

Supplementary Table S3 Bootstrap robustness check and proportional hazards diagnostics for the final multivariable Cox model							
Predictor	Primary Cox HR	Bootstrap SE	Bootstrap 95% CI	Bootstrap <i>p</i> -value	Schoenfeld residual-based test, rho	Schoenfeld residual-based test, χ^2	PH test <i>p</i> -value
Tooth-level variables							
Child age at time of treatment, years	1.05	0.02	1.01–1.09	0.017	0.05	0.10	0.750
Preoperative disease-burden variables							
Preoperative soft-tissue appearance							
Normal soft tissue	Reference	—	—	—	—	—	—
Gingival or vestibular swelling	1.81	0.86	0.72–4.58	0.211	−0.02	0.00	0.988
Sinus tract	4.98	29.34	0.00005–512910.10 ^a	0.785	0.03	0.00	0.967
Preoperative root resorption							
No resorption	Reference	—	—	—	—	—	—
<1/3 of root length	1.39	0.57	0.62–3.12	0.421	0.18	1.36	0.244
1/3–2/3 of root length	2.96	4.55	0.15–60.32	0.480	0.04	0.01	0.942
Global test	—	—	—	—	—	7.83	0.166

Abbreviations: HR, hazard ratio; SE, standard error; 95% CI, 95% confidence interval; PH, proportional hazards. Primary Cox analysis refers to the multivariable Cox proportional hazards regression model with robust cluster variance estimation using the Huber–White sandwich estimator, applied to variables with $p < 0.10$ in the univariate analysis. Bootstrap estimates were obtained from the final multivariable Cox model using 326 tooth-level observations and replications based on 242 patient-level clusters. The proportional hazards assumption was assessed using Schoenfeld residual-based tests. A p -value <0.05 was considered evidence against the proportional hazards assumption. No statistically significant violation of the proportional hazards assumption was detected in either variable-specific tests or the global test.

^a The extremely wide bootstrap confidence interval for the sinus tract group reflects sparse events in this subgroup.