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Direct Vs Indirect Restorations- A Comparative Review

[1]Dr Priyanka Puri, Senior Resident (Dental), M.L.B Government Medical College Jhansi (U.P)

[2]Dr Abhishek Mishra, Assistant Professor (Dental), M.L.B Government Medical College Jhansi (U.P)

Corresponding Author: Dr Priyanka Puri, Senior Resident (Dental), M.L.B Government Medical College Jhansi (U.P)

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Abstract

The introduction of adhesive dentistry and the minimally invasive approach of restorative treatment has changed the traditional approach in restorative dentistry. In the era of continuous research and development the clinician has a plethora of options to choose the restorative material. This article highlights the factors responsible for making choice of the type of restoration and the restoration material while choosing the restoration type.

Keywords: Restorative Dentistry, Restorative Dentistry Tooth.

Introduction

A restoration may be defined as a material so placed in the prepared cavity of a tooth that its physiologic and mechanical functions, anatomic forms, occlusion, contact point and esthetic appearance are properly restored or preserved, and the tooth in the area of the restoration is protected as far as possible from recurrence of dental caries.[1]

Numerous dental restorations are placed each day in human teeth, mainly to restore defects caused by caries but also those caused by tooth wear (mechanical and erosive) and fracture.[2] Advances in restorative dentistry and increases in patient expectations regarding aesthetics have led to demands for non-metallic, tooth-colored restorations in the posterior region. Indirect restorations, especially crowns, were considered long-lasting restorations, and the aim was for the restoration to be permanent. However, almost no restoration is really permanent, except the last one in a patient's lifetime. Traditionally, in a tooth that will be restored with an indirect restoration, all direct restorative materials are removed or are covered by the indirect restoration in an attempt to promote the restoration's longevity.[3] This is mainly based on the assumption that an indirect restoration will have a better marginal fit and that indirect restorative materials are more resistant to deterioration over time due to wear, fracture, and discoloration.

Direct restorative materials include nonesthetic materials and esthetic materials. Such restorations can be completed in a single appointment however they do not reinforce the remaining tooth structure.[4] Common indirect restorations include inlay, onlay, crown and

bridges veneers. Placement of these materials generally requires two or more appointments. Indirect restorations on the basis of material can be metallic or non metallic. Metallic include gold restorations and cast metal whereas non metallic include indirect composites, porcelains.[5]

Direct Restoration

A direct restoration refers to restorations that can be fabricated inside the mouth. These restorations can be completed during a single dental appointment because they do not require the use of a dental lab for fabrication. Instead, dentist will place, shape, and harden the restoration in place during your appointment. Not only does this mean that won't need a temporary restoration or a second appointment to place the permanent restoration, but it also means that won't have the dietary restrictions associated with temporary restorations.[6]

Non-esthetic direct restoration materials include amalgam, Direct filling gold. Amalgam according to G.V Black, is an alloy, one of the constitutes of which is mercury. According to Mc-Gehee, an amalgam is a mixture, or union of mercury with one or more other metals.[7] Direct filling gold is described by Sturdevant as gold restorative materials that are manufactured for compaction directly into prepared cavities.[8]

Esthetic direct restoration materials include composite resin, glass ionomer cement, resin modified GIC, compomers. Composite resin according to Skinners is a "A highly cross linked polymeric material reinforced by a dispersion of amorphous silica, glass crystalline or organic resin filler particles and/or short fibers bonded to the matrix by a coupling agent.

The most common direct restoration used in dentists are composite fillings. Composite fillings are used to restore teeth with small to medium sized cavities caused by tooth decay. To place a composite filling, the decayed tissue must first be removed. Then, the composite resin will be applied to the cavity one layer at a time. Each layer will be hardened in place before placing the next layer. The final layer will then be shaped to blend in with the surrounding tooth structure before being hardened into place.[9]

Composite resin can also be used for a restorative treatment known as cosmetic bonding. Cosmetic bonding, also known as dental bonding or composite bonding, uses composite resin to repair small chips or cracks in the teeth. Just like a composite filling, cosmetic bonding can be entirely completed in a single dental appointment.

Direct adhesive restorations may be inserted in cavity preparations resulting, basically, from the removal of dental caries and/or old restorative materials[10]. In the past, sound dental structure was sacrificed to compensate for the limitations of tecnhiques and restorative materials.[11] Currently, based on the minimally invasive philosophy, the preparation of a cavity takes the preservation of the sound dental tissue into account, giving a chance for the tissues for potential remineralization[12]. Therefore, this philosophy integrates concepts of prevention, control and dental treatment, using restorative materials of low cost and easy repair[13].

Indirect Restoration

An indirect restoration refers to permanent or semi-permanent fixed restorations that must be fabricated outside of the mouth. These types of restorations generally need to be fabricated by a dental laboratory, however they can also be fabricated using an in-office milling machine. Since they are fabricated using a dental lab, indirect restorations often require two dental appointments for proper placement.[14]

During the first appointment, the tooth is prepared by removing any decayed or damaged tissue and then

shaping the remaining structure. Depending on the type of direct restoration being used, varying amounts of natural tooth structure may need to be removed or reshaped. Once the tooth is prepared, a dental impression or oral scan will be taken to obtain the information necessary for fabrication. This information is then sent to a dental laboratory and a temporary restoration will be placed to protect the tooth. Within a few weeks, a second appointment will be needed to check the fit of the restoration and permanently cement it in place.

Although indirect restorations take two appointments to place and require the use of a temporary restoration, they offer restoration options for larger areas of damage and decay. Furthermore, indirect restorations can be used to correct a number of cosmetic concerns, including discolored, oddly shaped, unevenly sized, or improperly spaced teeth. Examples of indirect restorations include: Crowns & Bridges, Dental Implants, Inlays & Onlays, Porcelain Veneers

Intracoronal restoration includes the inlay, which is described by Mc-Ghee as a restoration, which has been constructed out of the mouth from gold, porcelain, or other material and then cemented into the prepared cavity of a tooth."[7] According to Sturdevant, the class II gold inlay involves the occlusal and proximal surface(s) of posterior tooth and may cap one or more but not all the cusps.[8]

In indirect restorations, classic approaches are based on subtractive techniques, where the tooth must be prepared to create enough space for the restorative material[15]. In order to avoid undesirable prosthetic over contours, often a greater amount of tooth preparation is performed by the clinician, which may result in loss of pulp vitality. In addition, devitalized abutment teeth associated with these prostheses generally have intraradicular posts, which require more removal of dental tissue, impacting negatively the clinical survival of these restorations[16,17].

Longevity of Restorations

Long term survival of direct and indirect restorations is dependent on the restoration not failing "failure occurs when a restoration reaches a level of degradation that precludes proper clinical performance for either aesthetic or functional reasons of because of inability to prevent new disease".[5]

Size of defect

Traditionally, small defects in teeth are treated with a direct restoration. For larger defects, including cusp replacement and deep cervical outline, different restorative options are available, either direct or indirect. For large posterior and anterior defects, a direct composite restoration can be a feasible solution. Several studies have shown that a direct composite is suitable for restoration of large defects, including cusp replacement, and for treating cracked teeth.[18] Inlay/onlay restorations are also considered to be an option for larger defects.[19] They have the advantage of precision and better control on the final morphology and occlusion. However, the need for a tapered preparation design may result in increased tooth tissue loss. This can be prevented by using immediate dentin sealing and direct composite buildups to remove undercuts.[20] For a long time, crowns were considered the best restorations for severely compromised teeth.[21] Disadvantages of crowns are that they require sufficient ferrule and that the outline should be extended considerably toward the cervical region which may result in loss of more tooth substance. The costs for crowns are considerable; therefore, some restorative dentists recommend alternative concepts.[22]

Conclusions and Recommendations

The reasons to choose indirect restorations ranged from indirect restorations are stronger to indirect restorations

last longer, the defect is too large for a direct restoration, and subgingival margins in cementum require an indirect restoration. In large rehabilitations in which the dentition has to be restored extensively, indirect techniques allow for preoperative design with wax-up or digital wax-up and better management of occlusion and vertical dimension. In cases in which a direct restoration is too difficult for the operator to make, sometimes an indirect restoration can be more successful.

References

1. Anusavice ed. Phillip's Science of Dental Materials, Ed 11, Philadelphia, Saunders.
2. Heintze SD, & Rousson V (2012) Clinical effectiveness of direct class II restorations—A meta-analysis Journal of Adhesive Dentistry 2003;14(5):407-431.
3. Van Meerbeek B, De Munck J, Yoshida Y, Inoue S, Vargas M, Vijay P, et al. Buonocore memorial lecture. Adhesion to enamel and dentin: current status and future challenges. Oper Dent. 2003;28:215-35.
4. Charbeneau GT: Principles and Practice of Operative Dentistry, Ed 3 (1st Indian reprint), Varghese publ. house, Bombay, 1989.
5. Sajjanhar I, Mishra P. Direct versus indirect restoration: A review. *Indian J Conserv Endod*2019;4(3):75-8.
6. Ericson D, Kidd E, McComb D, Mjör I, Noack MJ. Minimally invasive dentistry-concepts and techniques in cariology. Oral Health Prev Dent. 2003;1:59–72.
7. McGehee, WHO: A Textbook of Operative Dentistry, Ed 4, M.C. Books, New York, 1989.
8. Sturdevant JR, Sturdevant CM: Class II Cast Metal Restorations. In, Roberson T.M, Heymann H.D., Swift J.E .eds. Sturdevant's Art & Science of Operative Dentistry, Ed 4, St Louis, Mosby, 2002.
9. Featherstone JDB, Doméjean S. Minimal intervention dentistry: Part1.From "compulsive" restorative dentistry to rational therapeutic strategies. Br Dent J. 2012;213:441–5.
10. Demarco FF, Collares K, Coelho-de-Souza FH, Correa MB, Cenci MS, Moraes RR, et al. Anterior composite restorations: a systematic review on long-term survival and reasons for failure. Dent Mater. 2015;31:1214– 24.
11. Peters MC, McLean ME. Minimally invasive operative care. Minimal intervention and concepts for minimally invasive cavity preparations. J Adhes Dent. 2001;3:7–16.
12. Duncan HF, Galler KM, Tomson PL, Simon S, El-Karim I, Kundzina R, et al. European society of endodontology position statement: management of deep caries and the exposed pulp. Int Endod J. 2019;52:923– 34.
13. Dong JK, Jin TH, Cho HW, Oh SC. The esthetics of the smile: a review of some recent studies. Int J Prosthodont. 1999;12:9–19.
14. Marzouk MA, Simonton AL, Gross RD: Operative Dentistry Modern Theory and Practice, Indian ed. 1, All India Publishers, Chennai, 1997.
15. Edelhoff D, Liebermann A, Beuer F, Stimmelmayr M, Güth JF. Minimally invasive treatment options in fixed prosthodontics. Quintessence Int. 2016;47:207–16.
16. Sagsen B, Aslan B. Effect of bonded restorations on the fracture resistance of root filled teeth. Int Endod J. 2006;39:900–4.
17. Cobankara FK, Unlu N, Cetin AR, Ozkan HB. The effect of different restoration techniques on the

fracture resistance of endodontically-treated molars. Oper Dent. 2008;33:526–33.

18. Opdam NJ, Bronkhorst EM, Loomans BA, & Huysmans MC. 12-year survival of composite vs. amalgam restorations Journal of Dental Research 2010;89(10):1063-1067.
19. Attin T, Filli T, Imfeld C, & Schmidlin PR. Composite vertical bite reconstructions in eroded dentitions after 5_5 years: a case series Journal of Oral Rehabilitation 2012;39(1):73-79.
20. Magne P. Immediate dentin sealing: A fundamental procedure for indirect bonded restorations Journal of Esthetic and Restorative Dentistry.2005;17(3):144-154.
21. Magne P, Kim TH, Cascione D, & Donovan TE. Immediate dentin sealing improves bond strength of indirect restorations Journal of Prosthetic Dentistry 2005;94(6):511-519.
22. Rocca GT, & Krejci I. Crown and post-free adhesive restorations for endodontically treated posterior teeth: From direct composite to endocrowns European Journal of Esthetic Dentistry 2013;8(2):156-179.