Clinical Considerations for Cementation of Implant Retained Crowns

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ABSTRACT:
Context: Introduction of osseointegrated implants in early 1980’s altered the way in which partially and fully edentulous patients are treated prosthetically.

Implant supported restorations can be attached to implants with screws or can be cemented to abutments which are secured to implants with screws.

The debate between screw- versus cement-retained implant prostheses has long been discussed but the best type of implant prosthesis remains controversial among practitioners.

The purpose of this article is to provide an overview of the advantages of cement retained over the screw retained implant prostheses and give clinically relevant discussion of definitive cements, in order to enhance the dentist’s ability to make intelligent cementation choices and application in order to increase the success rate for implants

Key words: Cement-retained implant restorations

Implant dentistry requires a blend of diagnostic, treatment planning, prosthetic and maintenance skills in order to achieve maximum success. The goal of implant dentistry is to return to a patient normal contour, comfort, function, esthetics, speech and health.

The purpose of this article is to provide a clinically relevant discussion of definitive cements, in order to enhance the dentist’s ability to make intelligent cementation choices and application in order to increase the success rate for implants

Cement-retained crowns and screw retained crowns are the two options for single tooth replacement, out of which the cement-retained one is more common.

Advantages of cement retained restorations:1,2,3
1. More passive superstructure
2. Easy correction of a non passive superstructure
3. Axial load of fixing easier
4. Traditional laboratory prosthetic techniques can be utilized.
5. Easier esthetics, progressive loading more gradual, abutment may be splinted to decrease overload.
6. Less fracture of acrylic or porcelain components, cement failure or partial retained restoration.
7. Easier access to posterior abutments
8. Fewer appointments and less time to restore patients

Much of what we know and how we think about cements has been learned from their use with teeth. Luting considerations for cemented implant supported crowns differ slightly and depend on the type of prosthesis and long term goals. Basic requirements (mechanical, biological and handling requirements) must be met by the luting agent, but some properties (i.e. fluoride release, bonding to tooth) are not needed for these restorations.

Logically, no single retrievable cement will suffice for all clinical situations. Mechanical factors, such as resistance/retention form, height, distribution and number of abutments, accuracy of superstructure fit, as well as maxillary versus mandibular arch, will strongly influence the amount of cement retentiveness required for a given restoration.
Factors affecting retention and resistance form of cement-retained restorations are:

A) Abutment based:
1. Total occlusal convergence
2. Surface area and height
3. Surface finish or roughness
4. Shear forces
5. Path of insertion for non parallel abutments
6. Intracoronal auxiliary features in the preparation

B) Casting based:
1. Relative adaption of the restoration to the abutment
2. Texture of the internal surface of casting
3. Splinting of multiple units
4. Strength properties of the cast metal superstructure

C) Luting agent based:
1. Type of cement
2. Use of venting or internal casting relief
3. Variations in cement viscosity
4. Variations in the seating forces
5. Variations in the duration of the force

Studies have shown that cement-retained, implant supported crowns luted with zinc phosphate and glass ionomer do not have same quality marginal fit as compared to screw retained counterparts. Though both have acceptable strength qualities, they may have solubility issues if exposed to oral fluids too early. It may be difficult to achieve or maintain a dry cementing environment for crowns placed on deep subgingival abutment margins, which often occur in esthetic areas. Hence a resin cement of relatively low solubility may seem to be the better choice in such situations.

The biggest challenge of a cemented (implant supported) restoration is the complexity in clinical delivery and cleaning the excess cement. There are lots of complications caused due to this inefficiency.

It was found on study that zinc phosphate was the easiest to remove and resin was the most difficult. Plastic scalers are recommended for removal of excess material, to avoid metal scratches.

“Is the luted implant-supported crown or prosthesis intended to be retrievable?” If so then the inclination would be towards the use of provisional cements. It has been observed that single-unit cemented implant supported crowns luted with provisional cements necessitate frequent recementation. Recementations can be very difficult especially if the surrounding tissues quickly collapse around the abutment. In many situations where the height of the abutment is less, due to reduced inter-occlusal space, the retention provided by temporary cements may be seriously in doubt. Assuming that the abutment screws are properly tightened and all the other clinical and laboratory protocols are followed it is seen that the need for retrievability may be quite minimal. Sometimes, single crowns cannot simply be tapped off the abutments, and the retrieval may result in total destruction of the restoration, especially if it is a metal free ceramic restoration.

Thus it is recommended that temporary cements be used only for multiple-unit implant-supported restorations while a more permanent luting agent be used for single unit cases.

For both situations, whether single unit or multiple splinted, Polymeric implant cements should be preferred now-a-days as they have a good combination of required properties. They are adequately retentive and at the same time have good retrievability. The cleaning of excess residual cement around the abutments and in the sulcus is also very easy and predictable.

References:
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Figure 1 - Showing degree of taper and height of abutment needed for good retention

Figure 2(a); 2(b) - Different cements used for cementation of dental implants are: