diversity of possibilities of integration. Minimizing the treatment time and the number of appointments is favorable for the patient, and also precludes the complications and it is possible to achieve the preferred treatment outcomes with expedition of the whole procedure. Another advantage is represented by the leading of an excellent intraoral fit of the prosthetic appliance (8).

CONCLUSIONS

The technique presented in this case report describes a conservative method of rehabilitation of a single-tooth edentation, as an alternative to an implant-supported crown. The mechanical and aesthetic advantages of this type of restoration make our treatment alternative an extremely viable option. Briefly, the advantages of a minimally invasive bridge are conservative, highly aesthetic, strong bonded to teeth support, no discoloration of dental tissues, insulation of the teeth, good suited for large cavities, long lasting (9, 10). Surveying the mechanical properties of materials, their behavior over time, the advantages and disadvantages of the techniques, the causes that lead to failures, as well as the requirements of each patient, we can establish the optimal therapeutic solution for each clinical case.

REFERENCES