

Euro Dental 2018: Crestal Bone Height Changes Surrounding Implants of Different Attachment Systems

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Aim: This study was conducted to compare the effect of GPS attachment, equator attachment and ball and socket attachment on crestal bone around implants in implant retained mandibular overdenture cases.

Introduction: Implant-retained overdentures are now an advanced method of restoration for edentulous patients, overcoming many of the problems of conventional removable dentures. Yet an implant-retained overdenture requires more thorough and critical planning. When considering an implant-retained overdenture, one of the main factors affecting success of the treatment is the available interarch distance. This is a critical factor as insufficient interarch space would result in an over contoured prosthesis, excessive occlusal vertical dimension, fractured teeth adjacent to the attachments, attachments separating from the denture, fracture of the prosthesis and overall patient dissatisfaction. As such, limited interarch space often restricts the prosthetic armamentarium to low-profile attachments and prevents using O-ring attachments and bars.

Low profile attachments like OT equator and GPS offers multiple solutions for overdenture treatment planning where inter-occlusal space limitations are considered. Whereas ball and socket attachments are not low profile, they do have considerable advantages, including optimizing stresses and minimizing denture movement. Patient's appreciation of their ball retained mandibular overdenture remained high over ten years follow-up period and clinical parameters revealed healthy mucosal conditions, high retentive measures and stable marginal bone levels.

Three dimensional visualization of jaw areas has

improved the clinical success of implants and their associated prostheses, and led to more accurate outcomes. Cone beam computed tomography (CBCT) accurately pinpoints vital structures and evaluates the surgical site underneath the soft tissues making it possible to pre-surgically determine with a high degree of accuracy and with 3D views the best position and inclination for implant placement based on the final prosthetic outcome. In general, the main motivation of the patients who look forward mucous supported implant rehabilitation is to increase the retention of the lower denture and to improve the masticatory capacity.

This study was thus carried out to compare between GPS, Equator and Ball and socket attachments regarding their effect on crestal bone changes in Implant-retained mandibular overdentures.

Materials and Methods: Following two stage surgical protocol eighteen completely edentulous patients received two implants placed bilaterally in the canine region (36 implants) to retain mandibular overdentures. Four months following the surgery patients were randomly divided into three equal groups; Group I received OT Equator attachment, group II received GPS attachment and Group III received ball and socket attachment. Patients were then placed on zero, three, six and twelve months follow-up periods using cone beam computed tomography. Measurements were taken on crestal bone height surrounding the implants and on bone height at distal aspect of the ridge then the results were statistically analysed.

Statistical analysis: The data are expressed as the mean \pm standard deviation (SD). The results were

analyzed via two-way (ANOVA) to compare between groups at different time periods, followed by Tukey test for pairwise comparisons (intergroup comparison) and one-way analysis of variance (ANOVA) to compare between different groups at the same time. All tests were done by GraphPad Prism version 7.00 (GraphPad Software, San Diego, CA). P values <0.05 considered statistically significant.

Results: GPS attachment showed the least bone changes around the implants, followed by equator attachment, whereas ball and socket showed more bone changes than the other two attachment types.

Conclusion: GPS attachment is least destructive to bone surrounding the implants, followed by the equator attachment, while ball and socket attachment showed the greatest bone changes surrounding the implant.

Discussion: Only Male patients were recruited for this study to avoid the effect of female hormonal changes on oral mucosa and bone. CBCT was chosen in this study to determine the amount of marginal bone loss around implants based on its reported accuracy and precision. It is utilized successfully whenever direct measurements of bone height and density are required due to the fact that periapical and panoramic radiography ignore the bone density and height

at the buccal and lingual surfaces. The decreased amount of crestal bone resorption with Group I (GPS attachment) in comparison to Group II (Equator) and Group III (Ball and socket attachment) might be attributed to the difference in the abutment designs of the three groups. In case of GPS attachment the abutment connected to the implant is the female part which transfers the fulcrum point close to the fixture thus reducing lever arm and torque and allowing less crestal bone resorption. Group III (Ball and socket attachment) also showed greater bone changes at the end of one year than Group II (Equator attachment), which could be due to the latter's low profile design, creating a favorable effect and causing less crestal bone loss. These results are within the acceptable range of implant success which has shown a mean marginal bone loss around dental implants of 1.5-2 mm in the first year after prosthetic restoration and 0.1-0.2 mm annually after that. This bone reduction might be due to surgical trauma, bone osteotomy and healing process. Also it might be considered an immediate bone reaction after insertion of the prosthesis and the functional stresses following prosthesis connection.

Keywords: GPS attachment, Equator, Ball and socket, Implant overdenture, Cone beam computed tomography