Risk factors associated with implant survival in the atrophic maxilla: clinical implications
Category: implant therapy outcomes:surgical aspects

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Background: Rehabilitation of the atrophied posterior maxilla can be simplified by placing implants with the osteotome sinus floor elevation (OSFE) technique. Simultaneous bone grafting is recommended even though peri-implant bone formation after sinus augmentation without grafting has been documented. The long-term influence of other parameters on implant survival has not been reported as extensively.
Objectives: 1) To evaluate the long term survival rate of rough surfaced short implants placed with osteotome sinus floor elevation technique (OSFE) in extremely atrophic maxillae. 2) To identify and quantify variables as risk factors associated with the success of implants placed in these conditions.

Materials and Methods: Between June 2000 and December 2007, 279 rough surfaced implants (Straumann AG, Basel, Switzerland) were placed by means of an OSFE in reduced maxillary residual bone height (RBH) ≤ 6 mm. All implants were evaluated in 2011 (3 to 10 years of function). Twenty-eight variables were selected for the statistical analysis. These variables were distributed in 4 categories related to: **patient, site, implant, and technique**. Four equations were constructed using the variables of each category. Consequently, Multivariate Cox regression analysis with a robust standard error adjusted for clustering effect was applied using Stata® 12 software. Variables with a statistically significant hazard ratio were selected from each equation and integrated into the final model.

Results: 184 patients received 279 implants. 180 patients (274 implants) were observed after 3 to 11 years of function, 4 patients (5 implants) were lost to follow-up, 14 implants failed. Cumulative survival rate according to life-table analysis was 82%. 50% failed implants were placed in less than 3mm RBH.
Results from Cox regression analysis showed that residual bone height, crestal bone type, implant rotation at rehabilitation time, and presence of grafting material can be considered as risk factors with p values respectively 0.001, 0.018, 0.002, and 0.015. With every 1mm increase in RBH, the risk of implant failure decreased by 55%. Presence of cortical crest at implantation site reduced the risk by 77%. An implant that rotated at the time of commencing the prosthetic rehabilitation had 893% more risk of subsequent failure. Finally, adding intra-sinus grafting material increased the risk of implant failure by 267%.

Conclusion: This study confirmed that grafting is not required to obtain long term osseointegration and to maintain function from 3 to 10 years in reduced maxillary bone. Survival of implants placed with OSFE technique in RBH ≤ 6mm was optimized by: a) increased RBH, b) presence of crestal cortical bone, and c) absence of grafting material.