

## Knowledge, Practice and Believes Regarding Class II Restoration Proximal Contact among Dental Practitioners

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### Abstract

**Objectives:** This study aims to assess the knowledge, practice and believes of Dental students, interns, general practitioners and specialists regarding proximal contact tightness of class 2 direct dental restoration.

**Material and methods:** A cross-sectional observational study was conducted on the target group using an online-based survey. The questionnaire was sent to eligible participants (N = 250). It was divided into 3 domains as follow: demographic data serving as age, gender, professional ranking and duration of practice; experience of dental professionals regarding proximal contact of class II restoration (7 questions); opinion and believes of dental professionals about proximal contact of class II restoration (9 questions). The collected data were analysed with a statistical software program.

**Results:** The response rate was 74.4% (N = 186). The participants were 62.4% male and 37.6% female. 57.5% of respondents were dental students, 26.9% dental interns, 11.3% dental specialist and 4.3% general practitioners. In domain 2, particularly in response to the question regarding checking the contour of class II restoration, less proportion of general practitioners use bitewing radiograph for that purpose than most of the specialists who used both bitewing and dental floss (p = 0.001). Similarly, in domain 3, the specialists strongly accept a difference in the contact area's tightness at rest and function (P = 0.049). Most of the specialists believed that the amalgam restoration provides better proximal contact (P = 0.003).

**Conclusion:** Most of the dental practitioners surveyed in this study appeared with good knowledge, practice and believes regarding proximal contact tightness of class II direct dental restoration. However, continuous professional courses for all dental health care personnel are recommended to update their knowledge, which will be reflected in their practical skills.

**Keywords:** Knowledge; Dental Professionals; Class II Restoration; Proximal Contact

### Introduction

Proximal contact is defined as the area where the two adjacent teeth surfaces meet [1]. This contact needs to be restored following proximal caries removal. In addition to the standard clinical examination, several proximal caries detection techniques have been reported in the literature. These techniques include x-rays, fibre optic light, laser light, electrical current and ultrasound. The natural space in the proximal contact area ranged from 3 to 12 micrometres during the jaws' physiological movement [2,3].

Proximal surface anatomy has been conventionally reconstructed by using a dental matrix [4]. The dental matrix can be defined as “a properly shaped piece of metal, or other material, inserted to support and to give form to the restoration during placement and hardening of the restorative material” [4,5]. The teeth to be restored should be separated because it gains proper access to the lesion and achieves good contour and the finishing of the restoration can be easier. Most of the studies showed that tight proximal contact could be achieved using different sectional matrix systems and separation rings, while other techniques seem to result in less than adequate proximal contacts [6-8].

During restoring proximal caries, the dentist should do wedging to create separation from adjacent tooth to protect it from damaging and create space to compensate for the matrix band thickness [9]. Moreover, a spring-action ring in conjunction with a sectional matrix or Elliot separator is used to separate the teeth to restore proximal contact properly. By creating a proper contact area has many advantages that include and are not limited to, maintaining periodontal health and arch continuity. The matrix system has a relation to the proper proximal contact achievement regardless of the type of the restorative materials used. Proximal restoration needs finishing and polishing to remove the restoration's rough surface that permits the plaque to adhere to the surface [9]. After class II restoration finishing, a radiograph is indicated to assess the overhanging or under-contoured restoration. Absence or loss of proximal contact might lead to periodontal disease as result of the food impregnation [10,11].

### Aim of the Study

The aim of this study was to assess the knowledge, practice and believes of dental professionals regarding effect of posterior proximal contact tightness of class II direct dental restorations. The tested hypothesis was the dental professional have a good knowledge and experience toward posterior proximal contact tightness.

### Materials and Methods

A cross sectional observational study was conducted between April and July of 2020.

Fourth, fifth and sixth level dental students; Dental interns; prosthodontics and restorative faculty members at Faculty of Dentistry, Taibah University were eligible for participation. The study was approved by the Institutional Review Board (IRB), College of Dentistry, Taibah University (TUCDREC/20200123) and was conducted in accordance with the guidelines of the Declaration of Helsinki.

The tool used in this study was questionnaire that capture information on different aspects serving the purpose of the study. A first pilot online questionnaire was distributed to academic staff members at the College of Dentistry, Taibah University to ensure that the questions was easily understood. A second pilot study was conducted on 20 dental students and 10 dental specialists to finalize the questionnaire. The final version of the questionnaire involved 3 sections as follows: demographic data such as their gender, age, educational level, practice duration and place of practice; experience of dental professionals regarding proximal contact of class II restoration (7 main questions); opinion and believes of dental professionals about proximal contact of class II restoration (9 main questions).

The online questionnaire was created by using Google Drive and the link was emailed to all potential participants (N = 250). The email letter explained the aims and methods of the study, as well as assuring participants that their identities would remain anonymous and that all information given would stay confidential and used for research purposes only. Reminder emails were sent to all candidates after 2, 4 and 6 weeks. Responses were collected by using the Google Drive Excel document and data were entered into a statistical software program (IBM SPSS Statistics, v22.0; IBM Corp). The data were presented as frequencies and percentages.

### Results

Of 250 who were invited to participate, 186 complete the survey with a 74% response rate. Of these participants, 62.4% were male and 37.6% were female. Just above half of the respondents (57.5%) were dental students, 26.9% were dental interns, 11.3% were dental

specialists and 4.3% represented general dentists. Regarding experience years, 87.1% were with less than 5 years of experience while 1.6% were between 5 - 9 years of experience, 8.1% has been with more than 15 years of experience and 3.2% was between 10 - 15 years experience (Table 1).

		Count	%
Age	20 to 35	167	89.8%
	36 to 60	19	10.2 %
Gender	Male	116	62.4%
	Female	70	37.6%
Professional ranking	Dental student	107	57.5%
	Intern	50	26.9%
	General dentist	8	4.3%
	Dental specialist	21	11.3%
Experience year	Less than 5 years	162	87.1%
	5 to 9 years	3	1.6%
	10 to 15 years	6	3.2%
	More than 15 years	15	8.1%

Table 1: Respondents catachrestic.

Just above half of our respondents (51.6%) used the Tofflemire matrix, 32.8% used the sectional matrix, 12.9 used Automatrix and 2.2% used all types of matrixes. Most of our respondents, 89.2% use a wedge for interdental separation while restoring posterior proximal caries, 6.4% used rubber band and 2.1% used PTFE tape and 2.1% did not use separation. About (80.6%) use a rubber dam when dealing with class II restoration. Moreover, 80.6% of them use retraction cord in certain situations (Table 2).

About 48.9% of the participants use dental floss to evaluate a posterior proximal contact tightness, 5.4% bitewing radiograph, 1.1% use Finish strip and 44.6% of them use (dental floss, bitewing radiograph and finish strip). Regarding the checking of the contour of class II restoration, the majority, 52.1%, use (dental floss and bitewing radiograph) and 13.4% use bitewing radiograph and 34.4% use dental floss (Table 2).

Question		Count	%
What type of matrix do you use while restoring posterior proximal caries?	Tofflemire matrix	96	51.6%
	Sectional matrix	61	32.8%
	Automatrix	24	12.9%
	All	4	2.2%
	Nothing	1	0.5%
Which type of interdental separation do you use while restoring posterior proximal caries?	Wedge	166	89.2%
	Rubber band	12	6.4%
	PTFE tape	4	2.1%
	None	4	2.1%
Do you use the concept of deep margin elevation?	Yes	63	33.9%
	No	123	66.1%
Do you use rubber dam?	Yes	150	80.6%
	No	36	80.6%
Do you use retraction cord, in certain situation?	Yes	150	80.6%
	No	36	19.4%
How do you precisely evaluate a posterior proximal contact tightness?	Dental floss	91	48.9%
	Bitewing radiograph	10	5.4%
	Finish strip	2	1.1%
	All	83	44.6%
How do you check the contour of your class II restoration?	Dental floss	64	34.4%
	Bitewing radiograph	25	13.4%
	All	97	52.1%

Table 2: Experience of dental professionals regarding proximal contact of class II restoration.

The majority of our respondents (62.9%) believed that the best posterior proximal contact tightness is a medium contact, versus 30.6% believed that it should be tight and 6.5% think the light contact is what to be done. Just above half of the respondents (51.6%) believed there is a difference in posterior proximal contact tightness at rest and function. Regarding the relation between posterior proximal contact tightness and caries risk, 93.5% of our respondents believed there is a relation. Over 90% of the participants believed in the correlation between loss of posterior proximal contact tightness and proximal caries or periodontal health (Table 3).

About 64% believed that the contact tightness affects the occlusal scheme. The majority of our respondents (59.1%) believed that the polymerization shrinkage together with inherent sensitive technique and inherent limitations of materials could affect the quality of proximal contact tightness. About 60.2% think that the amalgam restoration material is better for achieving posterior proximal contact tightness (Table 3).

Question		Count	%
What is best posterior proximal contact tightness you can achieved in your restoration?	Tight (as an area)	57	30.6%
	Medium (as a point)	117	62.9%
	Light (as slight open)	12	6.5%
Is there any difference in posterior proximal contact tightness at rest and function?	Yes	96	51.6%
	No	90	48.4%
Is there any relation between posterior proximal contact tightness and caries risk?	Yes	174	93.5%
	No	12	6.5%
Is there any relation between loss of posterior proximal contact tightness and caries risk?	Yes	172	92.5%
	No	14	7.5%
Is there any relation between loss of posterior proximal contact tightness and periodontal health?	Yes	176	94.6%
	No	10	5.4%
Is there any difference in posterior proximal contact tightness between male and female?	Yes	48	25.8%
	No	138	74.2%
Does the contact tightness affect occlusal scheme?	Yes	119	64.0%
	No	67	36.0%
Why is there difficulty in achieving good posterior proximal contact tightness in composite restoration?	Polymerization shrinkage	38	20.4%
	Inherent sensitive technique	37	19.9%
	Inherent limitations of materials	1	0.5%
	All of the above	110	59.1%
Which type of material is better for achieving posterior proximal contact tightness?	Amalgam material	112	60.2%
	Composite material	59	31.7%
	Glass Ionomer	8	4.3%
	Compomer	7	3.8%

**Table 3:** Opinion and believes of dental professionals about proximal contact of class II restoration.

Regarding the comparison between 4 different practitioners regarding their experience toward proximal contact of class 2 restoration, all of the results were statistically not significant except the question asking about checking the restoration’s contour. About 37.4% of the general dentists versus 60% of the dental specialists use dental floss with bitewing radiographs for that purpose (Table 4).

		DS <sup>†</sup> %	DI <sup>‡</sup> %	GD <sup>£</sup> %	DS <sup>ˆ</sup> %	P value
What type of matrix do you use while restoring posterior proximal caries?	Tofflemire matrix	55.1%	42.0%	25.0%	60.0%	0.50
	Sectional matrix	32.7%	42.0%	37.5%	20.0%	
	Automatrix	9.3%	16.0%	37.5%	20.0%	
	All	1.9%	0.0%	0.0%	0.0%	
	Nothing	0.9%	0.0%	0.0%	0.0%	
Which type of interdental separation do you use while restoring posterior proximal caries?	Wedge	86.9%	94.0%	75.0%	90.0%	0.11
	Rubber band	9.3%	2.0%	0.0%	10.0%	
	PTFE tape	0.9%	4.0%	12.5%	0.0%	
	None	2.8%	0.0%	12.5%	0.0%	
Do you use the concept of deep margin elevation?	Yes	27.1%	42.0%	62.5%	40.0%	0.08
	No	72.9%	58.0%	37.5%	60.0%	
Do you use rubber dam?	Yes	84.1%	82.0%	62.5%	80.0%	0.48
	No	15.9%	18.0%	37.5%	20.0%	
Do you use retraction cord, in certain situation?	Yes	74.8%	86.0%	100.0%	90.0%	0.13
	No	25.2%	14.0%	0.0%	10.0%	
How do you precisely evaluate a posterior proximal contact tightness?	Dental floss	53.3%	40.0%	87.5%	10.0%	0.8
	Bitewing radiograph	5.6%	6.0%	0.0%	10.0%	
	Finish strip	1.9%	0.0%	0.0%	0.0%	
	All	39.3%	54.0%	12.5%	80.0%	
How do you check the contour of your class II restoration?	Dental floss	41.1%	20.0%	62.5%	20.0%	0.001*
	Bitewing radiograph	13.1%	18.0%	0.0%	20.0%	
	All	45.8%	62.0%	37.5%	60.0%	

**Table 4:** Comparison between 4 different practitioners regarding their experience toward proximal contact of class II restoration.

†: Dental Student, ‡: Dental Intern, £: General Dentist, ˆ: Dental Specialist, \*: p = .001.

Regarding the comparison of 4 different professionals for their opinions and beliefs with respect to proximal contact with class II reconstruction, all findings were statistically non-significant except the concern posed about the existence of a difference in proximal contact tightness at rest and function, where 80% of dental specialists agreed that there was a difference. Also, question asking about the type of material ideal for achieving proximal contact tightness; although 90% of dental specialists agree that amalgam does this, only 46% of dental interns did (Table 5).

		DS <sup>†</sup> %	DI <sup>‡</sup> %	GD <sup>£</sup> %	DS <sup>ˆ</sup> %	P value
What is best posterior proximal contact tightness you can achieved in your restoration?	Tight (as an area)	29.9%	22.0%	62.5%	40.0%	0.33
	Medium (as a point)	62.6%	70.0%	37.5%	60.0%	
	Light (as slight open)	7.5%	8.0%	0.0%	0.0%	
Is there any difference in posterior proximal contact tightness at rest and function?	Yes	55.1%	38.0%	62.5%	80.0%	0.04**
	No	44.9%	62.0%	37.5%	20.0%	
Is there any relation between posterior proximal contact tightness and caries risk?	Yes	95.3%	90.0%	87.5%	100.0%	0.41
	No	4.7%	10.0%	12.5%	0.0%	
Is there any relation between loss of posterior proximal contact tightness and caries risk?	Yes	91.6%	96.0%	75.0%	90.0%	0.23
	No	8.4%	4.0%	25.0%	10.0%	

Is there any relation between loss of posterior proximal contact tightness and periodontal health?	Yes	94.4%	94.0%	87.5%	100.0%	0.72
	No	5.6%	6.0%	12.5%	0.0%	
Is there any difference in posterior proximal contact tightness between male and female?	Yes	22.4%	30.0%	37.5%	30.0%	0.11
	No	77.6%	70.0%	62.5%	70.0%	
Does the contact tightness affect occlusal scheme?	Yes	66.4%	60.0%	62.5%	50.0%	0.7
	No	33.6%	40.0%	37.5%	50.0%	
Why is there difficulty in achieving good posterior proximal contact tightness in composite restoration?	Polymerization shrinkage	22.4%	22.0%	12.5%	0.0%	0.42
	Inherent sensitive technique	19.6%	26.0%	25.0%	10.0%	
	Inherent limitations of materials	0.0%	0.0%	0.0%	0.0%	
	All of the above	57.9%	52.0%	62.5%	90.0%	
Which type of material is better for achieving posterior proximal contact tightness?	Amalgam material	60.7%	46.0%	62.5%	90.0%	0.003**
	Composite material	36.4%	30.0%	37.5%	10.0%	
	Glass Ionomer	0.9%	14.0%	0.0%	0.0%	
	Compomer	1.9%	10.0%	0.0%	0.0%	

**Table 5:** Comparison between 4 different practitioners regarding their opinion and believes toward proximal contact of class II restoration.

†: Dental Student, ‡: Dental Intern, §: General Dentist, ^: Dental Specialist, \*\*: p < .01.

## Discussion

This study aimed to assess the knowledge, practice and beliefs of dental professionals regarding the posterior proximal contact tightness of class II direct dental restorations. When comparing all types of dental matrices in terms of proximal contact tightness and reconstruct the proximal surface to relatively in that of the intact tooth, the sectional matrix is considered the best, the other types failed to accomplish these criteria [12,13].

Regarding contact tightness, most of our respondents 62.9% believed that it should be a medium contact versus 30.6% who responded to this as tight. There is evidence [14,15] that tighter contacts tend to loosen after a period of time, this is probably due to proximal wear of the restorative materials or “adaptation mechanisms” of periodontium to compensate for tighter than necessary contact strength.

Following a class II restoration placement, interproximal contact must be evaluated to check the tightness. The most commonly used way to evaluate proximal contact tightness is by using dental floss. Ideal proximal contact tightness appeared as a snap when the dental floss passes through the adjacent teeth’ contact points. Although the use of dental floss is easy and convenient, it is considered an inaccurate technique for checking slight changes in the proximal contact that’s why some investigators suggested the use of metal strips for that purpose due to its reliability [11].

Most of our respondents, 89.2%, use a wedge for interdental separation while restoring posterior proximal caries. Interdental separation using wedge provide initial separation to prevent adjacent teeth from being damaged during preparation and facilitate placement of the matrix in the proximal area. Also, it helps in achieving space to compensate for the thickness of the matrix band. However, the sectional matrix system (with a separation ring) is more convenient than wedges [9].

Due to improper isolation, the extension of restoration preparation subgingivally might result in a defective restoration margin, leading to periodontal problems. When the gingival margin of caries lies subgingivally, a surgical technique as crown lengthening to expose the restoration margin is needed. Alternatively, the deep marginal elevation technique can be used [16].

Proximal contour can be checked by both dental floss and bitewing. Based on our findings, dental students and interns fulfil that because they execute their training under senior specialists' supervision who insists on finishing their requirements properly. On the other hand, most of general dentists responded that they use dental floss without using bitewing radiographs for verification. This might be attributed to trusting themselves or reducing the cost of the patients or themselves.

Most dental specialists accepted a difference in proximal contact at rest and function; this might belong to their long experience. So, they must reinforce this point and teach the student about the difference in proximal contact tightness at rest and function. This again underscores the importance of continuous professional courses for all dental health care personnel.

Based on which type of material is good in creating proximal contact tightness, most specialists opted for amalgam. Unlike amalgam, the composite resin is not condensable, making the reconstruction of good proximal contacts with this material complicated.

To the authors' knowledge, this is the first survey that assessed the knowledge, practice and beliefs of dental professionals regarding the posterior proximal contact tightness of class II direct dental restorations in Saudi Arabia. However, the present study results should be interpreted with caution, considering potential methodological limitations. While the response rate is comparable to that of other questionnaire-based surveys of dental professionals, this may have resulted in a non-response bias in the results that would subsequently restrict the generalizability of findings of all dental professionals working in Saudi Arabia. Besides, the responses were subjective since the study was questionnaire-based (self-reported data) and the responses do not adequately represent current levels of experience and practice.

### Conclusion

In this study, most of the dental practitioners surveyed appeared with good knowledge, practice and beliefs regarding proximal contact tightness of class II direct dental restoration.

Continuous professional courses for all dental health care personnel, regarding proximal contact tightness of class II direct dental restoration, are recommended to update their knowledge, which will be reflected in their practical skills.

### Author Contributions

All authors contributed to the work reported in this paper. This included conception, study design, data collection, acquisition, analysis and interpreting the results. In addition, the authors contributed to the literature review, drafting, revising and critically commented on the article. All authors approved the final version submitted for publication, agreed to which journal the article has been submitted to and agreed on responsibility for all aspects of the work.

### Disclosure

The authors declare no conflicts of interest.

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