

Effect of Abutment Design and Cementation Technique on Peri-Implant Soft Tissue in the Esthetic Zone

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Abstract:

Background: The long-term esthetic success of implant-supported restorations in the esthetic zone depends not only on proper implant placement and prosthetic design but also on maintaining healthy peri-implant soft tissues. Abutment design and cementation technique may influence the amount of residual cement, peri-implant inflammation, and the stability of the peri-implant mucosal tissues.

Aim: The aim of this study was to evaluate the effect of abutment design and cementation technique on peri-implant soft-tissue health and esthetic outcomes around implant-supported restorations.

Materials and Methods: Twenty-eight patients requiring single implant-supported restorations in the maxillary premolar region were included. Patients were randomly divided into two main groups according to abutment design: a closed abutment group and a vented abutment group. Each group was further subdivided according to the cementation technique. In one subgroup, cement was applied to the cervical/apical third of the internal axial walls of the restoration, while in the other subgroup cement was applied to all internal axial walls, excluding the occlusal surface. Clinical and esthetic parameters were evaluated during follow-up, including pocket probing depth, plaque accumulation, bleeding, peri-implant soft-tissue condition, keratinized mucosa, buccal marginal recession, papilla level, and Pink Esthetic Score.

Results: The results demonstrated that the vented abutment design provided more favorable peri-implant soft-tissue outcomes than the closed abutment design. The vented abutment group showed improved peri-implant tissue health, with more favorable clinical and esthetic parameters during follow-up.

Regarding cementation technique, application of cement to the cervical/apical third of the internal axial walls resulted in better peri-implant soft-tissue outcomes than application of cement to all axial walls. The limited cement application technique was associated with more favorable soft-tissue conditions and reduced potential for cement-related peri-implant inflammation. Overall, the combination of a vented abutment and restricted cervical/apical-third cement application demonstrated the most favorable clinical and esthetic outcomes.

Conclusion: Within the limitations of this study, vented abutments appear to provide superior peri-implant soft-tissue and esthetic outcomes compared with closed abutments. Furthermore, limiting cement application to the cervical/apical third of the internal axial walls is preferable to applying cement to the entire axial surface, as it may reduce excess cement and contribute to healthier peri-implant soft tissues. The combination of vented abutment design and controlled cement application may therefore be recommended to enhance peri-implant soft-tissue health and esthetic results in implant-supported restorations in the esthetic zone.