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Research Article

BONDED BRIDGE...WHAT EVOLUTION?

Morchad Bouabid

Department of Fixed Prosthodontics, Faculty of Dentistry Rabat, Morocco

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ABSTRACT

The evolution of bonded bridges is a reflection of technological advances in the treatment of surfaces and in the design of adhesive products.

In the presence of anterior unitary edentulousness, the aesthetic problem arises because of a gray border at the incisal edge due to the translucency of the enamel, in the same way as at the mandibular level.

Hence the interest of all-ceramic bonded bridges.

However, their realization must follow a rigorous clinical analysis to put the indication, a rigor in the different stages of preparation until bonding and an architectural design taking into account the different ceramic materials.

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INTRODUCTION

In the presence of a unitary edentulousness, the clinician is most often confronted with several therapeutic options. Whenever possible, the patient will choose an implant-supported or support-based prosthesis therapy adjacent teeth, for aesthetic, functional and psychological reasons.

In addition to classical achievements, the appearance of new materials and improved bonding procedures have led to the establishment of a more conservative general approach based on the respect of the dental organ.

Thus, glued bridges are a therapeutic option combining economy tissue, saving time and a lower cost price. Progress in collage has greatly contributed to the genesis of bridges glued, whose design has evolved a lot.

Conventional bonded bridges involve adhesion at several levels (1,2): between the tooth and the composite resin and between the latter and the prosthetic intrados which can be metallic, ceramic or composite resin.

Each component evolves, the metal (the nature, the shape, the treatments), the tooth (preparation and processing), ceramics, laboratory composite and bonding composite (physical and chemical properties). Depending on these developments, different types of bonded bridges are described, are tested in vitro and in vivo, improved or abandoned.

Bridges glued metal fins are they always news or should he abandoned to the profits of their counterparts with ceramic fins.

Interests of glued bridges and evolution

Different therapeutic solutions have been used to compensate for edentulousness, such as glued bridges. This solution presents several interests:

On the aesthetic level:

Bonded bridges are generally well appreciated by patients who wear them. Creugers assessed the satisfaction of these patients and concluded that it is high and decreases neither with time nor with impact reversible (detachment then recollement of the prosthesis) this is from (3):

- Respect of the vestibular surfaces, the proximal angles, vestibular slopes of cusps during the preparation of the abutment teeth;
- In the previous sector to avoid the visibility of the metal and its greyish appearance, the limit may be 1mm below the incisal edge.
- The realization of all-ceramic bonded bridges remains a therapeutic alternative in order to remedy this greyish aspect at the anterior level, proximal as well as for the mandibular occlusal tables (4).

*Corresponding author: **Morchad Bouabid**

Department of Fixed Prosthodontics, Faculty of Dentistry Rabat, Morocco

Tissue saving

It is the only non-mutilating solution of dental tissue. Unlike a bridge Conventional, only the palatal or lingual surfaces of the abutment teeth are to prepare.

The extent of dental preparation is more mutilating for bonded bridges ceramics in order to remedy weak mechanical properties compared to those with metal fins.

The limits of preparations are supra-gingival with respect for vitality pulp as well as periodontal. The abutment teeth should have a hint of the hutch favorable to avoid a too much tissue mutilation.

If a bonded bridge is used as a waiting solution before implant placement in a young patient, or waiting for osseointegration, no teeth preparation pillars will be realized and the retention of the device will depend solely on the collage (Fig.1,2,3,4,5,6).



Fig 1 Initial situation: the 11 present an abnormal mobility with a favorable occlusion to answer a therapy by bonded bridge immediate.



Fig 2 The radiological examination confirms the presence of a metal post (the removal is risky) with a periapical image ...

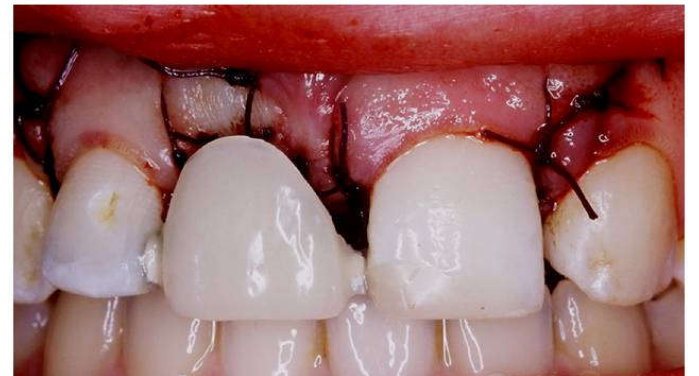
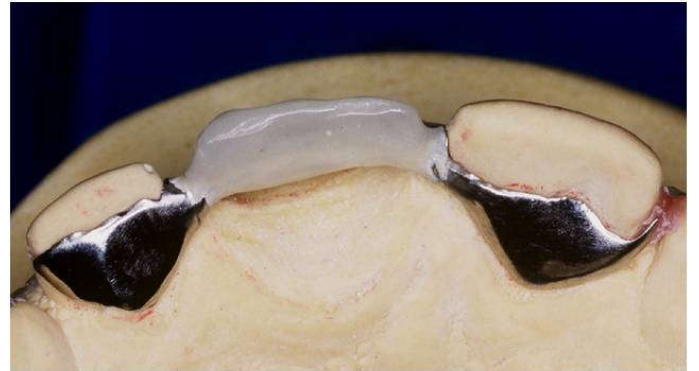
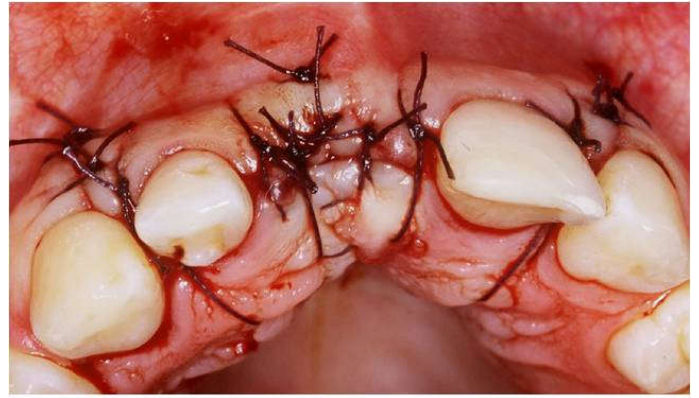


Fig 3 the extraction decision was made beforehand, with implant placement and restoration of the edentulousness immediately by a previously bonded metal bridge.



Fig 4 This is a young girl with an agenesis of the 12 and 22, who benefited from a pre-prosthetic orthodontic treatment to open spaces to put 2 implants.



Fig 5 The patient refuses a removable solution, a bonded ceramic bridge was retained and accepted.



Fig 8 Unsightly aspect due to visibility of metal.



Fig 6 final result



Fig 9 Preparing to receive a sealed bonded bridge.



Fig 10 Bridge ready to be bonded.

Preparation for bonded metal bridge

Preparations made in sealed prostheses require the absence of cons draft and opposite walls. These geometric shapes, guaranteeing the retention of the prosthesis, are unfortunately far from the loss of substance encountered clinically and it is often necessary to prepare healthy tissue to obtain them. This additional decay, sometimes very mutilating, participates in the mechanical weakening of the tooth.

Adherence to dental tissues helps to overcome some of the need and often allows more conservative preparations. To meet the requirements of retention, sustenance and stabilization (1-5-6-7-8-9) (fig.7,8,9,10):

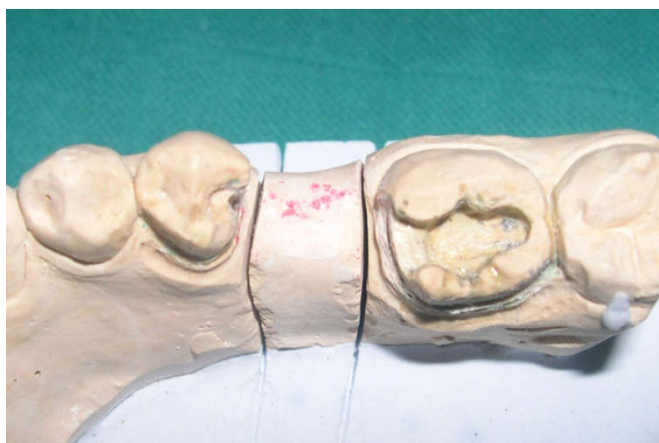


Fig 7 preparing to receive a bonded bridge in order to replace the 46.

- Changing more than 180 ° of the fin around the tooth;
- Support pads in the proximal faces adjacent to the edentulous flat-bottomed seedlings; cingulate supports;
- Let's dentin
- Recoverment of a portion of the occlusal faces if the occlusion allows it.

Preparation for ceramic bonded bridge

- Dental preparations are not standardized and must take into account following imperatives (fig.11,12,13,14,15,16,17,18, 19):
- The cavities to be prepared are essentially dentine. The quality of the gluing therefore largely depends on

the quality of the dentin hybridization guaranteeing effective dentin-pulp protection.

- The mechanical strength of a tooth is illustrated clinically, by the quantity of residual enamel at the cervical level, by the thickness / height of the walls as well as by the continuity of the walls (10,11).
- low thickness (<2mm) is synonymous with greater fragility when the restorations are glued on the dentine (12). A thickness greater than 3mm does not bring significant improvement in the resistance of ceramic fins. Furthermore, 2 to 3mm thick are most often compatible with the maintenance of pulp vitality and also allow effective polymerization (13,14,15).



Fig. 11 Dental preparation to receive a bonded metal bridge, but the unsightly appearance ...



Fig. 12 and the patient's refusal, made us change of treatment by a bonded bridge entirely of ceramic (zirconia), while informing the patient of the weak clinical recoil of this type of restoration.



Fig. 13 Final result and aesthetic integration of the bonded bridge.



Fig. 14 Initial situation: the patient wishes to restore the absence of the 35 and 45, at the same time replace the fillings with the composites on the 36 and the 46 with guarantee of the results



Fig.15...a wax-up was made to convince the patient.



Fig 16 Dental preparation to receive ...



Fig 17 ...two bridges bonded in zirconia.



Fig 18 Bridges bonded after assembly of the cosmetic ceramics.



Fig 19 Occlusal view after collage.

Regarding the situation of the cervical limit, the ideal option is the third cervical amelaire bonding, optimal sealing, easy realization, result aesthetic acceptable. Regarding the shape of the cervical limit, a quarter round leave constitutes a commonly accepted option (easy and fast realization, minimal enamel loss, improves the bonding quality).

Principles and criteria for preparation (16)

1. Support stalls of the proximal faces of 1.5 to 2mm of vestibulolingual and mesio-distal depth (table of ceramics used)

2. Drafting $\geq 10^\circ$
3. Angles between axial walls and bottom must be rounded
4. Cavo-superficial boundaries sharp and without bevel
5. Occlusal impacts outside the tooth-restoration interface (fin)
6. Width of the main isthmus $\geq 2\text{mm}$
7. Thick 2mm at the central furrow
8. Width of the residual walls of at least 2 mm at the cervical level and 1 mm at the occlusal level
9. Cusp cover of at least 1.5 to 2mm

DISCUSSION

Bonded bridges with metal fins: noble alloys replace with Ni-Cr and the Cr-Co for economic reasons make it possible to make fins more fine with good mechanical properties and good adhesion to the composite of collage (16,17).

Despite its advantages, there is a parallel technological evolution including mastery of surface treatment, improvement of mechanical properties ceramics, mastery of dental preparations as well as the demand growing in the aesthetic field of our patients (greyish appearance of the metal) and biocompatibility are all reasons that favor glued bridges entirely ceramic.

This therapeutic solution must be selected after an examination clinical (dental, periodontal, occlusal, aesthetic ...) and radiological judged favorable.

The patient is warned of the lack of clinical follow-up, also explained that this is a reversible solution and be replaced by a conventional all-ceramic bridge in case of failure.

Different ceramic systems have been proposed for the realization of bridges glued in ceramic:

- The ceramic rich in aluminum oxide infiltrated by glass, either by the slip technique (Kern *et al.*, 1991) (18), either with recourse to the milling method (Kern and Gläser 1997) (19),
- Zirconia-enhanced and infiltrated ceramics (Kern *et al* 2005) (20), pressed glass ceramics (Ries *et al.*, 2006) (21) and CAD / CAM zirconia frames (Holt, Drake 2008, Duarte *et al.* 2009) (22,23). Various high tenacity ceramic materials (for example: In Ceram® alumina / zircon, Vita; Empress II®, Ivoclar) (24, 25) have been proposed for the manufacture of the reinforcement (fig.20, 21, 22).



Fig 20 Bridge bonded to replace 24 ...



Fig 21 ... according to the Empress II® technique, ...

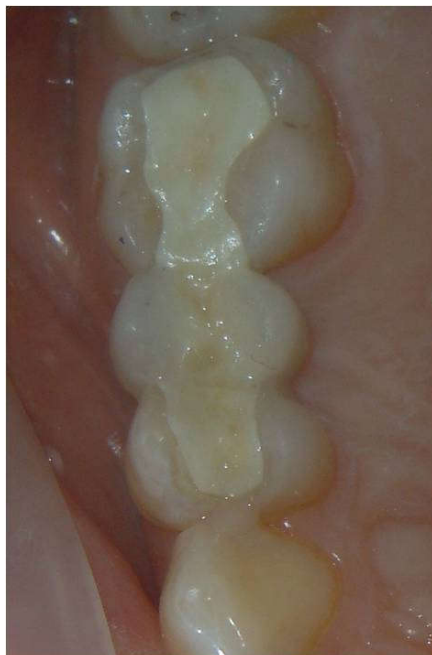


Fig 22 ...final result with good aesthetic and functional integration.

The assembly uses two surface treatments depending on the ceramic chooses: sanding with 50µm alumina particles, or even by treatment tribo-chemical (ROCATEC 3m Espe)

The connection

In 2005 Kern advocates the use of Inceram Zirconia, the frame can be machined using a CAD / CAM process. The amelar reduction is 0.5 to 0.7mm minimum and the preparation includes proximal boxes of 2mmx1mmx 0.5mm.

Connections are subject to tension stresses on their gingival side due to the application of occlusal force and compression stresses on their occlusal face. The maximum of these constraints is found in the center of connections on their gingival or slightly lingual side.

The weak point of all-ceramic bonded bridges is at the level of the connection, any variations in dimension may have consequences for the fracture resistance. The connection remains a narrow zone of construction, essential for biological and aesthetic reasons.

Depending on the type of ceramic, the connections must have a height and sufficient width to support the occlusal loads (Board 1).

CONCLUSION

Given a case of unitary edentulousness, if the implant-borne solution represents the least mutilating therapeutic, in certain situations, constraints medical, anatomical or financial reasons do not always allow us to consider this therapeutic choice.

A bonded bridge is then an alternative of choice answering the imperatives functional, aesthetic and biological. The design of the first glued bridges was without any clinical preparation prior. They have undergone significant evolution since their conception by Rochette until today passing from metal fins to fins in ceramics.

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