

TOOTH SURVIVAL

Implant and root canal treated tooth survival



BACKGROUND

Dental practitioners face a challenge in clinical practice when trying to determine when it is best to maintain a tooth with extensive carious lesions and pulpal or periapical pathology through root canal treatment and when the tooth needs to be replaced by a dental implant. Evidence-based dentistry sees the maintenance of natural teeth as the ultimate goal. Both root canal therapy and dental implants have high predictability, but the survival rates of single-tooth implants is as high as 97%, making this a highly attractive option for managing nonvital, compromised teeth. Root canal treatment has about an 84% success rate and fixed dental prostheses an 81% rate. There are also failures and complications associated with both treatment options, which must be considered. The literature offers a wide range of definitions of success for implants and for root canal treatment, making it difficult to compare outcomes. It's clear that success is compromised when factors related to the patient, the tooth, or the treatment adversely affect the situation, whether that is root canal therapy or dental implants. Clinicians must weigh all the factors and make a selection that fits each patient. A study was undertaken to gather information regarding the survival rates of implant therapy and root canal treatment, then to identify tooth-related and patient-related factors that are associated with each treatment option.

METHODS

This retrospective study evaluated the dental records of patients who received root canal treatment and implant therapy. Treatment outcome, demographic characteristics, dental insurance status, socioeconomic status, medical history, and tobacco use were noted for each of the 13,434 records. Four thousand five hundred nineteen (33.6%) patients had implants and 8519 (66.4%) underwent root canal treatment. The prevalence of root canal treatment and implant therapy failure and potential risk indicators for each were compared.

RESULTS

The sample was evenly divided between men and women; the mean age was 52.72 years. The majority of cases dealt with root canal treatment or implant therapy in the maxilla and posterior region. The systemic medical conditions identified most often were hypertension (23.9% of the sample), high cholesterol (20.4%), and arthritis (18.8%). Just over 14%

self-reported that they smoked. About three-fourths of the patients were in a high socioeconomic group, and about 63% were self-payers.

Four hundred thirty-five treatments failed, for a failure rate of 3.2%. Follow-up lasted a mean of 34 months (range 1 to 76 months) for implant patients and a mean of 26 months (range 1 to 77 months) for root canal treatment patients. Fifty-one implants and 384 root canal treatments failed during the observation period. Most of the implants (58.82%) were removed during the first year after placement, with just 35.16% of the root canal treated teeth extracted during that time period. Most of the root canal treated teeth were extracted after the first 3 years of observation.

Survival rates for implants were 99.3% at 1 year, 99.1% at 2 years, and 98.7% at 3 years. Root canal treatment survival rates were 98.3% at 1 year, 96.8% at 2 years, and 95.1% at 3 years. Overall survival for implants up to 76 months was 98.3%, while that for root canal treated teeth was 72.7% up to 77 months. The difference in survival rates for the two approaches was statistically significant, with implant therapy have higher survival rates.

Retreatment was done in 689 of the 8915 teeth receiving root canal therapy. The overall survival of the initial root canal therapy was 72.1%, with retreatments having a survival of 78.9%.

The unadjusted Cox regression model showed root canal treatment was significantly associated with failure. Patients who had root canal treatment were at a 5.34 increased risk of experiencing failure compared to patients who had implant therapy. Multivariate Cox regression analysis showed patients who had root canal treatment were at a 6.82 higher risk of having treatment failure compared to those having implant therapy; the risk was considered significant for root canal treatment.

Age was significantly associated with treatment survival. Older persons who had root canal therapy or implant therapy had a significantly increased risk of treatment failure.

When a stepwise backward elimination method was applied, treatment, age, and anxiety were significantly associated with

Clinical Significance

The failure rates associated with implants were significantly lower than those associated with root canal treatment. However, multiple factors contribute to the outcome in each case. Two factors that adversely affect the outcome are older age and anxiety. Clinicians should take these into account when determining whether to treat the tooth with root canal therapy or extract it and replace it with an implant.

treatment failure. Having root canal treatment, older age, and anxiety remained significantly associated with failure.

DISCUSSION

Patients who had root canal treatment had a significantly higher likelihood that they would experience failure than those who had implant therapy. Older patients had a higher risk of failure with both methods of treatment. In addition, anxiety had a significant effect on the outcome.

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ULTRASONIC INSTRUMENTATION

Enamel damage



BACKGROUND

Periodontal therapy is designed to remove the dental biofilm, calculus, and any bacterial toxins present. Scaling is the method by which this is achieved and can be done either with hand instruments or with ultrasonic scalers. The ultrasonic devices are being used more frequently because they increase working efficiency for the hygienist, decrease chair time for the patient, and offer ergonomic benefits for clinicians. The primary mechanism employed by ultrasonic scalers is the mechanical chipping action of the oscillating scaler probe against the tooth surface. A risk of damaging the tooth surface exists with these devices. It's also possible that teeth with defects that can't be visualized clinically, such as enamel cracks and early caries, may be damaged to the extent that dentin and cementum are lost. Patients may develop hypersensitivity as a result. Composite resin restorations can also be difficult to visually distinguish from sound enamel, and ultrasonic scaling may damage the marginal integrity of cervical restorations. A study was conducted to identify the degree of enamel damage caused by ultrasonic scaling on teeth with various enamel conditions that can be difficult to visualize.

METHODS

One hundred twenty extracted teeth were analyzed using a quantitative light-induced fluorescence-digital system, which can detect enamel defects, such as cracks, dental caries, and calculus. The 120 tooth surfaces were then divided into experimental groups based on enamel condition, as follows: sound enamel, enamel cracks, early caries, and resin restoration.

Early carious lesions were subdivided into those with carious opacity in the enamel when air-dried and those with a more extensive distinct visual change detected either when wet or dry. The ultrasonic scaling was done by an experienced hygienist under standardized conditions: a 15-degree angle or less between the scaler tip and tooth surface and lateral pressure of 40 to 80 g at the rate of 12 times/10 seconds. After the specimens were scaled, the depth of enamel damage was observed using a scanning electron microscope (SEM) and measured using a surface profilometer.

RESULTS

Significantly deeper damage was found in the enamel cracks and early caries groups than in the sound enamel group. No significant differences were noted between the cracks and early caries groups. The sound enamel group showed no clear difference between the scaled and the untreated areas. The resin restoration group did not differ significantly from the other groups.

The damage depths were 37.63 μm for the enamel cracks group, 26.81 μm for the early caries group, 18.63 μm for the resin restoration group, and 17.00 μm for the sound enamel group. The SEM clearly showed the loss of enamel in the enamel cracks, early caries, and resin restoration groups.

DISCUSSION

Damage to tooth surfaces is a possibility when ultrasonic scalers are used on teeth that have visually indistinguishable