
Evaluation Of Commonly Used Technique For Fabrication Of Provisional Restoration In Fixed Partial Dentures Among Dental Students - An Institution Based Retrospective Study

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Abstract: Provisional restoration is an integral part of fixed dental prosthesis. The common techniques in fabrication are direct, indirect and indirect-direct. The study was designed to retrospectively evaluate the commonly used technique for fabrication of provisional restoration in fixed partial dentures among dental students and to determine the frequency of use in each sextant. The data was collected from June 2019 to March 2020 at a private dental institution in Chennai and a total of 999 case records of patients who underwent fixed partial denture procedure was obtained. This study reported that 55.1% of temporisation was done using indirect technique, 29.6% used direct technique and 15.2% used direct-indirect technique. Chi-square test was applied to see associations of sextants and techniques used. P value = 0.04 was obtained and was found to be statistically significant. In sextant 1, indirect technique was highly preferred with 51.4%, followed by direct technique with 29.9%. In sextant 2, indirect technique with 53% was preferred followed by direct technique with 33.9%. In sextant 3, 49.2% of indirect technique was observed. In sextant 4 and 5, indirect technique with 62.6% and 55.5% was used respectively. In sextant 6, 61.6% of indirect was highly used. The present study concluded that most of the dental students preferred indirect technique for fabrication of provisional restoration over the other techniques in all the sextants.

Keywords : Direct technique; direct-indirect technique; indirect technique; provisional restoration.

INTRODUCTION:

Provisional restoration is an integral part of fixed dental prosthesis (Trushkowsky, 1992)(Behrend, 1967). According to the Glossary of Prosthodontics Terms, "Provisional or inter-rim prosthesis is a fixed/removable dental or maxillofacial prosthesis designed to enhance esthetics, stabilisation or/and function for a limited period of time, after which it is to be replaced by a definitive dental or maxillofacial prosthesis" ('The Glossary of Prosthodontic Terms', 2005). They are placed following tooth preparation and should remain in-situ until the definitive restoration is placed. Provisional restorations must satisfy biologic, mechanical and esthetic requirements. It protects the pulp from adverse effects of micro-leakage, prevents sensitivity in the prepared teeth, protects the tooth or core from fracturing and maintains periodontal health by producing cleansable contours, correct emergence profile, smooth well fitting, well finished margins which do not impinge on soft tissues (Patras et al., 2012)(Gratton and Aquilino, 2004). Wassel has elaborated further functions of provisional restorations which helps in diagnosis like assessing phonetic problems and other practical uses such as to measure the amount of tooth reduction, to provide isolation and a temporary filling in the form of a crown during endodontic treatment, to act as a mold for core construction (Wassell et al., 2002). A well made provisional restoration should maintain stability of inter and intra arch relationship, establish optimal proximal and occlusal contacts and maintain positional stability of the prepared tooth. As it mimics the morphology of the prepared tooth, it guides the clinician to establish desired occlusal harmony and determines the patient's reaction and response prior to construction of the definitive prostheses (Preston, 1976). This leads to better clinician-patient rapport and patient satisfaction. Also, it minimizes post insertion adjustments (Zinner, Panno and Landa, 1989).

The theories and techniques of fabrication for numerous types of provisional restorations abound in the dental literature (Federick, 1975). The most commonly used techniques are direct method, indirect method and combination of direct-indirect technique. In the direct technique, the prostheses are fabricated in the patient's mouth by inserting an impression which is previously taken before tooth preparation and loaded with acrylic

resin material. In the indirect technique, it is fabricated outside the patient's mouth, on a model which is prepared from an impression taken before tooth preparation. This technique demands laboratory procedure. A combination indirect-direct technique is also possible which has evolved as a sequential application of these that involves fabrication of a preformed shell that is then relined intraorally. The duration between the tooth preparation of teeth and cementation of the final restoration can vary from a few days to several weeks or even several months for complex cases. Recently, temporary materials are also available which are prepared using computer-aided design and computer-aided manufacturing technology to meet the functional and esthetic properties. Various articles suggest that direct technique is preferred by clinical practitioners due to reduced chair side time (Kaiser and Cavazos, 1985). In this technique, the prepared teeth and gingival tissues directly provide tissue surface form, eliminating all intermediate laboratory procedures. However, this technique is likely to cause potential tissue trauma from polymerising resin and inherently poorer marginal fit (Robinson and Hovijitra, 1982). Crispin et al suggested that indirect technique produced provisional restoration with greater marginal accuracy than direct technique (Crispin, Watson and Caputo, 1980). Barghi and Simmons reported the need for routine relining of inter-rim restoration (Barghi and Simmons, 1976). Indirect-direct technique produces a custom made external surface form of the restoration but the internal tissue surface form if formed by the underprepared diagnostic casts. Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J et al., 2018; Menon et al., 2018; Prabakar et al., 2018; Rajeshkumar et al., 2018, 2019; Vishnu Prasad et al., 2018; Wahab et al., 2018; Dua et al., 2019; Duraisamy et al., 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu et al., 2019; Mehta et al., 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma et al., 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi et al., 2020; Samuel, Acharya and Rao, 2020). Thus each technique has its own pros and cons. There are various articles comparing and evaluating the accuracy and ease of each technique. But there are very few studies that report the frequency of technique used in day to day practice. The aim of this study was to retrospectively evaluate the commonly used technique for fabrication of provisional restoration in fixed partial denture among the dental students and to determine the preference of the technique in each sextant.

MATERIALS AND METHODOLOGY:

The present study is a retrospective analysis of a commonly used technique to fabricate provisional restoration in a dental school in Chennai. The study was commenced after approval from the Scientific Review Board, and the ethical clearance was obtained from the Ethical Committee of the University with the following ethical approval number- SDC/SIHEC/2020/DIASDATA/0619-0320. The data was collected from June 2019 to March 2020. So a total of 1020 case records were collected and the missing entries were omitted. So a total of 999 case records were obtained. Written informed consent was taken from each patient participating in the study. Case sheet of each patient included age, chief complaint, history of presenting illness, relevant medical and dental history, intraoral and extraoral examination, treatment plan, preoperative and post-operative radiographs and photographs, status of the edentulousness and an elaborate summary of the treatment procedure done on the patient, where in the technique and material used for fabrication of provisional restoration is mentioned. Photographs and radiographs were used for cross verification of data to reduce errors. To minimise the sampling bias, the study was double blinded by an analyser and a reviewer.

Statistical analysis:

A specific statistical software (IBM SPSS V10 Statistics, IBM, Armonk, USA) was used to analyse the data. Descriptive and association statistics were analyzed using chi-square test for the following parameters: technique used for fabrication of restoration and the sextant. The results were assessed at a significance level of 0.05.

RESULTS AND DISCUSSION:

When evaluating the data, it was found that 55.1% (n=551) of temporisation was done using indirect technique, 29.6% (n=296) used direct technique and 15.2% (n=152) used a combination of direct-indirect technique (figure 1). It was observed that in sextant 1, indirect technique was highly preferred with 51.4% (n=55), followed by direct technique with 29.9% (n=32) and direct-indirect technique with 18.7% (n=20). In sextant 2, indirect technique with 53% (n=186) was preferred followed by direct technique with 33.9% (n=119) and direct-indirect technique with 13.1% (n=46). In sextant 3, 49.2% (n=62) of indirect technique was observed. In sextant 4 and 5, indirect technique with 62.6% (n=82) and 55.5% (n=81) was used respectively. In sextant 6, 61.6% of indirect method was highly used. Chi square test was used to find statistical significance between the technique and quadrant in which the restoration was placed. P Value of 0.04 was obtained ($p > 0.05$). Hence, the association was statistically significant. Our institution is passionate about high quality evidence based research

and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh et al., 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai et al., 2019; Sridharan et al., 2019; Vijayashree Priyadharsini, 2019; Mathew et al., 2020)

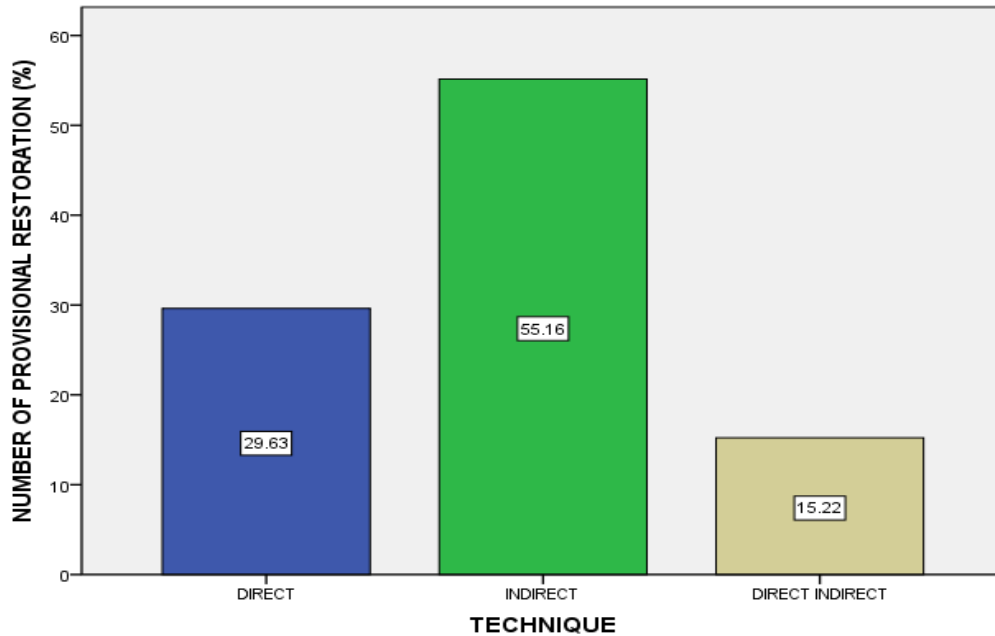


Fig.1 : Frequency of technique used for fabrication of provisional restoration. Blue colour represents direct technique, green shows indirect and brown represents direct-indirect technique. X axis represents the technique used and Y axis represents the number of provisional restoration. Indirect technique was preferred over the other techniques.

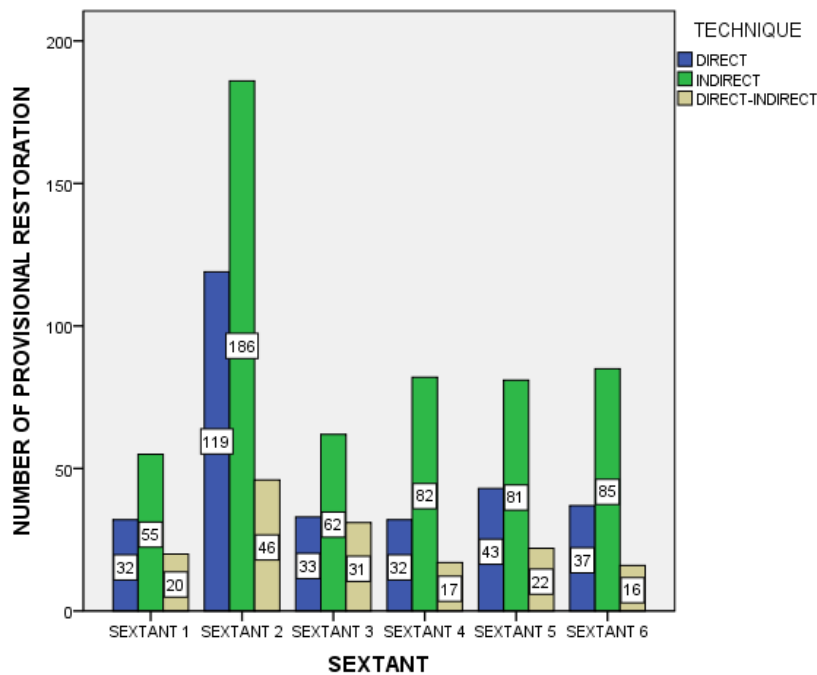


Fig.2 : Sextant wise distribution of the technique used during fabrication of provisional restoration. Blue colour represents direct technique, green shows indirect and brown represents direct-indirect technique. X axis represents the quadrant and Y axis represents the number of provisional restoration. Indirect technique was highly preferred with 55,186,62,82,81,85 number of provisional

restorations in sextant 1,2,3,4,5 and 6 respectively. Association between quadrant and technique was done using Chi Square test with p value = 0.04 (<0.05), and was found to be statistically significant.

Previously our team has conducted numerous original studies over the past 5 years (Ariga et al., 2018)(Jyothi et al., 2017)(Duraismy et al., 2019)(Selvan and Ganapathy, 2016)(Ganapathy, 2016)(Subasree, Murthykumar and Dhanraj, 2016)(Jain, Ranganathan and Ganapathy, 2017)(Vijayalakshmi and Ganapathy, 2016)(Ganapathy, Kannan and Venugopalan, 2017)(Ashok and Suvitha, 2016)(Ashok et al., 2014)(Venugopalan et al., 2014)(Kannan and Venugopalan, 2018)(Basha, Ganapathy and Venugopalan, 2018)(Ajay et al., 2017)). The idea for this study stemmed from the current interest in our community. A well made provisional restoration serves as a guide for fabricating a definitive prosthesis (Tjan, Tjan and Grant, 1987). The temporizing of preparations for crowns and bridges not only influences greatly the success of the final restoration and satisfaction of the patient, but also affects the efficiency of the office routine (Fisher, Shillingburg and Dewhirst, 1971). The present study evaluated the frequency of use of technique for fabricating provisional restoration. It demonstrated that students highly preferred indirect technique followed by direct technique and then combination of direct-indirect technique. This could be because the restoration is fabricated outside the mouth and there is no contact of free monomer with the prepared teeth or gingival tissue which might cause tissue damage and an allergic reaction or sensitization. Ola E Dahl et al, emphasised the toxic effects of methyl methacrylate monomer on leukocytes and endothelial cells (Dahl, Garvik and Lyberg, 1994). The technique avoids subjecting prepared teeth to the heat evolved from the polymerizing resin. The danger of pulpal damage because of exothermic reaction during polymerisation has been equally documented by several authors like Grajower, RB Wolcott, Kramer, Langeland, and Suarez (Wolcott, Shiller and Kraske, 1962) (Suarez, Stanley and Gilmore, 1970) (Braden, 1997). It has been reported that provisional restorations fabricated indirectly have superior margins to those from direct techniques because the acrylic resin polymerizes in an undisturbed manner(Moulding, Loney and Ritsco, 1994). Polymerizing autopolymerizing acrylic resin under heat and pressure improves the physical properties of the material. Reinforcing the vacuum or pressure formed matrix allows it to be secured to the cast on which the provisional shell is polymerized (Fox, Abrams and Doukoudakis, 1984). The findings in this study agree with the work conducted by JJ Monday and D Blais who proposed that the indirect technique has been associated with superior fit and pulpal protection (Monday and Blais, 1985). As an auxiliary is involved in fabricating the restoration in the lab, it frees the patient and dentist for a considerable amount of time (Barghi and Simmons, 1976).

On the other hand, few dental students find it a tedious task to perform indirect technique if there is inadequacy of assistance or laboratory facilities, increased chair side time and increased number of intermittent steps. So they opt for direct technique. Direct-indirect technique produces custom made preformed external surface form of restoration, but the internal tissue surface form is formed by the underprepared diagnostic casts. However, a smaller amount of acrylic will polymerise in contact with the prepared abutment. This technique reduces the chair side time as the provisional shell is fabricated before the patient's appointment (Bennani, 2000). But this procedure demands the potential need of a laboratory phase before tooth preparation and adjustments are frequently needed to seat the shell completely on the prepared tooth.

Since this study was conducted in an institution-based set-up and the sample size is small, this might bias the study results, as the selected sample is not representative. The inclusion and exclusion criteria were not well specified and different materials for provisional restoration could have been included in the study. Hence, further studies are required to explore the preference of technique. "The ideal CAD / CAM system" for many years is a dream of many researchers. The future scope for the technique used in provisional restoration includes use of virtually designed temporary FPD's that are milled or 3D printed; these serve as a guide during tooth preparation.

CONCLUSION:

Since the provisional restorations fabricated by indirect technique shows superior marginal fit, no contact of free monomer with the prepared tooth or gingival that can cause tissue damage, dental students preferred indirect technique over direct and indirect technique. The study reported high preference of indirect technique in all the sextants followed by direct and direct-indirect technique.

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