

## RESTORATION METHODS PREFERRED BY DENTAL PRACTITIONERS FOR ENSURING THE LONGEVITY OF COMPOSITES IN EXTENSIVE POSTERIOR RESTORATION

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### **ABSTRACT**

#### **OBJECTIVES**

To find the restoration methods preferred by dental practitioners for ensuring the longevity of composites in extensive posterior restoration.

#### **METHODOLOGY**

A cross sectional descriptive study was conducted in 150 dentists of Sharif College of Dentistry, SMDC, Lahore from June 2019 to July 2020. All participants irrespective of their age, gender and clinical experience were included. Practitioners who had never used composites for posterior restoration were excluded from the study. Data was collected using a pre validated questionnaire.

#### **RESULTS**

There was a statistically non-significant association between designation of the clinicians and the techniques used for ensuring longevity of extensive restorations ( $P=0.255$ ). That majority of the house officers (46%), postgraduate residents (7.3%) and consultants (29.3%) used incremental curing.

#### **CONCLUSION**

Most of the house officers used incremental curing, majority of the postgraduate students used the incremental curing technique while most of the faculty members preferred incremental curing for the longevity of the restorations.

**KEYWORDS:** Dentists, Posterior Composite Restorations, Incremental Curing, Rubber Dam

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#### **INTRODUCTION**

Composite resins have replaced amalgam restorations both in posterior as well as anterior teeth.<sup>1</sup> In addition to excellent aesthetics and

suitable longevity they offer minimally invasive preparation.<sup>2</sup> Composite placement requires effective moisture control and for this rubber dam isolation with clamps is the most practically used technique.<sup>3,4</sup> Along with rubber dam metal matrices are also being advocated for composite placement. They not only provide isolation but also provide proper proximal contours.<sup>5,6</sup> The key to a successful composite restoration is an adequate interfacial seal. Recent advancements in adhesives have generally classified them as self-etch and etch and rinse where self-etch resins are popular.<sup>7</sup> They require less time for preparation and reduce the chances of microleakage, especially at occlusal margins and fissures.<sup>8</sup> These adhesives not only aid in effective demineralization of dentine but also help in infiltration of the resin.<sup>9</sup>

The newer dentine bonding agents are extremely effective for this purpose.<sup>10</sup> There have been several advancements in their generations keeping in mind the purpose of interfacial seal and smear layer.<sup>11</sup> Various techniques have been advocated for the composite placement. The most used are bulk fill and incremental layering. Several studies have been conducted in this regard. A study done over a period of three years concluded that bulk fill technique as well as incremental technique involving the use of a liner showed good results.<sup>12</sup> At numerous times it was observed that the use of bulk fill composites varied according to the situation. For example in deep caries i.e. more than 4mm, flowable base bulk fill were used whereas in much deeper caries, full body bulk fill were used.<sup>13</sup> The micro hardness of adhesive placed through either technique was good.<sup>14</sup> In another research it was seen that incremental technique had higher bond strength than bulk fill especially in higher c factor cases.<sup>15</sup> For deep proximal caries, a proximal box design which incorporates placement of composite in an incremental manner, showed satisfactory results.<sup>16</sup> Hence, the most suitable technique being used for composite restorations is incremental layering, which includes placement of composite in increments with a thickness of 2mm.<sup>2</sup> However, recently studies are being done on the efficiency of bulk fill resin composites which range from 4-10mm.<sup>16</sup> This technique reduces polymerization shrinkage, time, cytotoxicity, and provides better marginal adaptation.<sup>17,18,19</sup> The aim of this study was to find the restoration methods preferred by dental practitioners for ensuring the longevity of composites in extensive posterior restoration.

## METHODOLOGY

A cross sectional descriptive was conducted in 150 dentists of Sharif College of Dentistry, SMDC, Lahore from June 2019 to July 2020 after obtaining ethical approval from Sharif Medical Research Centre (SMRC). All participants irrespective of their age, gender and clinical experience were included. Practitioners who had never used composites for posterior restoration were excluded from the study. The sampling technique used was convenient sampling. The sample size was calculated using an online sample size calculator keeping precision at 5%, 95% confidence level with prevalence of use of composites as posterior restoration. 9.8%, the sample size was calculated to be 150.<sup>20</sup> Data was collected using a pre validated questionnaire.<sup>20</sup> Informed consent was taken from the participants. Numerical data like the age was reported as mean and standard deviation. Nominal data like gender and years of clinical experience were recorded as frequency and/or percentages. For data analysis, all recorded data was coded and entered using SPSS statistical package version 23.0. Fisher exact test was used to find the association between years of clinical experience of dentists and trends, concerns, and techniques used for placement of composites in posterior restoration. P value less than equal of 0.05 was considered significant.

## RESULTS

A cross sectional descriptive study was conducted on 150 dental practitioners with 39.3% males and 60.7% were females with a mean age of 26.66 ± 4.514 years

Table 1: Shows a Statistically Non-Significant Association Between Designation of the Clinicians and the Techniques Used for Ensuring Longevity of Extensive Restorations (P=0.255)

Designation	Technique For Extensive Restorations					P-Value
	Incremental Curing	Use of Moisture Control Method (Not Rubber Dam)	Use of Rubber Dam	Total Etch/Dentine Bonding Agents	Metal Matrix Band	
House Officers	69 (46.0%)	04 (2.7%)	03 (2.0%)	02 (1.3%)	04 (2.7%)	0.255
Postgraduate Residents	11 (7.3%)	03 (2.0%)	0 (0.0%)	0 (0.0%)	01 (0.7%)	
Consultants	44 (29.3%)	03 (2.0%)	03 (2.0%)	03 (2.0%)	0 (0.0%)	

Table 1 shows that majority of the house officers (46%) used incremental curing followed by advocated the use of moisture control without rubber dam (2.7%), rubber dam for isolation while only a few of them used total etch dentine bonding agents and metal matrix band respectively. On the other hand most of the postgraduate students used the incremental curing technique (7.3%), followed by moisture control without rubber dam technique (2%) while none of them used rubber dam or total etch dentine bonding agents. It was also seen that majority of the consultants preferred incremental curing for the longevity of the restorations (29.3%).

## DISCUSSION

The functional outcome of affected hemiplegic Clinical use of posterior tooth fillings utilising resin-based composite substances is already on the rise, as is consumer interest for these kind of aesthetically pleasing replacements. Resin composite is, in fact, the much more aesthetically popular substitute for amalgam fillings. But the rate of failure, repeated cavities, and maintenance frequencies of intermediate to huge posterior composite fillings are increased. Researchers from all over the world are working to develop novel methods and substances that would enhance the therapeutic efficacy, usability, and physical and mechanical properties qualities of composite resin restoring components. In 2005, 166 million tooth fillings have been put in situ in the American States, and diagnostic and therapeutic investigations indicate that many more than half of those were repairs for damaged ones.<sup>22</sup> Since they provide exceptional aesthetic possibilities, adequate lifespan, and a significantly cheaper cost than comparable composite fillings again for repair including both anterior and posterior tooth, composites currently hold a leading place amongst dental restorations.<sup>23</sup> Methods used in repair implantation are widely acknowledged to play a significant role in decreasing shrinking stress. It may be possible to reduce tension brought on by limited shrinking by utilizing specialized restorative procedures. On the other hand, it is unclear which remedial method should indeed be applied to eliminate shrinking stress. To lessen shrinkage strain, delivering the composites in layer rather than in mass is advised.<sup>24</sup> Use of a limited amount of substance, a smaller cavity configuration factors, and less interaction well with oppositional cavity sidewalls while polymerization all work together to minimize shrinkage strain. It is generally acknowledged that progressive filling reduces shrinkage pressure because there is less polymerization substance to work with. Because each incremental is made up for by another following, the effect of shrinkage is much less harmful because only the final layer's size loss has the potential to harm the bonding interface.<sup>25</sup> Most people agree that the best substance regarding posterior direct fillings is posterior epoxy composites. Given that average yearly rate of failing range from 1% and 3%, their chances of surviving are great.<sup>26</sup> The majority of clinical investigations compared various resin composites manufacturers and varieties, and research periods rarely surpassed five years. Recently, with mounting proof that now the

material qualities are all more than acceptable, we have shifted our attention to other variables that might affect the longevity of restoration, including such individual risk variables.<sup>27</sup> These variables, which may be linked to lifespan, were infrequently investigated in individual research, but they were occasionally noted by authors or provided as a generalized characteristic in those research.<sup>28</sup> Khier and Hassan noted that oblique as well as occlusogingival incremental methods showed greater grades of micro leakage at occlusal and gingival edges than split-increment method after comparing the effectiveness of 3 placement methods in marginal cementation of Class V composite restoration work going to extend over onto root. Following laser drying, dividing a smooth composites component diagonally retained the durability of the adhesive gingival border and decreased propagation of cracks.<sup>29</sup> Susanne Szep et al. found that marginal coat and micro - hardness of Class II composite reconstructions were affected by 2 different distinct proximal restoration methods (centripetal vs incremental), both with varying matrix frameworks (metal as well as transparent matrix). Those who came to the conclusion that now the smallest, but just not markedly distinct, microleakage has been accomplished in completely adhered profound Class II restorations planned mostly with edges encircled by enamel while utilising translucent matrix. Translucent matrix as well as reflective wedges were associated with the composites resin's extremely high surface toughness.<sup>30</sup> Results (67%) of a study conducted in dental schools in Oceania showed that use of rubber dam is mandatory in composite placement which is much greater than the percentage at Sharif medical college i.e on average 2.0%.<sup>31</sup> In another study in KSA, it was observed that around 95% practitioners use tofflemire matrix for isolation, whereas only about 4% practitioners in SMDC use metal matrix.<sup>32</sup> On the other hand, a research was carried out to test the retention abilities of total etch dentine bonding agents and an amazing 100% retention was seen in a UK based study as compared to only about 3% in our study.<sup>11</sup> Lastly, a significant amount of percentage favored the use of incremental layering technique in posterior composite placement.<sup>32</sup> Even at Sharif Medical and Dental College, about 69% practitioners use the incremental layering technique.

## LIMITATIONS

A larger sample size would have helped unravel more findings.

**CONCLUSIONS**

Most of the house officers used incremental curing followed by the use of moisture control without rubber dam, rubber dam for isolation while only a few of them used total etch dentine bonding agents and metal matrix band respectively. On the other hand most of the postgraduate students used the incremental curing technique, followed by moisture control without rubber dam technique while none of them used rubber dam or total etch dentine bonding agents. Majority of the consultants preferred incremental curing for the longevity of the restorations while an equal number employed moisture control without rubber dam, rubber dam and total etch dentine bonding agents.

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**REFERENCES**

- Chesterman J, Jowett A, Gallacher A, Nixon P. Bulk-fill resin-based composite restorative materials: a review. *Br Dent J.* 2017 Mar;222(5):337-44.
- Chandrasekhar V, Rudrapati L, Badami V, Tummala M. Incremental techniques in direct composite restoration. *J Conserv Dent.* 2017 Nov;20(6):386.
- Mackenzie L, Waplington M, Bonsor S. Splendid isolation: a practical guide to the use of rubber dam Part 1. *Dent Update.* 2020 Jul 2;47(7):548-58.
- Bhatia S, Kohli S. Placement with modifications. *Br Dent J.* 2021 Jul;231(1):3-.
- El-Shamy H. INFLUENCE OF METAL VERSUS TRANSPARENT MATRICES ON PROXIMAL CONTACT TIGHTNESS OF CLASS II BULK-FILL COMPOSITE RESTORATIONS. *Egypt Dent J.* 2018 Jul 1;64(3-July (Fixed Prosthodontics, Dental Materials, Conservative Dentistry & Endodontics)):2819-25.
- Lindroos VK, Talvitie MJ. Recent advances in metal matrix composites. *J Mater Process Technol.* 1995 Aug 1;53(1-2):273-84.
- Ahmed AA, Hassan MM, Abdalla AI. Microshear bond strength of universal adhesives to dentin used in total-etch and self-etch modes. *Tanta Dental Journal.* 2018 Apr 1;15(2):91.
- Gupta A, Tavane P, Gupta PK, Tejolatha B, Lakhani AA, Tiwari R, Kashyap S, Garg G. Evaluation of microleakage with total etch, self etch and universal adhesive systems in class V restorations: an in vitro study. *J Clin Diagn Res.* 2017 Apr;11(4):ZC53.
- Nahvi A, Razavian A, Abedi H, Charati JY. A comparison of microleakage in self-etch fissure sealants and conventional fissure sealants with total-etch or self-etch adhesive systems. *Eur J Dent.* 2018 Apr;12(02):242-6.
- Burke FT, Lawson A, Green DJ, Mackenzie L. What's new in dentine bonding?: universal adhesives. *Dent Update.* 2017 Apr 2;44(4):328-40.
- Burke FT, Crisp RJ, Cowan AJ, Raybould L, Redfearn P, Sands P, Thompson O, Ravaghi V. A randomised controlled trial of a universal bonding agent at three years: self etch vs total etch. *Eur J Prosthodont Restor Dent.* 2017 Dec 1;25:220-7.
- Karaman E, Keskin B, Inan U. Three-year clinical evaluation of class II posterior composite restorations placed with different techniques and flowable composite linings in endodontically treated teeth. *Clin Oral Investig.* 2017 Mar 1;21(2):709-16.
- Van Ende A, De Munck J, Lise DP, Van Meerbeek B. Bulk-fill composites: a review of the current literature. *J Adhes Dent.* 2017 Apr 25;19(2):95-109.
- Moharam LM, El-Hoshy AZ, Abou-Elenein K. The effect of different insertion techniques on the depth of cure and vickers surface micro-hardness of two bulk-fill resin composite materials. *J Clin Exp Dent.* 2017 Feb;9(2):e266.
- Han SH, Park SH. Incremental and bulk-fill techniques with bulk-fill resin composite in different cavity configurations. *Operative dentistry.* 2018;43(6):631-41.
- Müller V, Friedl KH, Friedl K, Hahnel S, Handel G, Lang R. Influence of proximal box elevation technique on marginal integrity of adhesively luted Cerec inlays. *Clin Oral Investig.* 2017 Mar 1;21(2):607-12.
- Costa TR, Rezende M, Sakamoto A, Bittencourt B, Dalzochio P, Loguercio AD, Reis A. Influence of adhesive type

- and placement technique on postoperative sensitivity in posterior composite restorations. *Operative Dentistry*. 2017;42(2):143-54.
18. Misilli U, Yilmaz F. Evaluation of marginal microleakage in composite restorations with different placement techniques. *International Dental Research*. 2018 Aug 27;8(2):70-7.
  19. Alqudaihi FS, Cook NB, Diefenderfer KE, Bottino MC, Platt JA. Comparison of internal adaptation of bulk-fill and increment-fill resin composite materials. *Operative dentistry*. 2019;44(1):E32-44.
  20. Naz F, Khan SR, Chatha MR, Tariq U. Trends for Choosing Composites For Posterior Restorations By The Dentists In Lahore. *Pakistan Oral & Dental Journal*. 2012 Dec 1;32(3).
  21. Loch C, Liaw Y, Metussin AP, Lynch CD, Wilson N, Blum IR, Brunton PA. The teaching of posterior composites: A survey of dental schools in Oceania. *Journal of dentistry*. 2019 May 1;84:36-43.
  22. Beazoglou T, Eklund S, Heffley D, Meiers J, Brown LJ, Bailit H. Economic impact of regulating the use of amalgam restorations. *Public Health Rep*. 2007;122(5):657-663.
  23. Osborne JW, Norman RD, Gale EN. A 12-year clinical evaluation of two composite resins. *Quintessence Int*. 1990;21:111-4.
  24. Donly KJ, Jensen ME. Posterior composite polymerization shrinkage in primary teeth: An in vitro comparison of three techniques. *Pediatr Dent*. 1986;8:209-12.
  25. Giachetti L, Scaminaci Russo D, Bambi C, Grandini R. A review of polymerization shrinkage stress: Current techniques for posterior direct resin restorations. *J Contemp Dent Pract*. 2006;7:79-88.
  26. Manhart J, Chen H, Hamm G, Hickel R. (2004). Buonocore Memorial Lecture. Review of the clinical survival of direct and indirect restorations in posterior teeth of the permanent dentition. *Oper Dent* 29:481-508.
  27. Demarco FF, Corrêa MB, Cenci MS, Moraes RR, Opdam NJ. (2012). Longevity of posterior composite restorations: not only a matter of materials. *Dent Mater* 28:87-101
  28. Van de Sande FH, Opdam NJ, Rodolpho PA, Correa MB, Demarco FF, Cenci MS. (2013). Patient risk factors' influence on survival of posterior composites. *J Dent Res* 92(7 Suppl):78S-83S.
  29. Khier S, Hassan K. Efficacy of composite restorative techniques in marginal sealing of extended class v cavities. *ISRN Dent*. 2011;2011:180197.
  30. Szep S, Frank H, Kenzel B, Gerhardt T, Heidemann D. Comparative study of composite resin placement: Centripetal buildup versus incremental technique. *Pract Proced Aesthet Dent*. 2001;13:243-50.
  31. Al-Otaibi F, Al-Zughaibi M, Al-Otaibi G. The usage of Matrix Band by Dental Students in Class II Restorations. *Journal of Advanced Medical and Dental Sciences Research*. 2019 Jul 1;7(7):69-74.
  32. Fahmi MK, Ashour AA, Arora V. Effect of multilayering incremental technique on the microleakage of high-viscosity bulk-fill composite restorations in endodontically treated teeth. *J Contemp Dent Pract*. 2019 Jul 1;20:822-7.

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