

A prospective study of the factors affecting outcomes of non-surgical root canal treatment: part 2: tooth survival

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Abstract

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Aim To investigate the probability of and factors influencing tooth survival following primary (1°RCTx) or secondary (2°RCTx) root canal treatment.

Methodology This prospective study involved annual follow-up of 2 (100%) to 4 years (50%) of 1°RCTx (759 teeth, 572 patients) and 2°RCTx (858 teeth, 642 patients) carried out by Endodontic post-graduate students. Pre-, intra- and post-operative data were collected prospectively from consented patients. Information about extraction of the root filled tooth was sought from the patient, the referring dentist or derived from the patient's records and included the timing and reasons for extraction. Tooth survival was estimated and prognostic factors were investigated using Cox regression. Clustering effects within patients were adjusted in all models using robust standard error.

Results The 4-year cumulative tooth survival following 1°RCTx [95.4% (93.6%, 96.8%)] or 2°RCTx [95.3% (93.6%, 96.5%)] was similar. Thirteen prognostic factors were identified. Significant patient factors included history of diabetes and systemic steroid therapy. Significant pre-operative factors included

narrow but deep periodontal probing depth; pain; discharging sinus; and iatrogenic perforation (for 2°RCTx cases only). Significant intra-operative factors included iatrogenic perforation; patency at apical terminus; and extrusion of root fillings. Significant post-operative restorative factors included presence of cast restoration versus temporary restoration; presence of cast post and core; proximal contacts with both mesial and distal adjacent teeth; and terminal location of the tooth. The presence of pre-operative pain had a profound effect on tooth loss within the first 22 months after treatment [hazard ratio (HR) = 3.1; $P = 0.001$] with a lesser effect beyond 22 months (HR = 2.4; $P = 0.01$). Patency at the apical terminus reduced tooth loss (HR = 0.3; $P < 0.01$) within the first 22 months after treatment but had no significant effect on tooth survival beyond 22 months. Extrusion of gutta-percha root filling did not have any effect on tooth survival (HR = 1.1; $P = 0.2$) within the first 22 months but significantly increased the hazard of tooth loss beyond 22 months (HR = 3.0; $P = 0.003$).

Conclusions The 4-year tooth survival following primary or secondary root canal treatment was 95%, with thirteen prognostic factors common to both.

Keywords: outcome, root canal treatment, success, tooth survival.

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Introduction

Most previous studies investigating the factors affecting outcomes of primary (1°RCTx) or secondary (2°RCTx) root canal treatments have used clinical and/or radiographic signs of periapical healing as the