CEMENT OR ADHERE FIXED PROTHESIS

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Introduction:

The evolution of dental restoration techniques has significantly transformed the field of fixed dental prostheses. The choice between traditional cementation and bonding is crucial for ensuring the success of restorations. Traditional cementation utilizes dental cement for metallic restorations, while bonding offers more intimate chemical adhesion for aesthetic materials like composites and ceramics. This discussion delves into the nuances of both methods, suitable material types, clinical considerations, and long-term implications, aiming to assist dentists in making informed decisions for their patients. [6]

There are different assembly methods in fixed prosthodontics:

- Cementation: This is an assembly method that involves a setting reaction when using a material that sets as a result of an acid-base reaction but does not adhere significantly to the tooth or prosthesis.
- Bonding: This is when a material sets through a polymerization reaction and adheres to both the tooth and the prosthesis, either on its own or in combination with an adhesive.[2]

Cementation

Temporary cementation :

The temporary cementation depends mainly on the anticipated period for retaining the prosthesis in the mouth. One can have dedicated temporary cementation for temporary prostheses intended for a short duration, generally recommended between clinical sessions of 3 days to a few weeks, or for long-term temporary cementation in situations involving occlusal analysis or surgical maintenance phases (up to 6 months).

Role of temporary cementation:

- Ensure the seal of the prosthetic joint.
- Achieve assembly through micro-retention.
- Facilitate the relatively easy removal of prostheses.

Materials: Zinc Oxide Eugenol (ZOE), polycarboxylates, calcium hydroxide [5]

Definitive cementation :

- Assembly by wedging due solely to mechanical interlock of the hardened cement.
- Ensures a hermetic seal of the tooth prosthesis joint.
- Its effectiveness is enhanced by the parallelism of the walls, macro-retentions, and micro-retentions.

Materials: Zinc phosphate, glass ionomers, polycarboxylates, silicophosphates [5]

A common quality of all cements is their facility of use (easy removal of excess, minimal or no surface treatment required) and their tolerance to handling (hydrophilic setting reaction, thus tolerating oral moisture). Dental cements are used for both canal and crown fillings, as well as for fixed prosthesis sealing. Cement sealing materials have numerous advantages and disadvantages, primarily related to their mechanical properties. [3]

Bonding

Bonding is a method of assembly through physicochemical bonding.

- The adhesive must form strong bonds at both interfaces: material-adhesive and adhesive-dental tissues.
- The effectiveness of bonding is directly related to the surface area created at each interface since physico-chemical bonds form on the submicron scale on these developed surfaces. [2]

Advantages:

- Maximum tissue preservation.
- Dissipation of thermal, physical, and mechanical stresses due to the adhesive's joint deformability.
- A tight prosthetic seal.
- A wide range of shades, which plays a significant role in the final appearance and light transmission.

Disadvantages:

- Higher coefficient of thermal expansion.
- Presence of a surface-inhibited layer due to oxygen.
- Incompatibility with eugenol-based substances.
- Lower tolerance for handling errors.

Contraindications: Cases involving subgingival limits.

Indications: Restorations with low retention (bonded bridges, composite splints and fiber-reinforced splints, porcelain veneers, inlays, and onlays) require assembly by adhesive bonding [4]

Decisive Parameters

Finish Line Location

- Juxtaposed or supragingival limits → All sealing cements are suitable.
- Subgingival limit → Zinc phosphate, RMGIC.
- Conventional GICs are primarily recommended for supragingival limits; their sensitivity to early water contamination contraindicates their use in intra-sulcular situations.
- Contact with an aqueous phase during their initial setting could lead to alterations in their mechanical properties (via ionic diffusion).

Type of Materials

- Prosthesis with a metal framework → GIC sealing.
- Vitreous ceramics enriched with the vitreous phase (glass ceramics/feldspathic ceramics) → Bonding.
- Polycrystalline ceramics (Zirconia) → Adhesive sealing.

Pulp Vitality

- The acidic pH of zinc phosphate cement causes pulpal irritation, contraindicating its direct use on vital tooth.
- They are only used on fully mature tooth, with the application of a pulpal protection varnish, such as copalite, before sealing.

Number of Abutment Teeth

- In the case of numerous prosthetic abutments, the cement should have a sufficiently long working time to allow complete prosthesis insertion before setting begins.
- However, we consider zinc phosphate cement to be the preferred choice for multi-unit reconstructions. [2]

Clinical protocol

Prerequisites:

- Removal of the temporary prosthesis and cleaning of the tooth.
- Fitting of the prosthetic restoration.
- Placement of the rubber dam.

Treatment of the intaglio of the prosthetic piece.

Treatment of the intaglio of the prosthetic piece with hydrofluoric acid

The acid creates cavities within the vitreous matrix, increasing the surface area available for bonding and creating micro-retentions, enabling micro-mechanical locking of the adhesive composite.

The application time and acid concentration depend on the type of ceramic.

Rinse of hydrofluoric acid and drying.

Extensive rinsing with water for 60 seconds is essential to remove any trace of acid.

Application of silane.

After drying the prosthetic piece, a layer of silane is applied for 1 minute on the etched ceramic and then air-dried.

Application of the adhesive.

Once the silane is completely dried, the adhesive is applied to the ceramic. The chosen adhesive system should be compatible with the bonding composite. The adhesive is not photopolymerized at this stage. [6]

Dental surface treatment:

Etching :

Etching with 37% orthophosphoric acid for 30 seconds on enamel and 15 seconds on dentin.

Rinse under air/water spray for 15 seconds.

applying adhesive :

Thoroughly scrub the adhesive onto the dental surface.

- Apply a thin layer.
- Ensure deep penetration into dental structures.

After scrubbing for 20 seconds, remove excess with an air blast.

Photopolymerization of the adhesive. [7]

Conclusion

Due to the rich variety of assembly products available in dentistry, it is necessary to have a good understanding of their respective indications and properties to ensure the success and longevity of prosthetic restorations. However, mastery of techniques and implementation steps, especially for adhesives, contributes to this success , however, the dentist should have at least one product from each of the three material assembly groups in their therapeutic arsenal.

BIBLIOGRAPHY

1. Heboyan, A., Vardanyan, A., Karobari, M. I., Marya, A., Avagyan, T., Tebyanian, H., Mustafa, M., Rokaya, D., & Avetisyan, A. (2023). Dental Luting Cements : An Updated Comprehensive Review. *Molecules*, *28*(4), 1619. https://doi.org/10.3390/molecules28041619
2. Hoangminh. (2022, 4 octobre). *Couronnes tout céramique : sceller ou coller - EDP . . . · Couronne est essayée et validée clini-quement (limites cervicales, intrados, point de contact, occlusion statique et dynamique)*. vdocuments.site. https://vdocuments.site/couronnes-tout-ceramique-sceller-ou-coller-edp-couronne-est-essayee-et.html?page=5
3. Masaka, N., Yoneda, S., & Masaka, K. (2023). An up to 43-year longitudinal study of fixed prosthetic restorations retained with 4-META/MMA-TBB resin cement or zinc phosphate cement. *Journal of Prosthetic Dentistry*, *129*(1), 83-88. https://doi.org/10.1016/j.prosdent.2021.04.004
4. Ñaupari-Villasante, R., De Paris Matos, T., De Albuquerque, E. G., Warol, F., Tardem, C., Calazans, F. S., Poubel, L. A., Reis, A., De Oliveira Barceleiro, M., & Loguércio, A. D. (2023). Five-year clinical evaluation of universal adhesive applied following different bonding techniques : a randomized multicenter clinical trial. *Dental Materials*, *39*(6), 586-594. https://doi.org/10.1016/j.dental.2023.04.007
5. Oh, W. (2020). Cement type (Adhesive vs. conventional) may not affect clinical performance of zirconia and lithium disilicate Tooth-Supported crowns. *Journal of Evidence Based Dental Practice*, *20*(2), 101415. https://doi.org/10.1016/j.jebdp.2020.101415
6. Santos, M. C., Azevedo, L., Fonseca, P., Viana, P. C., Araújo, F., Villarinho, E. A., De Oliveira Fernandes, G. V., & Correia, A. (2023). The success rate of the adhesive partial fixed prosthesis after five years : A systematic review. *Prosthesis*, *5*(1), 282-294. https://doi.org/10.3390/prosthesis5010021
7. Sofan, E. A. A., Sofan, A. A. A., Palaia, G., Tenore, G., Romeo, U., & Migliau, G. (2017). Classification Review of dental adhesive systems : from the IV generation to the universal type. *Annali di stomatologia*, *8*(1), 1. https://doi.org/10.11138/ads/2017.8.1.001