Comparative Evaluation of Cemented and screw-retained implant-supported single-tooth restorations in the mandibular molar region

Dr. Arvind Kumar Singh[1], Dr. Shruti Sharma Grover[2], Dr. Harmanpreet Singh[3], Dr. Anand Kumar[4], Dr. Rohit Goel[5], Dr. Vikram Anand[6]

[1]Prof.&Head, Department of Prosthodontics, Chandra Dental College and Hospital, Barabanki, U.P, India. **(Corresponding author)**
[2]Associate Professor, Department of Prosthodontics, Chandra Dental College and Hospital, Barabanki, U.P, India.
[3]2nd year PG student, Department of Prosthodontics, Chandra Dental College and Hospital, Barabanki, U.P, India.
[4]2nd year PG student, Department of Prosthodontics, Chandra Dental College and Hospital, Barabanki, U.P, India.
[5]2nd year PG student, Department of Prosthodontics, Chandra Dental College and Hospital, Barabanki, U.P, India.
[6]2nd year PG student, Department of Prosthodontics, Chandra Dental College and Hospital, Barabanki, U.P, India.

Abstract:

Background: To evaluate cemented and screw-retained implant-supported single-tooth restorations in the molar mandibular region. **Materials & methods:** A total of 40 subjects implant-supported restorations were enrolled. A prosthetic rehabilitation of a mandibular molar was done. Debonding of the restoration was analyzed in the cemented-retained restoration group. The student-t test was done. The results were analysed using SPSS software. The significance level was set at $P < 0.05$. **Results:** The average rate of complications for cemented-retained restorations was 32.5% and 25% for the screw-retained restorations. **Conclusion:** In screw-retained restorations the presence of mucositis and peri-implantitis are lower than cemented-retained restorations.

Keywords: Screw-retained restorations, cemented-retained restorations, screw loosening.

Introduction

Dental implants represent a predictable treatment for full or partially edentulous patients, with high success rates for both function and aesthetics. [1,2] In the last decades, the application of dental implants has become more and more widespread, and, at the same time, many different types of fixtures and restorative materials have been introduced for use in different clinical situations. [3] Implant-supported restorations offer extremely effective and predictable treatment of complete and partial edentulism. However, while implants enjoy high success and survival rates, the incidence of peri-implant disease has been gradually increasing. [4,5] An important factor in implant failure, peri-implant disease occurs as a result of a disruption in the balance between bacteria and host-response following osseo-integration. [6] Any efforts at prevention and treatment of peri-implant disease must clearly address the contributing factors, which include poor oral hygiene, smoking, a history of periodontitis, diabetes mellitus, genetic factors, alcohol consumption, and implant surface characteristics, all of which have been mentioned as possible risk factors in the development of peri-implant disease. [7,8]

In recent years, rapid progress is observed in the field of implant dentistry. It is necessary to consider issues regarding different materials and designs used for implants for achieving maximum clinical success. As compared to screw-retained restorations, the fabrication used for cement-retained restorations is easier because it involves clinical prosthodontics and conventional laboratory techniques. [9] The use of extra components like; fixation screws, plastic sleeves, and laboratory fixation screws makes the screw-retained restorations expensive. [10] Although screw-retained restorations are costly, they tend to allow predictable retrievability, unlike the cement-retained restorations that may be damaged because of technical or biologic complications. The cement-retained and screw-retained restorations help in achieving predictable esthetics when the dental implant is placed in an ideal position. In the same line of research, various researches have shown an inclination to the cement restoration and recognized it as a versatile implant method in terms of its estheticity, passivity, and improved occlusion control.[10,11] However, the prospects of cement residue to be present following its restoration are high, harming the permanent tissues.[11] Similarly, the significance of screw-retained implant reconstruction is reported effective in terms of its retrievability, oral hygiene, and simpler procedures,[10] though, the loosening of the screw is reflected as a major drawback. The findings, thereby, fail to conclude. Hence, this study was conducted to evaluate cemented and screw-retained implant-supported single-tooth restorations in the molar mandibular region.

Materials & methods

A total of 40 subjects implant-supported restorations were enrolled. A prosthetic rehabilitation of a mandibular molar was done. 20 patients were rehabilitated with a cemented-retained restoration and the other 20 with a screw-retained restoration. The presence of the following complications was recorded for both types of prostheses: fractures of the ceramic veneering, loosening screws, mucositis and peri-implantitis. Debonding of the restoration was analyzed in the cemented-retained restoration group. The clinical survival of crowns was analyzed and the clinical complications were compared. The student-t test was done. The results were analysed using SPSS software. The significance level was set at $P < 0.05$.

Results

A total of 20 patients had some type of complication (12 and 8 patients for cemented and screw-retained restorations, respectively). The average rate of complications for cemented-retained restorations was 32.5% and 25% for the screw-retained restorations. The debonding and peri-implantitis was non-significant. The screw loosening was significant as less than 0.05.

Table 1: Rate of clinical complications

Types of complications	Type of prostheses		p- value
	Cemented- retained Mean	Screw- retained Mean	
Screw loosening	4.50	18	0.03*
Debonding	10.50	-	NS
Mucositis	14.50	4.50	0.03*
Peri-implantitis	2.15	-	NS
Fracture of ceramic veneering	12.40	4.50	0.4
Total	32.50	25	0.4

Discussion

Compared with cemented restorations, screw-retained systems are reported to be more frequently prone to technical complications, such as a screw loosening and components/restoration fractures. [12,13] Moreover, the presence of an occlusal hole can impair the occlusal design, especially in the case of implant malposition. Finally, screw-retained prostheses are more expensive due to the higher cost of the components. [14] Cemented prostheses can ease the restoration design when the fixture location is not ideal and when a screw-retained solution would face the problem of a screw hole emerging in a critical position (e.g., incisal margin, buccal surface in an anterior site, and cusp tip in a posterior site). In these cases, a proper cement-retained restoration design and the correct selection of the implant abutments are paramount since they allow for customization and compensate the emergence profile, limiting micromovements and consequent bacterial contamination at the implant–prosthetic microgap. [15,16] Hence, this study was conducted to evaluate cemented and screw-retained implant-supported single-tooth restorations in the molar mandibular region.

In the present study, a total of 20 patients had some type of complication (12 and 8 patients for cemented and screw-retained restorations, respectively). The average rate of complications for cemented-retained restorations was 32.5% and 25% for the screw-retained restorations. A study by Ferreiroa A et al, showed 27 patients with some complication. The average rate of complications was 37,5% for cemented-retained restorations and 30% for screw-retained restorations. The complications more common in the cemented-retained restoration were the presence of mucositis (14,87%), while in the screw-retained restorations was the loosening screw (20%). Student t test and Log-Rank test found significant differences (p=0,001)

between the screw loosening and presence of mucositis. [17]

In the present study, the debonding and peri-implantitis was non- significant. The screw loosening was significant as less than 0.05. Another study by Vigolo P et al, all patients completed the study. All 24 implants survived, resulting in a cumulative implant success rate of 100%. Statistical analysis revealed no significant differences between the 2 groups with respect to peri-implant marginal bone levels and soft tissue parameters. Within the limitations, the results indicate that there was no evidence of different behavior of the peri-implant marginal bone and of the peri-implant soft tissue when cemented or screw-retained single-tooth implant restorations were provided for this patient population. [18] Contrary to it, the cement-retained dental implant reconstruction is cheaper than screw implantation and can compensate for the discrepancies concerning the dental implant position. The examination of the studies has also revealed its efficacy in terms of passivity, enhanced esthetics, and better occlusion control as compared to the other implant technique. Though, it has one major drawback of leaving a residue of cement or excess cement, which leads to anaerobic development, causing biofilm growth, infection, and continuous bone loss. Similar findings have been drawn by various studies, which outline the advantages and disadvantages of the two information systems. [19,20] Linkevicius et al. [21] found in 73 implants restored with cemented-retained restorations, evidences of residual cement. Within these implants, 34 were placed in patients without history of periodontitis, 20 showed mucositis and 3 early peri-implantitis and other 39 implants were placed in patients with history of periodontitis, obtaining 35 implants with peri-implantitis and 3 with early peri-implantitis. In our study 8 implants showed signs of complications in the soft tissues and in all cases residual cement were found in the radiographic exam. Debonding of the cemented-retained crowns is a complication, which was only analyzed in these restorations. In our study, we used a polyurethane-luting agent, which is included in the group of semipermanent or provisional cement. [22] Schwarz et al. [23] in a clinical study used two types of provisional cement with similar loss retention than permanent cement in single crowns.

Conclusion

The cemented-retained restorations seem to prevent screw loosening. In screw-retained restorations the presence of mucositis and peri-implantitis are lower than cemented-retained restorations.

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