Immediate- vs delayed- implant placement following tooth extraction: Survival analyses and factors associated with survival

Michael R. Markiewicz\textsuperscript{a,c}, Sung-kiang Chuang\textsuperscript{b}, Meghan Weed\textsuperscript{b}, and Thomas B. Dodson\textsuperscript{c}

\textsuperscript{a}The University at Buffalo, School of Dental Medicine, Buffalo, NY, \textsuperscript{b}Implant Dentistry Centre, \textsuperscript{c}The Center for Applied Clinical Investigation, Department of Oral and Maxillofacial Surgery, Massachusetts General Hospital, Boston, MA

Abstract

Statement of the problem: Conventional implant practice dictates a delay between tooth extraction and implant placement. Some investigators advocate inserting implants immediately after extraction. However, there are no studies that compare the survival rates of implants inserted immediately or delayed. The purpose of this study was to answer the following clinical question: “Among implants inserted at any time after the day of extraction, those placed immediately after tooth extraction when compared to those placed at some later time after tooth extraction, have a decreased 5-year survival rate?” A secondary purpose was to identify prognostic factors associated with five-year implant survival.

Materials and methods: Using a retrospective cohort design, the investigators enrolled a sample of subjects having at least one implant inserted between July 1, 2001 and August 31, 2005. The study sample was composed of 161 patients having 963 implants inserted at the Implant Dentistry Centre, Boston, MA. The primary predictor variable was the timing of placement following extraction (immediate vs delayed). An immediate implant was defined as an implant inserted immediately following the extraction. A delayed implant was defined as an implant inserted at any time after the day of extraction. The outcome variable was implant survival at five years after insertion. Secondary explanatory variables were categorized as demographic, health status (e.g., ASA status, tobacco use), implant-anatomical, implant-staging, dentoalveolar reconstructive procedures, antibiotic use, implant stability at stage 1, and bone density at stage 2. Descriptive statistics, Kaplan-Meier survival analysis, as well as univariate and multivariate Cox regression analyses were completed using SAS statistical software. Level of statistical significance was set at \( p = 0.05 \).

Results: The study sample was composed of 161 patients having 963 implants inserted (immediate-placement group: n = 389, delayed-placement group: n = 574). The mean duration of clinical follow-up was 4.3 years. The 5-year survival rates for immediate and delayed-placed implants were 85.7% and 84.6%, respectively (log-rank test: \( p = 0.69 \)). Multivariate Cox regression models revealed no statistically significant differences in overall survival rates between immediate and delayed-placed implants (log-rank test: \( p = 0.98 \)), when adjusting for potential confounders. Factors significantly associated with implant survival were: implant survival at 12 months (hazard ratio: 2.4, 95% confidence interval: 1.5, 3.8), and implant survival at 12 months for immediate loading (hazard ratio: 2.0, 95% confidence interval: 1.1, 3.6). The adjusted five-year survival rate of immediately-implants was 91.5% (95% confidence interval: 88.3, 94.1), compared to 89.2% (95% confidence interval: 86.0, 92.0) for delayed-placed implants. Kaplan-Meier survival analysis demonstrated that the difference in survival between immediate and delayed-placed implants at five years was not statistically significant (log-rank test: \( p = 0.98 \)).

Conclusions: Implant survival at five years was not statistically different between implants inserted immediately or delayed following tooth extraction. After adjusting for potential confounders, the investigators found implant survival at 12 months, bone density at the implant site, and implant stability at stage 1, were independent predictors of survival. The data support the null hypothesis that the 5-year survival rate of immediately-placed implants equals the one-year survival rate of delayed-placed implants.

Clinical Question

How does the five-year survival rate of immediately-placed implants compare to delayed-placed implants? The adjusted five-year survival rate of immediately-placed implants equals that of delayed-placed implants.

Specific Aims

1. To estimate and compare the 5-year survival of immediate- and delayed-placed implants
2. To identify risk factors associated with implant failure using a rigorous survival analyses adjusting for clustered (correlated) observations

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References


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