ORIGINAL ARTICLE

RESTORATION OF ROOT CANAL TREATED TEETH WITH DIRECT COMPOSITE ONLAYS: A PROSPECTIVE CLINICAL STUDY

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ABSTRACT

The aim of this study was to clinically assess the success rate of direct composite onlays used to restore badly damaged endodonticaly treated teeth, and if it can be an alternative for the conventional crown. This study was carried out in conservative dentistry clinic, King Hussien Medical Center. Seventy five patients (36 males and 39 females) were selected with severely destroyed posterior teeth (34 molars and 41 premolars).

These teeth were restored with direct composite onlays. A follow up after a two year interval was performed to assess the survival rate. Out of 75 patients treated with direct composite onlays 65 were available for follow up after 2 years. Sixty tow patients revealed complete success and 3 patients revealed a fracture of the onlay.

The success rate after two years follow up interval was around 95.38%. Direct composite onlays have a high success rate (at 2 years) and it represents a feasible ,successful and more conservative choice for restoration of endodontically treated teeth.

Key Words: *Composite, endodontic, direct onlay.*

INTRODUCTION

In the past, amalgam was the most common material that was used in direct cuspal coverage of posterior teeth, but due to esthetic reason and their survival rate compared with other materials their use is limited nowadays. Smales and Hawthorne (1996) found a 66.7% survival rate after 10 years and a 47.8% survival rate after 15 years for large cusp-covered amalgam restorations.[11]

The increased survival rate of direct composite onlay has encouraged clinicians to progressively abandon amalgam over the last decade,[12] although placement of a direct composite onlay takes 2.5 times longer due to the complex sequence included in incremental techniques.[13]

Incremental techniques using composite resins are widely applied in everyday practice. Since the thickness of the composites that can be cured by light is limited, the application of multiple increments with a number and thickness appropriate for the material characteristics of the respective composite resin is inevitable. The applied incremental technique can influence the value of cavity configuration factor (C-factor) and the extent of polymerization shrinkage.[14]

Direct composite onlay has a lot of benefits in treating severely destructed teeth over crown because its ease of adjustment and repair, no wear of opposing structures in functional contact, resilience for comfort and shock absorption, less chance for differential wear. On the other hand, crown requires removal of more tooth structure, require two appointments and the need for provisional crowns.

Root canal treatment is usually performed on teeth significantly affected by caries with irreversible pulpits or necrotive pulp. Most of the endodontically treated teeth are extensively damaged. Most of the recent studies have reported that root canal treated teeth are weak, brittle and more probably fractured.[1] Already structurally weakened, such teeth are often further weakened by the endodontic procedures designed to provide optimal access and by the restorative procedures necessary to rebuild the tooth.

Restoration of endodotically treated teeth is a challenging task in dental treatment. Many factors should be considered while planning for the final restoration

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of endodontically treated teeth such as the amount of remaining sound tooth structure, occlusal function, opposing dentition, position of tooth in the arch and length, width and curvature of the roots.[2] Retention and resistance features for the final restoration are sometimes collectively termed anchorage. Both adequate retention for the final restoration and maximum resistance to tooth fracture are equally important.

There are many options to restore endodontically treated teeth, and the quality of these restorations is as much important for the outcome of the treatment as the quality of the root canal treatment.[3] To reduce fracture susceptibility, a restoration with a reinforcing ferrule design is commonly recommended after endodontic treatment.[4] Options to restore endodontically treated teeth include direct fillings such as amalgam alloy, composite, inlays, onlays or crown.

Inlays and onlays are a good option to restore endodontically treated teeth because of their durability, custom fit, resistance to staining and tooth structure preservation. Inlays and onlays can be made of alloy, composite or ceramic material. Alloy is not commonly used, because of patient refusal due to esthetic and financial reasons.[6] Ceramic materials are resistant to compressive forces, but are susceptible to tensile stresses and more prone to fracture than are composite materials.[7,8]

Composite inlays and onlays are made of a resinous matrix and fillers of different types.[9] They are classified into direct and indirect. Direct composite onlay technique restore decayed teeth in a single visit, without laboratory support compared with an indirect technique which need laboratory support and multiple visits.[10] The aim of this prospective clinical study was to assess the success rate of direct composite onlays used to restore badly damaged endodonticaly treated teeth, and if it can be an alternative for the conventional crown.

METHODOLOGY

Ethical approval by the Human Research Ethics Committee of the Royal Medical Services was obtained. This study was carried out in the Conservative Dentistry Clinic at King Hussien Medical Center. All subjects were informed about the aims and methods of this study, and they provided written consent to participate. In this research, 75 patients (36 males and 39 females) were selected with severely destructed root canal treated posterior teeth (34 molars and 41 premolars). Subjects with poor root canal treatment and subjects with bruxism were excluded from this research. Treatment was performed by an endodontist and conservative specialist. Occlusal reduction was done for the remaining cusps (buccal and lingual) by 1.5 mm, resulting in flattening of the cusps with rounding all sharp angles.

The cavities and reduced cusps were restored with direct composite fillings (Micro Hybrid composite by SDI Australia). Wet bonding was done for the remaining dentin (Hybridization technique). A pulse curing technique was used to reduce stress development at the cavosurface margins, avoiding the formation of microcracks. A follow up every six months for two year intervals was performed to assess the survival rate.

RESULTS

A total of 75 patients were included in the study. Ten patients were lost at 2 years follow up. Our clinical research showed that about 95% of cases were successful after 24 months compared with Dukic W et al who found that the indirect composite onlays were acceptable after 36 months, which indicates a 100% success rate.[16] (Table 1, Fig 1 &2).

DISCUSSION

All three failures in this study were fractures of composite onlay compared with Scholtanus et al who found that fracture, endodontic complications and inadequate proximal contact were the cause of direct composite onlay failure and cumulative survival rate was 96.6%.[17] These findings of this study are in agreement with the study done by Dukic W et al.

Barone et al found that composite inlays demonstrated a very high success rate (97.4%) after three years.[18] Also Manhart et al found 89% of composite inlays to be clinically excellent or acceptable after 3 years.[19] The finding of present study are also in agreement with another review study of the clinical survival of direct and indirect restorations in posterior teeth of the permanent dentition that showed 91.3% success rate after three years.[20]

Long term studies about direct and indirect composite onlay shows lower success rate. Thordrup M et al found that only about 80% of the inlays, including repaired inlays, were in function after 10 years.[21]

CONCLUSION

It was concluded that direct composite onlay has a high success rate (after 2 years follow up) and it represents a feasible, successful and more conservative choice for restoration of endodontically treated teeth. Insertion of composite onlay may improve the fracture resistance of the restored teeth, although further investigation and controlled clinical trials are necessary before a safe recommendation can be given.

TABLE 1

Total patients No.	Total reachable patients No.	Patient with success onlay	Patients with fractured onlay
75	65	62 (95.38%)	3 (4.62%)

Fig 1: Shows onlay composite restoration before and after treatment

Fig 2: Shows onlay composite restoration after 2 years

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