

Knowledge, Awareness and Perception Among Dental Practitioners Regarding Direct and Indirect Method Of Composite Restoration For Class I Cavity

Research Article

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Abstract

Introduction: Composite restorations have made a revolution in conservative dentistry due to their adhesive bonding ability and aesthetics which has increased patient appeal. The adhesive bonding ability of composite resin, makes it unnecessary to remove tooth structure for retention, prevention and convenience. Hence, this leads to successful restorations that can be done with less precise preparations.

Objective: The main aim of this study was to assess the knowledge, awareness and perception regarding direct and indirect method of composite restoration for class I cavity among dental practitioners in our region.

Methods: This cross-sectional study was conducted among 100 dental practitioners in Chennai city, using a self-administered questionnaire consisting of 18 validated and structured questions. Data obtained was statistically analysed and results obtained.

Results: About 85% of the dentists knew the different methods of composite restoration. 56% of them felt that direct method is more efficient than indirect restoration. Majority of the dentists (69%) followed direct technique in their practice.

Conclusion: From our study it is evident that, dentists knew the method of indirect restoration, although most of them did not find this technique to be effective and hence did not practice. It is necessary to create awareness among the clinicians to practice indirect restoration technique for suitable patients with class I cavities.

Keywords: Composite Resin; Dental Cavity; Dental Restoration; Class I Cavity; Restorative Dentistry; Aesthetics; Retention; Marginal Integrity.

Introduction

In today's world, there is an increase in the demand for aesthetics that has led to the development of tooth-coloured, non-metallic restorations such as direct composite restorations, indirect composite inlays, and ceramic inlays or onlays [1]. Composite restorations have made a revolution in conservative dentistry due to their adhesive bonding ability and aesthetic which has increased patient appeal. The adhesive bonding ability of composite resin, makes it unnecessary to remove tooth structure for retention, prevention, and convenience. Hence, this leads to successful restorations that can be done with less precise preparations [2].

Composite inlays were first proposed by Touati of France and James of United states of America. They made incrustations of moulded composite from an impression which was secondarily bonded in the mouth. These incrustations that were bonded were later named as composite inlays [3, 4]. The most commonly used composite materials are hybrid, micro-filled and nano-filled composites for posterior restorations. The filler loading in Micro-filled composites is 37%–40%, where as nano-filled composites have 60% volume filler loading [2]. Nano-filled composites show high translucency similar to micro-filled composites and physical properties similar to hybrid composite [5]. Other advantages apart

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from aesthetics are that these materials are relatively less expensive, induce lesser wear of opposing tooth structure and are based on the principle of minimally invasive procedure [6].

There are various techniques for placing composite resin restorations. It includes the direct and the indirect technique. The selection between direct and indirect technique is a challenging process. The advantage of single visit direct posterior composite restorations is the preservation of tooth structure [7]. The procedure in this technique includes etching and application of bonding agent to the prepared cavity, composite restoration is built up in increments, curing one layer at a time while allowing the practitioner to sculpt the restoration. Hence, cavities are filled incrementally. The layering technique, thus, effectively reduces the polymerization stress by minimizing the C-factor, which in turn increases the bond strength.

Advantages of direct technique include increased strength of remaining tooth structure and potential for repair, while the major disadvantages are the mechanical strength of these restorations is inferior to that of indirect composite restorations. Other disadvantages include occlusal and proximal wear, surface roughness, marginal discoloration, loss of marginal integrity, postoperative sensitivity, secondary caries, cusp flexure, technique sensitive, less-than-ideal bonding to dentin, and low fracture toughness [7].

Fabrication of the restoration outside the oral cavity in the laboratory, following which it is luted to the tooth with resin cement is referred to as Indirect technique. There are two types of indirect composite restorations, which include the first and second generation. The first generation of indirect restoration resins have shown failures in clinical studies. In spite of their secondary curing, they exhibited low levels of flexural strength (60-80 MPa) and elastic modulus (2-3.5 GPa); a resin volume more than 50% and higher wear levels [8]. A second generation of indirect composites was introduced which included micro-hybrid composites with fillers of approximately 66% by volume, to overcome the disadvantages of first-generation indirect composites. These composites had improved mechanical properties with flexural strength in the range of 120-160 MPa and elastic modulus of 8.5-12 GPa [9].

The fabrication process differs for direct composite restoration and indirect inlays. For direct composite, first a separating medium is applied to the prepared tooth. The resin pattern is then formed, light-cured and removed from the preparation. The rough inlay is then exposed to additional light for approximately 4-6 min or heat activated at 110°C for 7 min, after which the preparation is etched, the inlay is cemented in to place with a dual-cure resin, and is then polished. This technique can be completed in a single sitting since it eliminates the need for an impression of the cavity [10].

Indirect inlay system requires an impression to fabricate the inlay in the laboratory. It is important that the work done in the laboratory should co-ordinate to those done in the clinic to facilitate good bonding, fitting and occlusion of the inlay. In addition to conventional light-curing and heat-curing for polymerization, laboratory processing may use heat (140°C), pressure (0.6 MPa for 10 min) and nitrogen atmosphere. These materials have improved physical properties, resistance to wear and attain a higher degree of polymerization [11].

The advantages of Composite inlays are that they provide better contouring of proximal surfaces, occlusal contacts, improved wear resistance, reduced polymerization shrinkage, improved fracture resistance, and biocompatibility [11]. The indirect composite inlay offers better control of cervical tightness and better restitution of the contact point in cases of proximal loss of substance [12]. The drawbacks of composite inlays are increased cost and time, requires two appointments, fabrication of a temporary restoration, and low potential for repair. Secondary caries with composites to some extent is associated to the restorative material, as significantly more caries occurs with composites than with amalgam [13].

Hence, the selection between direct and indirect composite restorations is challenging. Many clinical studies have been performed on success or survival rate of direct and indirect composite restorations individually [14-20]. Very few articles have studied comparing direct versus indirect composite restorations [21, 22]. Hence, the primary objective of this study was to assess the knowledge, awareness and perception regarding direct and indirect method of composite restoration for class I cavity among dental practitioners in our region.

Materials and Methods

A cross-sectional study was conducted among 100 dental practitioners in Chennai city, to assess the Knowledge, Awareness and Perception regarding Direct and Indirect Method of Composite Restoration in Class I Cavity. Data were gathered with a self-administered questionnaire consisting of 18 validated and structured questions [Figure 1]. Data obtained was statistically analysed, results obtained and were expressed using pie charts.

Results

Majority of the participants were female clinicians, belonging to the age group of 20-30 years. About 85% of the dentists knew the different methods of composite restoration [Figure 2]. 56% of them felt that direct method is more efficient than indirect restoration. Majority of the dentists follow direct technique in their practice, with 69% having restored a cavity with direct technique [Figure 3]. About 39.1% of the dentists answered that potential for repair is the main advantage of direct composite restoration, and 33.3% of dentists replied that increased strength of remaining tooth structure as the advantage of direct composite restoration [Figure 4]. 26.6% of dental practitioners felt that better occlusion is the major advantage of indirect composite restoration, and 23.7% of dentists answered that minimising the effect of polymerisation shrinkage as the advantage of indirect composite restoration [Figure 5].

Discussion

Very few studies are done to evaluate the clinical efficiency of direct and indirect method of composite restoration. Currently, no surveys regarding the knowledge, awareness and perspective of direct and indirect method of composite restoration in class I cavities were conducted. Hence, this study was aimed to address the lacunae in the existing literature.

According to our study, majority of the clinicians agreed that the

Figure 1. Questionnaire regarding Knowledge, Awareness and Perception among Clinicians about Direct and Indirect Method of Composite Restoration in Class I Cavity.

Questions

1. Are you aware of the different methods of composite restoration? Yes/No
2. Are you aware that the size of the cavity determines the type of composite restoration? Yes/No
3. Are you aware of the steps involved in direct composite restoration? Yes/No
4. Are you aware of the steps involved in indirect composite restoration? Yes/No
5. What are the advantages of direct composite restoration?
 - a) Mechanical strength
 - b) Marginal integrity
 - c) Good margin combined with direct composite restoration
 - d) Polychromatic shade
 - e) More bulkage
 - f) Both a,b,c
6. What are the steps of indirect method of composite restoration? (More than 1 step)
 - a) Aesthetic preparation
 - b) Block technique
 - c) Minimize the effect of polymerization shrinkage
 - d) Marginal adaptation
 - e) All of the above
7. Do you think patient compliance plays a role in the indirect method of composite restoration? Yes/No
8. Which method of composite restoration is commonly used in your practice?
 - a) Direct method
 - b) Indirect method
9. Have you restored class I cavity by indirect method? Yes/No
10. Which method of restoration do you think is more efficient?
 - a) Direct method
 - b) Indirect method
11. Indications for indirect composite restoration?
 - a) Dimension of the cavity
 - b) Patient's aesthetic concern
 - c) Multiple restorations
 - d) All of the above
12. Laboratory processing of indirect restoration uses
 - a) Heat
 - b) Pressure
 - c) Nitrogen atmosphere
 - d) All of the above
13. What is the drawback of indirect composite restoration?
 - a) Shrinkage
 - b) Formation of secondary caries
 - c) Wear of composite resin material
 - d) All of the above
14. Indirect stress and potential bulkage are reduced in which type of restoration?
 - a) Direct method
 - b) Indirect method
15. Does indirect restoration provide improved factors retention? Yes/No

Figure 2. Awareness regarding the methods of composite restoration.



Figure 3. Method of composite restoration commonly used in dental practice.

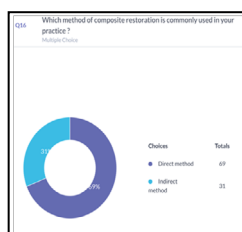


Figure 4. Advantages of direct composite restoration.

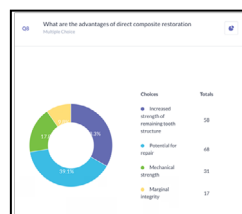
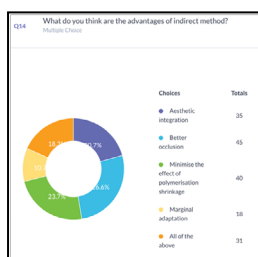


Figure 5. Advantages of indirect method of composite restoration.



size of the cavity plays a major role in determining the type of restoration. The disadvantages of direct composite restoration were answered correctly by the clinicians, which was polymerisation shrinkage. Only about 73% of the dentists knew the steps involved in indirect method restoration. 75% of the practitioners felt that patient compliance plays a major role in indirect method of restoration. Majority of the dentists answered that formation of secondary caries was the major disadvantage. Hence, in our study, it was found that there is insufficient knowledge and awareness of the various pros and cons of indirect restoration.

Karaarslan et al., [23] performed a study on seventy patients in

which 140 teeth were equally divided into two groups (n = 70); Group-I -direct composite and Group-II -indirect composite. This study concluded that indirect restorations have less surface roughness, postoperative sensitivity, and soft-tissue irritation than direct restorations. The clinical efficiency of indirect restoration was more satisfactory than the direct restorations, which is in accordance to our study results. Scheibenbogen-Fuchsbrunner et al., [24] in their study equally divided 60 teeth into Group-I direct composite, and Group-II indirect composite. This study concluded that inlays demonstrated better anatomic form of the surface than direct restoration, which is similar to our study results. According to Fennis et al., [25] 176 premolars in 157 patients

were divided equally into two groups. In this study, retention of the restoration was evaluated. This study concluded that there was no statistically significant difference between direct and indirect restorations.

According to Mendonça et al., [26] 76 teeth in 30 patients were divided into two groups: Group-I (Direct composite) (n = 44) and Group-II Targis (n = 32). The properties that were evaluated were surface texture, marginal discoloration, colour match, anatomic form, marginal integrity, and secondary caries. This study concluded that direct restorations performed better than indirect composite inlays for marginal integrity. According to our study, only 9.8% felt that marginal integrity was better in direct composite restoration and 10.7% of the dentists felt it was better in indirect composite restoration. Another study done by Cetin et al., [27] showed that there was no significant difference between the marginal integrity of direct and indirect composite restoration. According to Wassell et al., [28] 73 patients received 100 pairs of direct and indirect restorations, restored with the same material, which was Coltene BD. This study concluded that there was no significant difference in the clinical performance between direct and indirect technique and the direct inlay method gave no clinical advantage over conventional, incremental placement technique. The results were in accordance to our study outcome as majority of the dentists practiced only direct composite restoration.

Douglas et al., [29] in their study compared the microleakage in direct and indirect composite restoration, and concluded that indirect composite restoration had significantly reduced microleakage. Our study had contradictory results where in 30% of dentists felt that microleakage was a major drawback of indirect composite restoration. Dalpino et al., [30], conducted a study in 56 premolars to compare the fracture resistance in direct and indirect composite restoration. It was found that there was no significant difference between the two methods. In contrast clinicians in our study felt that indirect restoration has better fracture resistance. From our survey, it is evident that most of the dentists knew the different methods of composite restoration.

Conclusion

From our study it is evident that, dentists knew the method of indirect restoration, although most of them did not find this technique to be effective and hence did not practice. It is necessary to create awareness among the clinicians to practice indirect restoration technique for suitable patients with class I cavities.

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