Retrospective Analysis of Direct Pulp Capping Outcomes at a U.S. Dental School Practice Network

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Abstract

Methods

This study protocol was registered, reviewed and approved by the ECU Institutional Review Board under the number 19-020213. Data was collected from the ECU School of Dental Medicine’s electronic dental record (axiUm). Any charts having CDT code D3110 recorded between 2011 and March 2020 were included. Inclusion criteria included: D3110 code entry, an Odontogram entry for the treated tooth, or subsequent endodontic therapy or extraction codes for the treated tooth. Initially 185 cases met the criteria. Sixteen cases were eliminated due to material other than MTA or Dycal being used, the provider was not a student or resident, or a direct pulp cap was not performed despite having the D3110 code recorded for the patient encounter. As a result, 169 cases were available for analysis. Success was defined as a tooth that had no subsequent endodontic therapy or surgical procedure performed after the pulp cap.

Results

There were 106 female and 63 male patients, ages of 5-86 years in the cohort. The mean age was 35.25 years (s.d.19.23). 42 anterior teeth and 127 posterior teeth were evaluated. 72 teeth were treated by dental students while 97 teeth were treated by residents. Rubber dam was used in 106 of the 169 cases and had a success rate 2.3% higher than those teeth without rubber dam used (not statistically significant).

Cases without preoperative pain had a 9.2% higher success rate than those with preoperative pain (not statistically significant).

Multivariate regression analysis was performed with the result (success) as the outcome variable and the following predictors: material used, pre-operative pain, and provider type. None of the predictors was statistically significant in projecting a successful outcome (p>0.05). Kaplan-Meier survival curves showed survival rates at 2,000 days post-procedure were 81% for residents and 80% for students (not statistically significant). Within the confines of this exploratory, retrospective pilot study, we found no statistically significant difference in tooth survival between teeth treated with Dycal or MTA.

Conclusions

While many previous direct pulp capping papers have focused on a relatively young patient population, our data set included patients up to 86 years of age. While age was not a predictor of success in our study, the fact that 80% of direct pulp capping procedures lasted 2000 days (5.47 years) should encourage further research to investigate the efficacy of direct pulp capping in older adults.

While most direct pulp capping research shows MTA consistently provides statistically significant better results than Dycal, we found no such correlation. MTA was used almost six times as frequently as Dycal in our practice network. Additionally, given the favorable published MTA results, practitioners may have been using MTA in cases that were less likely to succeed. Therefore, case selection may have played a role in affecting our results.

A major challenge faced by our team was trying to extract data from 10 different dental treatment facilities that have no standardized direct pulp cap procedure protocol or chart entry protocol. As a result, there was great variation in the amount of data recorded by clinicians. A standard treatment protocol for direct pulp capping procedures along with a standard chart entry documenting all significant data points would greatly facilitate future research.

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