Clinical study of pulp capping in diabetes patients

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Received November 25, 2009; Accepted January 30, 2010

Diabetes is, generally speaking, a contraindication for conservative treatment concerning caries with pulp exposure. In certain situations, we can successfully use the pulp capping if we assure some conditions (asepsis, young patients).

- This study shows the advantages and disadvantages of this kind of treatment. We studied 60 patients (34 female and 26 male) aged between 25 and 35 years old, diagnosed with type 2 diabetes and who are under control through treatment. We undertook 68 pulps capping on teeth with caries that were exposing the pulp chamber during the conservative treatment. Of the 68 cases 26 cases (38.2%) were successful, part of patients 17 cases (65.38%) aged between 25 and 30 years and 9 cases (34.6%) aged between 30 and 35 years.
- 31 cases (45.5%) unsuccessful part of them 10 cases (32.2%) aged 25–30 years and 21 cases (67.74%) aged 30–35 years.
- 11 uncertain outcome cases (16.3) aged 30–35.
- Pulp capping can be successfully made in young patients 25–35 years with insulin-dependent diabetes, if we can obtain some conditions: optimal time for intervention, patient under adequate medication, patient with good oral hygiene, direct access to the teeth, the teeth is not good a candidate for prosthetic reconstruction, the patient is aware that the therapy may be unsuccessful.

Keywords: pulp capping, diabetes, insulin, glycemic control

Introduction

Pulp capping is not used commonly in diabetic patients because of local and general conditions [4]. The oral cavity has certain specific characteristics for these patients, such as:

- Low immune response – caused by chemo tactic changes of neutrophils and macrophages between teeth and bacterial plaque [1].
- Microangiopathies – by changing the proteic membranous permeability diapedesis and susceptibility for microbial aggressions [2].
- Saliva alteration – saliva pH is very low, which means we have a higher density of saliva and we can see a larger parotid gland.
- Degenerative changes of periodontal ligaments by reducing the collagen synthesis and the degradation of existent collagen [4].
- Candidiasis.
- Other oral lesions as hyperplasic gingivitis, irritative fibroma, glossitis.
- Neurologic lesions, diabetes, and neuropathies are associated with teeth loss and dysfunction for TMA [7].
- Caries due to the changes in salivary pH (for young people a low sugar diet is protective).
- Hematology alterations; periodontal ischemia caused by unused oxygen [2].

The aim of this study is to demonstrate that we can use the pulp capping as a preventive method instead of losing vitality for caries treatment in diabetes patients.

Material and method

We studied 60 patients (34 female and 26 male) aged between 25 and 35 years diagnosed with type 2 diabetes and which is under glycemic control through treatment. We performed 68 pulps capping on teeth with caries that were exposing the pulp chamber during the conservative treatment. The timing of the intervention is important: it must be undertaken in the morning, 1–2 hours after breakfast and after administering the antidiabetes medication (insulin). All pulp-capping procedures within this study were performed 1–2 hours after breakfast. In such a way we can maintain the glycemia constant all day long and we can adjust the doses if necessary. Stress and an inadequate diet after the intervention can contribute to hypoglycemic crises.

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Pulp capping procedure sequence:

1. Pulp tester as an additional check on vitality.
2. Anesthesia procedure: local anesthetic gel, injected anesthesia with Ubistesin® or Mepivastesin®.
3. Optimal isolation of the treated tooth with rubber dam and aspiration.
4. Caries debridement, small pulp exposure maxim 1 mm, cleaning with sterile physiologic serum.
5. Hemostasis.
6. Application of calcium hydroxide made from powder CaOH and physiologic serum on a sterile surface.
7. Ionomer cement closure (Fuji IX). All these operative stages were undertaken in aseptic environment.
8. Restoration in normal occlusion.
9. The patient must not drink or eat for 1 hour.

After pulp capping, the patients were called in periodically for re-examination by radiographs, electric pulp tests and history of symptoms. For the entire duration of the treatment, patients were supervised by a team of dentists and nutritionists. The patient followed oral hygiene rules, diet recommendations and their main treatment for diabetes.

We recommend a personalized assistance to help diabetic patient to evaluate, adjust, and control the balance between insulin, diet, and exercise, providing personalized recommendations (p-Health) about insulin doses to be taken. Health care professionals are assisted to follow the patient's condition and evolution.

Every patient must be treated according to his or her general health conditions such as glycemic status, stress level, cooperation and treatment admittance and handling of diseases associated with diabetes such as cardiopathy, neuropathy, and tumors. Within the study population, we did not observe any changes of the glycemic status.

Successful cases (asymptomatic teeth with positive vitality test, negative percussion tests) were treated with conventional composite fillings, while pulp removal procedures and endodontic treatment was performed in failed cases (negative vitality tests, painful teeth).

One year after the pulp capping procedure, all patients were invited for a follow-up. The treated teeth were classified in three categories: successful, unsuccessful, and uncertain. Successful treatment outcome was defined as a tooth with positive vitality at pulp tester, no symptoms present, normal color, good closure, and X Ray exam shows a dentine bridge around the lesion. An unsuccessful treatment outcome was defined as non-vital reaction to pulp test, pain or asymptomatic, and gray colored. Such a classification was followed by root canal treatment. Uncertain treatment outcome was defined as: during the study period of 1 year, these patients are developing periodontal disease, but the teeth remain asymptomatic which means that we can also consider as a successful treatment but not for long-term. The unsuccessful treatment outcome can develop because of a retrograde infection from the periodontal gap.

Results

After 1 year, we classified the outcomes as follows (Figs. 1 and 2):

Fig. 1: Graphic representation for success results

Fig. 2: Graphic representation by age

- Of the 68 cases 26 cases (38.2%) were successful; 17 cases (65.38%) aged between 25 and 30 years and 9 cases (34.6%) aged between 30 and 35 years.
- 31 cases (45.5%) were classified as unsuccessful; 10 cases (32.2%) aged 25–30 years and 21 cases (67.74%) aged 30–35 years.
- 11 cases (16.3) uncertain aged 30–35 years.

Discussion

Successful pulp capping (26 cases or 38.2%) was defined as teeth with: positive vitality at pulp tester, asymptomatic, normal colored, good closure, and x ray exam shows a dentine bridge around the lesion.

Not successful pulp capping (31 cases or 45.5%) was defined as loss of closure material, re-exposure of the teeth, lack of cooperation on the part of the patient for re-examination during this period, lack of undergoing diabetes medicine and diet recommendation. In those cases, we performed a total pulp removal at the same time with the parodontal treatment.

By uncertain results of pulp capping cases 11 (16.3%) we understand those cases where a retrograde infection from the periodontal sulcus may occur. If the patients are following the oral hygiene rules, medical and diet recommendation the uncertain results may become a success, the teeth remain asymptomatic and vital. On contrary, lack of hygiene and other medical indications from the diabetes

medical team may become successful in a not successful case.

On behalf of this, the gingival sulcus fluid analysis shows an increase of catabolic saliva enzymes, which made a quick progression toward periodontal disease [2].

Conclusions

Pulp capping may be successfully undertaken in young patients 25–35 years with insulin-dependent diabetes, if we can achieve certain conditions such as:

- Optimal time for intervention.
- Patient under adequate medication.
- Patient with good oral hygiene.
- Direct access to the teeth.
- The teeth are not good candidates for prosthetic reconstruction.
- Patient is aware that the therapy may be unsuccessful.

The age of the patient has an important role achieving the desired results, as the positive outcome decreases with the age

of the patients, even if the patients are undergoing the best diabetes treatment.

Conflict of interest

The authors declare that there is no conflict of interest.

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