

Refurbishment, repair, or replacement of dental restorations - perpetual dilemma

Abstract

Most of the general dentistry work includes replacement of old restorations or repair of some of the restorations to extend their longevity and serviceability. While some consider replacement is the best solution for deteriorated restorations, some other choose repair as a treatment option depending on the cases. Even though repairs may be frequently occurring in daily practice, there are not many randomized control studies to advice about the repair of restorations. Practice based research, should focus on the criteria when a restoration is best repaired or replaced. Both options have their advantages and disadvantages. Proper Diagnosis and treatment planning are the key factors. Assessing the caries risk level, type of restoration to be replaced, restorative materials to be chosen, aesthetic & functional considerations involved are very important for the longevity of the repair work. Teachers of conservative dentistry should continue to develop and refine the teaching of the repair of amalgam, direct or indirect composite resin restorations and ceramic restorations. This should in turn strengthen the evidence base for the application of repair techniques in clinical practice.

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Introduction

The teaching of Conservative Dentistry is undergoing transformational changes in India as well as in many parts of the world. With the developments in bonding agents, tooth-colored restorative systems, chemo mechanical management of caries, tissue engineering both primary & secondary and a shift to minimal intervention dentistry.^{1,2} For preparing our students for global market, teaching of best practices is necessary. Hence dental educational research should focus on establishing the optimal techniques in Restorative aspects of dentistry. Prevention of dental caries and tooth loss, conservation of tooth structure are the present mantra in dentistry. Minimal intervention is the technique followed in all the branches of dentistry. At present, the repair of restorations rather than replacement is rather followed by all the clinicians. It is believed that by repairing the restorations, their longevity is increased and prosthetic replacement or implants can be postponed. Study by Blum et al.³ have demonstrated that the teaching of the repair of defective composite restorations, rather than their replacement, is well established in primary dental degree programmes in the Scandinavian countries.⁴ Such teaching is to be encouraged, as it is in the best interests of patients, amongst other benefits, minimizing unnecessary loss of tooth tissue and limiting pulpal trauma. Teachers of conservative dentistry should continue to develop and refine the teaching of the repair of direct or indirect composite resin restorations. This should in turn strengthen the evidence base for the application of repair techniques in clinical practice. Most of the general dentistry work includes replacement of old restorations or repair of some of the restorations to extend their longevity and serviceability. Tyas et al.⁵ reported in 2000, that repair is not well accepted by practitioners and being considered as "patchwork dentistry". According to a study conducted 50–71% of a dental practitioners' activity is replacement of restorations.⁴ While some consider replacement is the best solution for deteriorated restorations, some other choose repair as a treatment option depending on the cases. Even though repairs may be frequently occurring in daily practice, there are not many randomized control studies to advice about the repair of restorations. Most of the times

dentist alone may have to take decision how to deal with it unless he is in group practice or in institutional practice where he may be able to make decision after consultation with other specialists.

3Rs of minimal interventional operative dentistry are,

1. Refurbishment :Refinishing/resurfacing.
2. Repair.
3. Replacement.

Refurbishment done to refinish or polish a restoration which is rough, with or without recontouring.⁵ Only margins of a restoration are refinished, while resurfacing may involve part or all of the exposed surfaces of the restoration.

Repair is limiting the amount of lost tooth substance and the amount of exposed dentine surface.⁶ This leads to a simple procedure, reduced risk for pulpal exposure or damage and more economical for patients.³ Repair includes slight grinding and polishing of tooth or restoration, removal of overhangs, polishing of discolored tooth-colored restorations and may include sealing margins. Localized marginal defects, marginal staining, bulk fracture of a limited portion of the restoration, initial secondary caries, localized wear of the restoration can be repaired.² Replacement is indicated if generalized or severe problems and interventions are necessary. Repair is not a reasonable or feasible treatment option since complete removal of the restoration in replacement usually combined with more loss of tooth structure.⁷

Restorations are replaced due to⁴

1. Primary and recurrent caries.
2. Poor margins.
3. Fracture of restorations.
4. Tooth structure fracture.
5. Poor esthetics due to discoloration.
6. Degradation of restorations.
7. Tooth structure loss due to attrition, abrasion, abfraction, and/

- or erosion; and around the restoration which causes tooth pain/sensitivity.
- 8. Secondary caries.
- 9. Material failures.
- 10. Marginal degradation.
- 11. Discoloration.
- 12. Loss of anatomic form.

Each time a restoration is replaced⁸

- a. The cavity becomes larger since it sacrifices the sound tooth structure (often distant from the site of restoration deterioration), hence tooth gets weaker.
- b. Reduces the likelihood of continuing pulp vitality.
- c. The restoration may become more complex.
- d. Adjacent teeth may be damaged.
- e. New defects may be introduced.
- f. Cost of the treatment will increase.
- g. An increased risk of failure.

Repair has following benefits over replacement:

- 1. Reduced risk of iatrogenic damage hence, less loss of tooth structure, more preservation and conservation of tooth tissue.
- 2. Reduction of potentially harmful effects to the dental pulp.
- 3. Reduction of pain, mostly no need for local anesthesia if repair is not extensive.
- 4. Often less risk of iatrogenic damage to adjacent teeth.
- 5. Reduction of treatment time and resources.
- 6. Reduced costs to the patient.
- 7. Good patient acceptance, patient centered treatment.
- 8. Increased longevity of the restoration
- 9. Opportunity for enhanced patient experience.

Refurbishment⁹

Resurfacing or removal of any excess of material and the reshaping of the anatomic form, by contouring and finishing the occlusal, lingual or facial surfaces of defective restorations. It can be done if shortcomings are adjustable without the damage to tooth, For e.g. removal of overhangs, recontouring the surface, removal of discoloration, smoothening or glazing of surface including sealing of pores and small gaps, which can be improved without adding new restorative material (except glaze or bonding).

Repair⁹

Repair was defined as the removal of part of the existing restoration and any adjacent pathologically altered as well as discolored tooth tissue that was esthetically or functionally unacceptable followed by placement of restorative material in the prepared site. Repair also included light grinding and polishing, removal of overhangs, polishing discolored tooth-colored restorations, or sealing margins. Repair is a minimally invasive approach that implies in any case the addition of a restorative material (not only glaze or adhesive), with or without a preparation in the restoration and/or dental hard tissues.

Procedure of repair

- 1. Careful opening
- 2. Cleaning to exclude deep undermining caries and to smoothen margins,
- 3. Phosphoric acid etching and application of an adhesive (in case of failed ceramic or composite restorations an adhesive containing silane may be advantageous),

- 4. Repair with resin composites
- 5. The gaps can best be filled with flowable composite resins.

Replacement⁹

Restoration replacement is defined as removal of entire the existing defective/failed restoration and any adjacent pathologically altered or discolored tooth tissue that was aesthetically or functionally unacceptable. To improve the longevity of the dental restorations, they have to be evaluated periodically. Clinical assessment with specific criteria is preferred. There are various criteria for evaluation 'Ryge' or 'USPHS' and their modifications^{10,11} have brought out the criteria for the clinical evaluation of dental restorative materials used by United states, Public health service and second one is variation of USPHS, which is termed as Standards of quality of dental care, used by the Californian dental association (CDA) are two widely used criteria. Depending on various criteria restorations are grouped or graded into various categories. Once they are categorized, the planning is done to whether restorations have to be refurbished, repaired or replaced. Codes Alfa, Bravo, Charlie and Delta are used to rate the restorations according to the assigned descriptive values for each characteristic The rating is conducted in a clinical setting, usually by two examiners (dentists) and a recorder (e.g. dental assistant), by visual inspection of the restoration with the use of a mirror if necessary. In addition, an explorer is used to rate marginal adaptation and the presence of caries. Many researchers have modified the U.S. Public Health Service which is Modified USPHS criteria (Table 1)¹²⁻¹⁶ In August 2010, an update of the "FDI clinical criteria for the evaluation of direct and indirect restorations" was published by Hickel et al.¹⁷ in the Journal of Adhesive Dentistry and Clinical Oral Investigations.^{17,18}

Decision making

Practice based research, should focus on the criteria when a restoration is best repaired or replaced. Both options have their advantages and disadvantages. However, a proper informed consent should make the patient decide on what option is chosen. Repairs on restorations failing due to caries have a better prognosis compared to repairs on restorations failing due to fracture.^{19,20}

This requires changes at all levels of the dental education continuum²¹

- 1. Special emphasis on diagnosis by recognizing proper pathology.
- 2. Identify the risk markers of progressive oral disease.
- 3. Explain the treatment options to the patients and suggest the best alternative.
- 4. Treatment planning has to be done along with patient's preferences and priorities.
- 5. Correct treatment procedures have to be followed with best choice of materials and techniques.
- 6. Aim to achieve pre-set treatment objectives that the dentist and patient have agreed upon.

Conclusion

A decision with special emphasis on following:

- 1. Proper Diagnosis and treatment planning is a key word
- 2. Assess the type of restoration, restorative materials available, aesthetic & functional considerations and involved the caries risk level to make decision during treatment planning with respect to repair or replace restorations

3. Patients' oral health and dental motivation is important while decision making, since it is a preventive approach towards dentistry.
4. However, there is a need for methodologically sound randomized controlled long-term clinical trials to be able to give an evidence based recommendation.

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Conflicts of interest

The author declares that there is no conflict of interest.

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