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RESEARCH ARTICLE

RESIN INFILTRATION TECHNIQUE – A REVIEW

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ABSTRACT

Aim: To know the principles of resin infiltration technique.
Background: Resin infiltration technique was first described in 1970s for conservative management of non cavitated smooth surface curious lesions. Caries infiltration is a micro-invasive treatment to arrest non-cavitated caries lesions. The method is based on the penetration of low-viscosity light-curing resins, so called infiltrants, into the pores within the enamel lesion.
Reason: This technique is a minimally invasive technique to treat the non cavitated smooth surface caries.

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INTRODUCTION

White spot lesions are defined as the enamel lesions that look opaque and chalky white. It can be due to 1) idiopathic 2) fluorosis 3) early caries lesion. White spot lesions and early enamel lesions are probably considered as a first sign of dental caries. They can occur on any tooth surface in the oral cavity where the microbial biofilm is allowed to develop and remain for a period of time. White spot lesions develop as a result of saliva modified bacterial infection and dietary carbohydrate, resulting in an imbalance between remineralised and demineralised of the enamel (Jeong- hye son, 2011 and Chang, 1997). Enamel demineralization and remineralisation are considered as a dynamic and continuous process that occurs throughout the life of the tooth. These areas of demineralised enamel that usually developed because of prolonged plaque accumulation would lose their translucency because of an extensive sub surface porosity caused by demineralisation. If the process is not interrupted and demineralisation is continued, they might progress from demineralisation to non cavitated lesion. With the progress in preventive and adhesive technologies in the field of dentistry, new techniques have emerged for preventing and arresting the caries process in order to prevent the tooth structure loss. "Minimal invasive dentistry is a systematic respect for the original tissue" by replacing and removing with little tissue loss (ZaferAzizi, 2015).

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It should be based on five generally accepted principles.

- Scientifically oriented caries diagnosis of early lesions including adequate diagnostic devices;
- Disease control by reduction of cariogenic bacteria/ modification of the oral flora and patient education;
- Remineralisation of the earliest lesions;
- Minimum surgical intervention of cavitated lesions; and
- Repair in favour of replacement of defective restorations (Andrej, 2010).

The purpose of this paper is to present the principles of resin infiltration technique.

Principles of minimal intervention

Control the disease through reduction of cryogenic flora.

- Only in the absence of disease will restorative dentistry succeed.
- This is why control of the disease is the primary focus and only when such control has been achieved will it be possible to offer long term repair of the damage.
- Correct diagnostic procedures must be carried out for any at risk patient to determine the potential for carious activity.
- Modification of the oral micro flora is essential in the initial stage, and a number of oral lavages are available

to modify the balance of the oral flora although chlorhexidine is probably the most effective of these.

Remineralize early lesions

- Remineralization should be recognised and utilized as far as possible for any tooth that has been subject to attack by caries, because there is no real substitute for natural tooth structure.
- It has been known for many years that white-spot lesions on the visible surfaces of teeth can be remineralised and repaired.
- Successful remineralization requires intensive patient must have a full understanding of the implication of food types, the need for plaque removal, and the possible need for additional oral lavages for control of bacterial populations.

Perform minimal intervention surgical procedures, as required

- If the disease has progressed to cavitation on the tooth structure, it is no longer possible to completely control plaque accumulation without some degree of surgical intervention.
- In view of the potential for remineralization and healing a minimal intervention approach is encouraged.
- The principle of prevention of natural tooth structures should dominate decisions about both new and old lesions.

Repair, rather than replace, defective restorations

- The replacement of any failed restoration will also lead to further loss of tooth structure and subsequent weakening of the remaining crown.
- This steady progression should be limited as far as possible; with the advent of adhesion, biometric materials and minimal intervention cavity designs, it is often possible to repair, rather than replace, a restoration that has suffered a limited failure (Nikhil Marwah).

MATRIALS AND METHODS

ICON- infiltrant,
ICON- Etchant,
ICON- Dry (Weisrock, 2011).

Procedure

Step:1- White opacities (fluorosis stains).
Step:2- Application of ICON Etchant.
Step:3-Application of ICON Dry.
Step:4-Application of ICON Infiltrant.
Step:5-Light curing the infiltrant.
Step:6-Post-treatment photograph showing improved esthet (Kugel, 2009).

The concept of resin infiltration

Caries infiltration or resin infiltration technology is a micro-invasive technology that reinforces, fills and stabilizes demineralized enamel without drilling on sacrificing the healthy tooth structure; the micro invasive infiltration can be used to treat the proximal and smooth surface carious lesion up to the first third of dentin. It prevents the progression of lesion and life expectancy of a tooth will be increased. It provides an alternative to microabrasion and other restorative treatments for white spot lesions which are cariogenic. Once infiltrated by the resin, white spot lesion takes on the appearance of the surrounding healthy enamel. It is a novel technology that seems to bridge the gap between minimally invasion and non-invasive treatment of initial dental caries, postponing as long as possible the need for a restoration (Weisrock, 2011; Kielbassa, 2009). Charite Berlin and the university of Kiel developed the concept of caries infiltration for the first time, as a micro invasive approach for the management of proximal and smooth surface non-cavitated caries lesions (Kugel, 2009; CRG, 2012).

Advantages of the infiltration

In clinical dentistry, caries related clinical decision making remains as an important concern. However, most of the practising dentists still continue performing conventional restorative procedures.

- This technique is highly accepted by patients.
- Improved aesthetic outcome as a masking resin on demineralized labial surfaces.
- No risk of postoperative sensitivity and pulpal inflammation.
- It shows reduced risk of gingivitis and periodontitis.
- The progression of lesion is retarded.
- Minimum risk of secondary caries.
- Obturation of porous deeply demineralized areas.
- Delay of restorative intervention for longer periods.
- Mechanical stabilization of demineralized enamel.
- Prevention of sound hard substance.
- Permanent occlusion of superficial micro pores and cavities (Andrej, 2010; Sebastian, 2007).

Researcher's view of resin infiltration technique

- There is a significant increase in the micro hardness of initial enamel carious lesion with resin infiltration technique and the final micro hardness after a new acid challenge was similar in specimens infiltrated with resin and with 0.05% fluoride solution daily (Carlos rochagomeatorres, 2011).
- The ability of a light curing resin to penetrate enamel lesions can be predicted via its penetration co-efficient. Thus, penetration co-efficient determination seemed to be an appropriate means to estimate the penetrability of potential infiltrants. For complete resin infiltration of artificial enamel caries lesion within a short period, infiltrant with a high penetration co-efficient exceeding 100 cm/s should be preferable (Paris, 2013).
- Resin- infiltration was proven to be an effective treatment for masking white spot lesions. Also after a new acid challenge, the group with low viscosity resin infiltration presented the lowest means of colour change (Shin kim, 2011).
- Resin infiltration was shown to reliably mask artificial caries lesion in vitro. Polished infiltrated lesions proved to be resistance to staining influences. There is a moderate correlation between masking success and refractive indices of infiltrants, but clinical factors such

as depth and activity of the lesion, complete infiltration, and resin colour may be more important (Robinson, 1979).

- The masking effect of resin infiltrating was dramatic in some cases but not in others. The long term colour stability of this technique should be followed up through continuous clinical and scientific studies.

Material Characteristics

The well-defined requirements for potentially useful materials were characterized. These should be:

- Highly surface active and with low viscosity.
- Bacteriostatic.
- Hydrophilic.
- Resistance against mechanical and chemical challenges of the oral cavity.
- Non-toxic to oral tissues.
- Polymerizable to a solid state.
- Cosmetically acceptable.
- Some commercially available adhesives have been shown to be suitable for artificial infiltration subsurface lesion as well, but when infiltrants with differing penetration co-efficient were used significant differences are revealed[16].

Conclusion

The early detection of caries and individual risk assessment would help a lot in preserving the tooth structure and avoid unnecessary trauma to the dental tissues. When indicated, minimal invasive dentistry such as resin infiltration technique seems to provide a good solution in dealing with early enamel lesions as recommended by recent studies in this field. This technique can be used in combination with other enamel remineralizing agents like fluoride gels, fluoride varnishes, non-sugar containing chewing gums etc. studies with longer periods of follow up are necessary to confirm the efficiency of this treatment modality and encourage the clinicians to use it in their dental practise.

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