A split mouth study evaluating the ISQ trends, Radiographic bone loss and Implant survival of photofunctionalized and untreated dental implants

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Background: Ultra-violet (UV) light treatment of titanium implants has been reported to increase bone-to-implant contact (BIC) up to 100% (Ueno, 2010). Increased BIC results in better and faster osseointegration. This study uses a split mouth design to assess the change in the ISQ trends, and the clinical survival of photofunctionalized dental implants versus untreated dental implants.

Aim/Hypothesis: Using a split mouth study model to: (a) Evaluate ISQ trends for photofunctionalized implants compared to untreated implants from fixture installation to loading. (b) Compare marginal bone levels around the implants up to 1 year of follow up. (c) Assess survival of the photofunctionalized implants.

Material and Methods: 30 patients needing implants bilaterally within the same arch were recruited for the study. In all 60 implant sites were assessed. For each patient, a clinical evaluation of the implant site was carried out. Using random allocation, each patient received a Test implant on one side and Control implant of same length and diameter on the contralateral side. After a healing period free of masticatory loading of at least 3 months, the implants were loaded. The following parameters were evaluated: (a) Implant Stability Quotient (ISQ) values ISQ at implant placement and at commencement of functional loading was recorded using Osstell ISQ. Osseointegration Speed Index (OSI) was determined. (b) Crestal bone loss. – Periapical radiographs were taken immediately after implant placement and at the time of placement of the definitive restoration. The level of the marginal bone was recorded by taking standardized radiographs. (c) Implant survival.

Results: A highly statistically significant difference were noted between the Test and the Control group when OSI values and Crestal bone loss were compared (P < 0.01). The Test group presented with a higher mean OSI value (3.07) in comparison to Control group (1.29). Similarly higher mean crestal bone loss was noted in Control group (-0.57 mm ± 0.41 mm) as compared to the Test group (-0.27 mm ± 0.35 mm). By applying Karl Pearson’s correlation coefficient, a positive correlation was found between the OSI and length (r=0.402). Similarly positive correlation was found between OSI and healing time (r=0.287). Whereas a negative correlation was found between Crestal bone loss and diameter of the implant (r=-0.272). Life table analyses showed an implant success rate of 99.4 % for the Test group and 100% for the Control group at one year after loading.

Conclusions and Clinical Implications: Photofunctionalized implants showed an increased Osseointegration Speed index, thus reducing the overall healing time as compared to untreated implants. A significantly reduced crestal bone loss was observed in photofunctionalized implants in comparison to untreated implants. This study suggests that photofunctionalization can be a useful and effective aid for chair-side conditioning of implant surfaces in order to achieve faster osseointegration with good crestal bone stability.