

# Tunnel preparation: A survey of practice among Palestinian dentists

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## ABSTRACT

**Introduction:** Conservative tooth preparation has been increasingly accepted and practiced among dentist, especially when treating small sized tooth decay. This includes tunnel preparation for simple class II caries or those carious lesions located only on the proximal surface of a posterior tooth with the adjacent noncarious tooth. This study attempted to determine the practice of tooth tunnel preparations among dentists of the Palestinian Dental Association. **Methods:** Three hundred dentists from the Palestinian Dental Association were randomly selected and received an online questionnaire. Informed consent was also obtained. Frequency and percentage were computed for qualitative variables. Data were analyzed using SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc. **Results:** Of the 193 dentists who answered the surveys, 154 (79.8%) participants said that they were familiar with tunnel restorations. However, only 107 (55.4%) did actual cases. Most of them have been practicing dentistry for >10 years. Glass-ionomer high viscosity cement and flowable composites were usually used as filling material for this technique. Compared with class II composite restorations, tunnel restoration has more clinical success and longevity for the 74 (69.2%) of the 107 dentists, who perform the technique. **Conclusion:** Half of the participants with >10 years of experience perform tunnel restorations in their practice. More than half agreed that it had better clinical result than conventional class II composite restorations.

## Key words

Amalgam, class II, composite, Palestinian dentists, tunnel restoration

## INTRODUCTION

Prevention of tooth disease through various techniques is the main purpose for the development of preventive dentistry. The term was derived from Latin “*praevenire*” and “*dens*”, which meant to anticipate and tooth, respectively.<sup>[1]</sup> It determines the presence, absence, and risk assessment of diseases of the oral cavity. It involves scaling and polishing, oral hygiene instructions such as proper tooth brushing, use of adjuncts, including dental floss and mouthwash, fluoride treatment, placement of sealants on permanent posterior teeth, etc. In fact, it is believed that fluoride has been an effective caries control measure for over 30 years now.<sup>[2]</sup> From this early detection, early treatment of dental caries has also been founded. It was termed as minimal intervention

dentistry, which uses a more conservative approach in treating dental caries by minimal removal of tooth structures.<sup>[1]</sup>

Over the years, dentistry has gradually changed from G.V. Black’s conventional tooth preparations to a more conservative technique. Tunnel preparation for simple class II caries is one of them. It is believed that the first tunnel preparation was originally done by Jinks to place amalgam with sodium silicofluoride on the distal of primary second molars to provide flouridation to the erupting permanent first molar.<sup>[3]</sup> According to a textbook on operative dentistry, the tunnel preparation is indicated for low caries patient with carious lesion located only on the proximal surface of a posterior tooth with an adjacent noncarious tooth.<sup>[4,5]</sup> The proximal lesion is removed through a tunnel prepared from the occlusal surface of the tooth leaving the marginal ridge undermined but preserved.<sup>[6]</sup> A couple of studies on tunnel preparations have been done including a 36 months experiment on primary molars using glass-ionomer (gi) cement, in which the result is a 72% survival rate of the teeth.<sup>[7]</sup> In addition, the marginal ridge height of 2.5 mm and a specific adhesive material used for the tunnel preparation on premolars were said to have a strength comparable to a noncarious tooth.<sup>[8]</sup>

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With its advantages, the purpose of this study is to determine the dental practice of tunnel preparations among dentists from the Palestinian Dental Association.

## METHODS

A descriptive study design was used as the article aimed to identify the tunnel preparation practices among dentists from the Palestinian Dental Association. Among its members, 300 dentists were randomly selected and invited to participate in letter form, which were given to them through electronic mail. A list of 1050 E-mails was received from the Palestinian Dental Association.

Ethical Approval from Al-Quds University Research and Ethics Committee was received under the number 9/REC/18.

An 8-item, self-administered online questionnaire was adopted from the study of Chu *et al.*<sup>[9]</sup> to obtain the following information: Gender, years of clinical experience, type of practice, familiarity and actual practice of tunnel preparation, number of cases done, materials used, and its subjective clinical success.

To easily tabulate and assess the data, years of clinical experience was categorized into 0–5 years, 6–9 years, and >10 years as a general practitioner or a specialist. Tunnel restorations performed were numbered as <5, 6–10, >10 restorations or none. The filling materials mentioned were packable composite (pc), flowable composite (fc), gi high viscosity, and combination of flowable and packable composite (fpc). Other materials used can also be written.

## RESULTS

Online questionnaires were submitted back by 193 (64.3%) of 300 corresponding dentists surveyed. There were 78 (40.4%) female and 115 (59.6%) male respondents. A total of 186 (96.3%) respondents described themselves as general practitioners and 7 (3.7%) as specialists. The years of clinical experience of the dentists and their familiarity and actual practice of tunnel restorations among general practitioners is shown on Table 1 and of specialists on Table 2.

Among the 186 general practitioners who answered the survey, 148 (79.6%) dentists answered that they were familiar with tunnel restorations. However, only 102 (69.4%) of the 147 respondents were able to perform such restorations. There were 71 participants who did <5, 9 who did 6–10, and 22 dentists did >10 cases.

Of the seven specialists, 6 (85.7%) said that they were familiar with tunnel restorations. Those who have an

actual practice of it were 4 (57.1%) dentists out of the 7 respondents. There were four participants who did <5, 1 who did 6–10, and none did >10 cases.

Table 3 shows the materials used to fill tunnel restorations. These were amalgam, fc, pc, combination of fpc, combination of glass-ionomer and packable composite, flowable, packable glass-ionomer, and gi high viscosity. Respondents who were general practitioners mostly used fc, while specialists used gi high viscosity. Among the participants, 74 (69.2%) of the 107 dentists, who perform the technique, have said that compared to class II composite restorations, tunnel restoration has more clinical success and longevity.

## DISCUSSION

In the study, 300 dentists were randomly selected to participate and answer an online questionnaire. This eliminated bias as it manifested the actual prevalence of tunnel preparation practice among the members of the Palestinian Dental Association. After the surveys were compiled, all respondents were included in the study to maximize the data and further assess the practice profile of tunnel restorations.

Answering online survey was convenient for both the researchers and participants. Members from different parts of the country were able to answer the survey;

**Table 1: Years of clinical experience, familiarity, and performance of tunnel restorations among general practitioners**

	Familiar with tunnel restorations	Performs tunnel restoration
0-5 years	29	18
6-9 years	37	14
10-15 years	29	22
16-20 years	24	24

**Table 2: Years of clinical experience, familiarity, and performance of tunnel restorations among specialists**

	Familiar with tunnel restorations	Performs tunnel restoration
0-5 years	16	15
6-9 years	7	3
10-15 years	13	11
16-20 years	0	0

**Table 3: Materials used in tunnel restorations**

	Amalgam	Fc	Pc	Fpc	Gip	Fpgi	Gi
General practitioner	1	20	11	19	3	2	24
Specialist	2	5	1	3	-	5	13

however, more information about their dental practice such as the type of specialization they do was not included in the questionnaires. It may pose a problem in the interpretation of the result as some dentists may not actually perform restorations due to the limitation of their specialization. Answering surveys at the comfort of their home or workplace could have allowed the participants to answer the questionnaires profoundly.

Surveys that require answers from past experiences may be subjected to recall bias. This was reflected in the result on familiarity and practice of tunnel restorations for both general dentists and specialists. Those with 0–5 years of dental practice had higher results compared to those with 6–9 years of practice. Yet, it can be seen that those with >10 years of experience also practice a significant amount of tunnel restorations. This may be attributed to a more skilled clinician over time and further studies that they may have taken. It is known that tunnel restoration is a technique sensitive as success of the restoration can be attributed to the skill and experience of the clinician.<sup>[3]</sup>

A survey of practices of tunnel preparation among dentists who attended the 100<sup>th</sup> FDI Annual World Dental Congress has found that 87% knew about tunnel restorations, but only 53% has an actual practice of tunnel preparation.<sup>[9]</sup> The results were somehow the same with our study as 80% said that they were familiar with the technique although only 55% do it. This may be due to the introduction of minimal intervention dentistry in the academe, seminars, and alike. Still, there is limited actual practice probably due to in the execution of the technique.

With the advent of the phase-down of amalgam by WHO due to the potential toxic effect of mercury to its handlers and the environment,<sup>[10]</sup> it was reflected in the study that only few used amalgam in their tunnel preparations. This may be due to larger, more complicated tooth preparation that requires strength, retention, and convenience form. In the study, it showed that fcs and gi high viscosity cements were used to fill the preparations. fcs have less fillers thus it is weaker<sup>[2]</sup> but this property makes it easier to place through injectables. Taking into consideration that proximal lesions or areas are not subjected to high load. However, some say that composite should have high filler content for better compressive strength.<sup>[3]</sup> Adhesive restorative materials are also believed to reinforce marginal ridges.<sup>[3]</sup> Meanwhile, gi cements are also advantageous as it is a stable material and releases fluoride.<sup>[11]</sup>

Clinical success of tunnel restorations was not represented properly by the study as it only showed subjective assessments and opinions of the dentists. 69% respondents claimed that tunnel restoration has

more clinical success and longevity compared with class II restorations.<sup>[12]</sup> Studies such as the 72% survival rate of the teeth with tunnel preparations filled with gi cement<sup>[4]</sup> and teeth filled with resin cements that have similar tooth strength with healthy tooth<sup>[5]</sup> may support the claims. The use of other armamentarium such as magnifying loupes, digital radiography, and dental handpieces with LED light can provide better visual, preparation, and restoration of carious tooth.<sup>[3]</sup> Success cannot be truly assessed in this situation as other objective conditions and results must be taken into consideration. A study on proximal tunnel restoration says that clinical studies with large population resulted to higher failure rates.<sup>[13]</sup>

## CONCLUSION

Based on this study, it can be said that around 80% of the dentists have a general knowledge on tunnel preparation. However, only half of the population of which mostly have >10 years of experience, actually perform the technique. High viscosity gi and fc cement were the most used filling material with 19.2% of prevalence. Among those who performed tunnel restorations, more than half agreed that it has better clinical result than conventional class II composite restorations.

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