



Cementation of Implant Prosthesis: A Review of Techniques for Controlling Excess Cement around Implants

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Abstract

Over the past few years, implant supported prosthesis have become the most popular treatment option for replacement of missing teeth. Implant prosthesis can be either screw retained or cement retained with the latter being more commonly used. However, a major drawback of cement retained prosthesis is the escape of excess cement into the peri implant sulcus provoking an inflammatory response accounting for 81% of peri implant disease. Numerous studies have established a positive link between peri implant diseases and residual excess cement, making it necessary to locate and remove excess cement around the implants. This article highlights the effect of residual excess cements on peri implant tissues and different techniques to control the extrusion of excess cement around the peri implant sulcus.

Keywords: Implant Cementation; Peri Implantitis; Dental Implants; Abutment Analogs

Introduction

Over the last few decades, implant supported prosthesis have become the most sought-after treatment option for replacement of missing teeth. A survival rate of 91.5% have been reported for dental implants if placed under favourable conditions in a healthy patient [1]. Implant prosthesis can be either screw retained or cement retained with the latter being more popular [2].

Though screw retained restorations demonstrate easy retrievability and better fit at the abutment margin, screw loosening has been observed in 50% of the restorations during the first year of function [3]. They are also more expensive to fabricate due to the additional components and laboratory costs [4]. Cement retained prosthesis remains a popular alternative as it is easy to use, provides better aesthetics, control of occlusion and a passive fit of the prosthesis. However, a major drawback of cement retained prosthesis is the extrusion of excess cement into the peri implant sulcus. This excess cement acts as a foreign body around the implant and provokes an inflammatory response accounting for 81% of peri implant disease [5,6]. Numerous studies

have established a positive link between peri implant diseases and residual excess cement, making it necessary to locate and remove excess cement around the implants. This article aims to review the different techniques reported in literature to remove excess cement around the implant restorations.

Types of cements used and their influence on peri implant tissues

A wide variety of cements are used to lute implant prosthesis, for example, glass ionomer cement, zinc phosphate cement, polycarboxylate cement, resin cement and zinc oxide with or without eugenol [7]. The two important factors to be considered while cementation of implant prosthesis is 1) to minimize excess cement 2) to balance the retentive forces for which the cement should be strong enough to retain the restoration yet weak enough to allow easy removal of the restoration [7,8].

M S Char, *et al.* in their systematic review concluded that zinc phosphate cement was most commonly used as permanent cement while zinc oxide eugenol as a temporary one for implant

restorations. The advantages of using zinc phosphate cement include 1) adequate retention for implant prosthesis 2) ease of removal of cement rests from abutment surfaces as compared to other cements [9].

Korsch, *et al.* in their research demonstrated 62% of residual excess cement when resin cement was used as against none when zinc oxide eugenol was used. Zinc oxide eugenol apparently dissolves when it comes in contact with sulcular fluid in peri implant tissues [10]. This is confirmed by studies which showed that zinc oxide eugenol dissolves in artificial saliva [11].

In spite of various research, there is still a debate about the most ideal cement to be used for implant prosthesis.

Techniques

Numerous techniques have been proposed to minimize residual excess cement around dental implants, either after cementation procedure, during the procedure or prior to the cementation. The techniques are enlisted below:

Use of dental instruments

The commonly practiced procedure for removal of excess cement is by using dental instruments.

Agar, *et al.* conducted a study to investigate the surfaces of abutments after the removal of cements (glass ionomer, resin, and zinc phosphate) by use of three instruments (gold coated scaler, plastic scaler, and stainless steel explorer). Irrespective of the type of instrument used, damage to implant surfaces was inevitable, with stainless steel being the most detrimental. The roughened surface further leads to increased plaque accumulation, impaired plaque removal, and compromised soft tissue compatibility [12].

Use of vent holes

Schwedhelm, *et al.* made use of vent holes within the implant prosthesis. This helped in the escape of excess luting cement. Nonetheless, the major drawback of this technique was unnecessary compromise in the integrity of the crown, increasing the possibility of porcelain fracture. Also it involved multiple material interfaces, as the vent hole in the crown required sealing after cementation [13].

Use of limited luting agent in the implant crown

Reducing the amount of cement used by placing it only in the cervical or the occlusal half of the intaglio surface of the restoration prior cementation has been shown to improve the marginal fit without compromising the retention. Dumbrigue, *et al.* suggested application of the luting agent only to the occlusal half of the inner surface of the restoration to avoid extrusion of excess cement. These techniques, however, may compromise the seal of the restorative margin due to use of insufficient material [14].

Use of practice abutments or abutment analog

Another technique makes use of a practice abutment or an abutment analog. The inner surface of the implant prosthesis is filled with luting agent and placed extraorally on the abutment analog. The excess cement is wiped immediately and the prosthesis is placed intraorally. Excess cement may be extruded, leaving a small amount of cement to coat the axial wall. Santosa, *et al.* showed that this practice abutment technique significantly reduced the amount of excess cement prior to final cementation without much effect on retention values [15]. Chee, *et al.* also showed that the least amount of excess cement was present when a cementation device was used to displace excess cement before seating the final restoration on an abutment [4].

Use of PTFE tape

Hess TA describes a technique in which Polytetrafluoroethylene (PTFE) tape is placed around the implant abutment before seating to protect the adhesion of cement to the subgingival aspect of the abutment whether it is metal, porcelain, or zirconia. It is a simple technique to eliminate residual excess cement from the implant abutment [16].

Conclusion

It is necessary to have a thorough understanding of biologic differences between natural teeth and dental implants to ensure stability and health of peri implant tissues. Residual excess cement is a known cause of periimplantitis and measures should be taken to prevent it. This article highlights the effect of residual excess cements on peri implant tissues and different techniques to control the extrusion of excess cement around the peri implant sulcus.

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