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GINGIVAL RETRACTION TECHNIQUES PRACTICED IN FIXED PARTIAL DENTURES AMONG DENTAL PRACTITIONERS - A SURVEY

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ABSTRACT

Aim: Precision and accuracy are involved in every step and forms an important aspect in fixed prosthodontic treatment.The impression materials at the margins of the preparation require substantial thickness in order to resist distortion and record the margins accurately. This goal is achieved by adequate gingival retraction. In this article, different methods of gingival retraction techniques are discussed in a questionnaire format which was circulated among the dental professionals and post graduate students of our college and the final outcome of the study was summarized in this article. **Material and methods:** Questionnaire containing 14 close ended questions were circulated among 100 postgraduate students in our college and dental professionals practicing privately. **Results:** Gingival retraction was found to be practiced among majority of the dentists and mechanical retraction of soft tissue was most commonly practiced. **Conclusion**: Gingival retraction has been used by dental professionals to minimize errors during impression procedures which thereby enable in accurate reproduction of the master impression.

KEYWORDS: Gingival retraction, Fixed partial denture, Marginal integrity, Marginal leakage.

INTRODUCTION

The fixed prosthodontic procedures have seen advancing improvement over the past. The progress has introduced improved procedures and a wide range of materials are incorporated for making impressions in fixed partial dentures. According to Zainab Dawood et al, restorations involving fixed partial prosthesis require adequate and accurate duplication of the prepared teeth and the corresponding finish lines, so that the restoration has well-adapted and smooth gingival margins that minimize cement dissolution and preserve the periodontium.[1] Gingival retraction reversibly introduced into the widened sulcus and the finish lines can be recorded. Nahid Y ashri et.al stated that gingival tissues are displaced both laterally and vertically. Lateral retraction displaces the tissues and provides less distortion. Vertical retraction exposes the portion of the tooth apical to the finish line. The sulcular width in this regard seems to be approximately 0.15-0.2mm.A width of less than 0.2mm results in impressions that have higher incidences of voids in the marginal area that increase in tearing of the impression material and a reduction in marginal accuracy.[2] Different types of retraction techniques are available such as; mechanical, chemico- mechanical or surgical. The most widely used method is the mechanical form of retraction. They are economical, effective and safe compared to surgical methods, using either a single-cord or a double-cord technique. Retraction cords can be used with haemostatic agents to prevent bleeding from the gingiva. Another method of retraction is cordless technique. It has many claimed advantages such as less time consuming and enhanced patient comfort. In the present survey, articles involving various gingival displacement techniques and its effect on impression procedure are analyzed.

MATERIALS AND METHODS

A survey was conducted among 130 dentists who are practicing in private dental clinics and post graduate students of our college in Chennai. Standard self-explanatory questionnaires with 14 closed ended multiple choice questions were distributed. All the participants were given a questionnaire to be filled through verbal meeting and E-mails. They were explained about the aim and methodology of the survey. About 100 respondents answered all the questions and the data were taken for statistical analysis such as frequency table and percentage. Other 30 questionnaires were excluded from the survey to eliminate bias has the respondents failed to answer all the questions in the survey.

RESULTS

The results obtained from the dental practitioners are summarized as follows.

Among 130 dental specialist who participated in the survey,100 participants answered all the questions in the siurvey.30 incompletely filled questionnaire were excluded from the study(Table-1). Gingival retraction techniques were regularly practiced among 68%dentists,22%practised it rarely depending on their cases and 10% did not follow any gingival retraction techniques in their practice .Routine gingival examination before fixed partial denture treatment was performed by 85% and 15%did not examine the gingiva before F.P.D preparation. Chemico mechanical method of gingival retraction based on the gingival health was regularly performed by 75% dentists and mechanical method was performed by 15% in all cases where healthy and firm gingiva was present(Fig-1).

Mechanical type of gingival retraction included the of twisted, knitted and braided cords for retraction of gingival(Table-2).27% used twisted gingival cords ,60% used braided cords and 13% used knitted cords.73%of the dentists felt that the size of the cord did influence the finish line and 27 % felt that the size did not have any influence on the finish line. The usage of cord size 0,00 and 000 was among the dentists who participated in the study.23% used 0 size,37 %used 00 and 40% used 000 size.75% used single cord technique and 25% used double cord technique for the marginal integrity and replication of the finish line in the final impression (Fig-2).

Gingival bleeding is an important factor for gingival retraction. If bleeding is present it can be controlled using the use of an astringent(Table-3). 18% have not experienced bleeding after gingival retraction. 32% of the practitioners have experienced bleeding of gingiva after retraction of soft tissue. Ferric sulphate was used by 46% as astringent. Aluminium chloride was used by 44% of the dentists and 10% used epinephrine as astringent.49% of the dentists have experienced gingival recession after mechanical retraction. 11% have experienced gingival recession occasionally and 10% have not experienced gingival recession.80% of the practitioners use gingival retraction for sub gingival margins and 20% use gingival retraction for equi gingival margins(Fig-3).

Patient comfort should be taken into consideration during gingival retractions(Table-4). Mechanical retraction might induce pain in compromised gingival health. Cordless technique was used by 76% in accordance with patient comfort and 24% preferred mechanical method of gingival retraction. According to their convenience 51% choose mechanical method and 49% choose cordless technique of gingival retraction. Marginal integrity is the most important factor after gingival retraction. Improved marginal integrity will show less marginal leakage and prevent secondary caries and failure of restoration. Marginal integrity was found to be improved after gingival retraction by 73% and 27% found marginal integrity to be same even after gingival retraction (Fig.4).

Table-1: Gingival retraction techniques and methods of retraction practiced among dentists.

Table-1	Gingival retraction techniques	Percentage (%) of use among dental professionals
1	Do you perform gingival retraction?	Yes-68
		No-10
		Sometimes-22
2.	Do you carry out routine gingival examination before you perform gingival retraction?	Yes-85
		No- 15
3.	Based on the gingival health, what is your preferred method of gingival retraction?	Mechanical in all cases-25
		Chemico mechanical in compromised cases- 75

Table-2: Types and sizes of retraction cord used for gingival retraction.

Table 2	Gingival retraction techniques	Percentage (%) of use among dental professionals
1.	If mechanical what is your preferred type of retraction cord?	Twisted-27
		Braided -60
		Knitted-13
2.	Do you feel that the size of retraction cord has a influence on finish line?	Yes-73
		No-27
3.	What size of retraction cord do you use?	0-23
		00-37
		000-40
4.	What impression techniques do you follow	Single cord-75
		Double cord-25

Table-3: Methods to control bleeding and gingival retraction based on the finish line.

Table 3	Gingival retraction techniques	Percentage (%) of use among dental professionals
1.	Have you experienced bleeding of gingival after gingival retraction?	Yes-50
		No-18
		Ocassionaly-32
2.	If bleeding is present what is your preferred astringent?	Ferric sulphate-46
		Aluminium chloride-44
		Epinephrine- 10
3.	Do you notice gingival recession after mechanical retraction	Yes-49
		No-10
		Sometimes-41
4.	According to your experience when do you perform gingival retraction?	Equi gingival-20
		Sub gingival-80

Table-4: Gingival retraction method preferred based on ease of use by the dentist.

Table 4	Gingival retraction techniques	Percentage(%) of use among dental professionals
1.	Which method of gingival retraction you prefer in terms of patient comfort?	Mechanical-26
		Cordless-74
2.	Which method of gingival retraction do you prefer in terms of your comfort?	Mechanical-51
		Cordless-49
3.	Do you feel marginal integrity has improved after gingival retraction?	Yes-73
		No-27

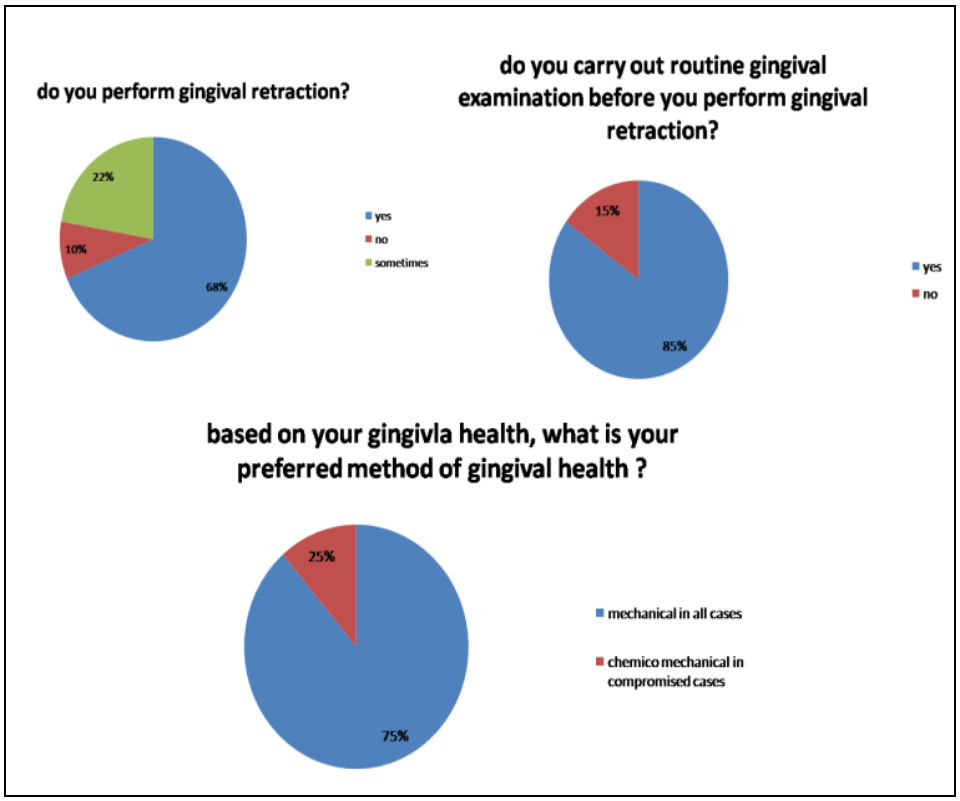

Fig. 1.

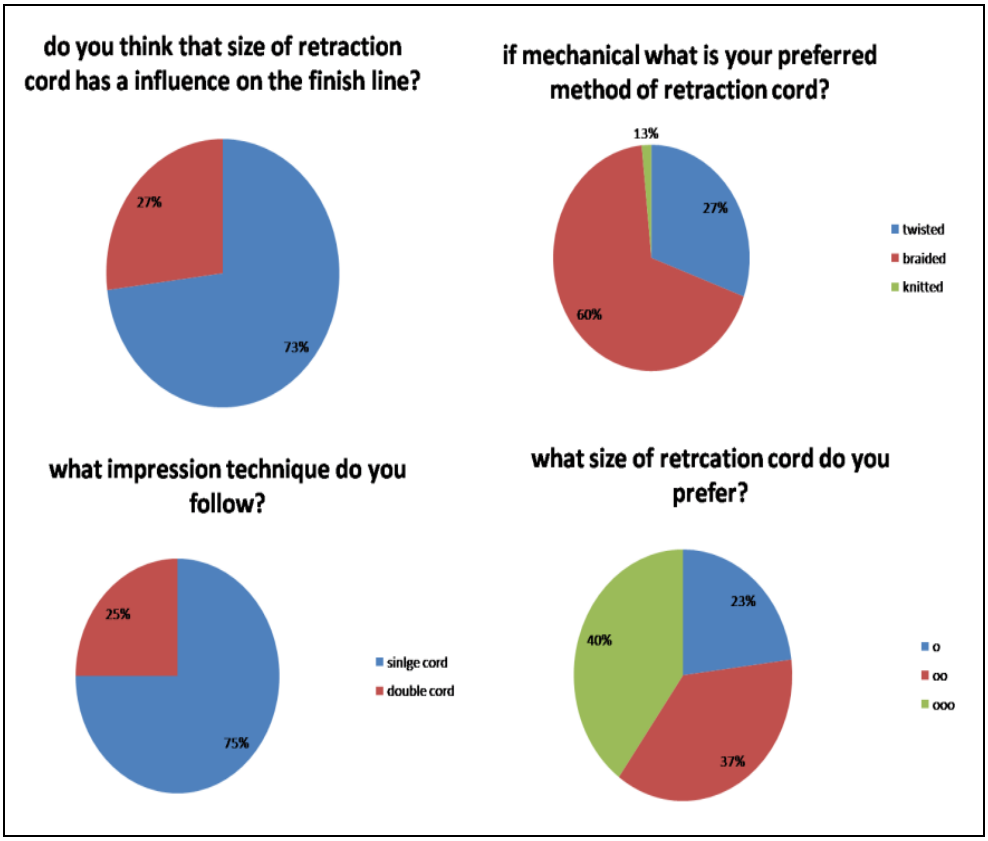
do you think that size of retraction cord has a influence on the finish line?
27%
73%
if mechanical what is your preferred method of retraction cord?
13%
27%
60%
twisted
braided
knitted
what impression technique do you follow?
25%
75%
sinlge cord
double cord
what size of retrcation cord do you prefer?
23%
40%
37%
o
oo
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Fig. 2.

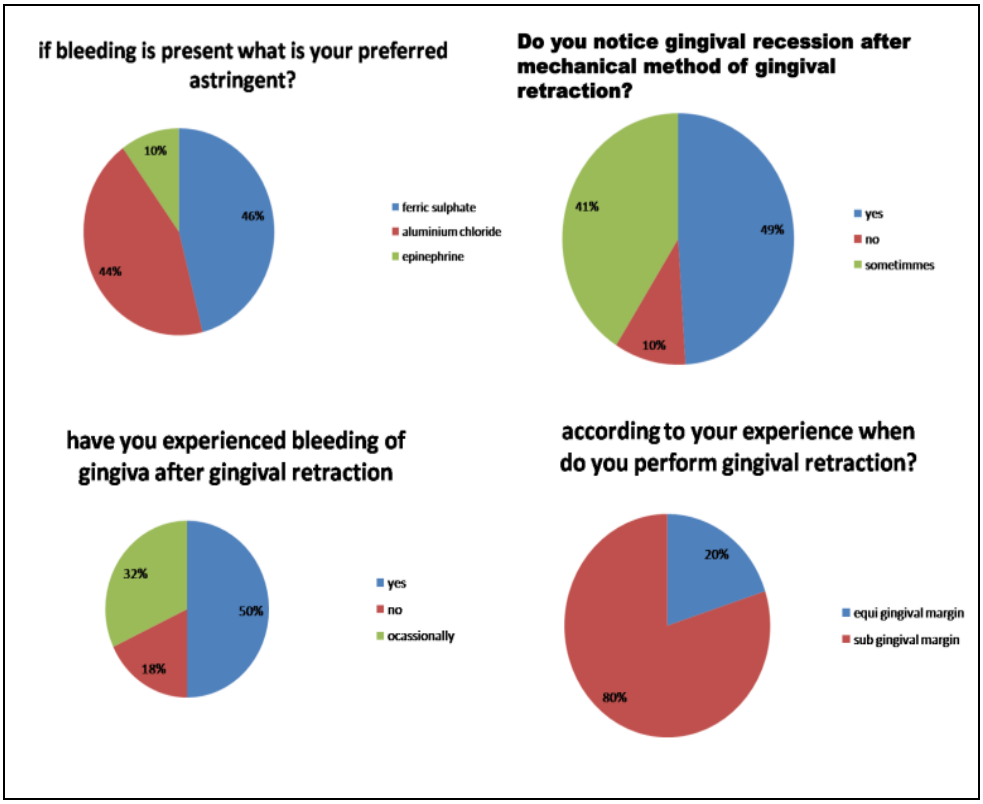
if bleeding is present what is your preferred astringent?
10%
46%
44%
ferric sulphate
aluminium chloride
epinephrine
Do you notice gingival recession after mechanical method of gingival retraction?
41%
49%
10%
yes
no
sometimmes
have you experienced bleeding of gingiva after gingival retraction
32%
50%
18%
yes
no
ocassionally
according to your experience when do you perform gingival retraction?
20%
80%
equi gingival margin
sub gingival margin

Fig. 3.

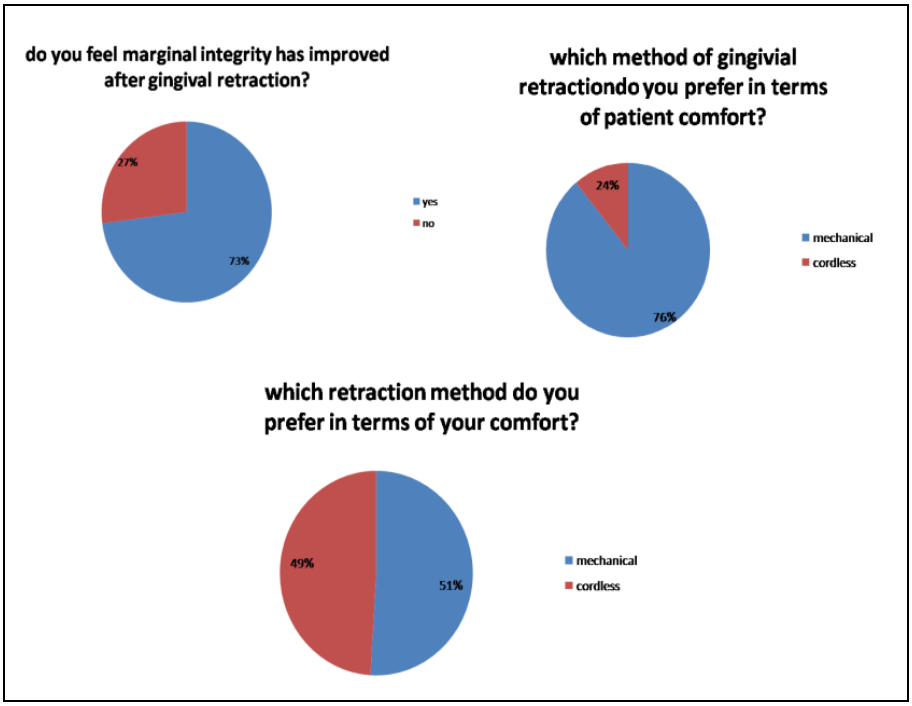

Fig. 4.

GINGIVAL RETRACTION TECHNIQUES –A SURVEY

1. Do you perform gingival retraction?
   a) Yes b) No c) Sometimes
2. Do you carry out routine gingival examination before you perform gingival retraction?
   a) Yes b) no
3. Based on the gingival health, what is your preferred method of gingival retraction?
   a) Mechanical in all cases b) chemico-mechanial in case of compromised cases
4. If mechanical, what is your preferred type of retraction cord?
   a) Twisted b) braided c) knitted
5. Do you think that size of retraction cord has a influence on the finish line?
   a) Yes b) no
6. What size of retraction cord do you use?
   a) 0 b) 00 c) 000
7. What impression technique do you follow ?
   a) single cord b) double cord
8. Have you experienced bleeding of gingival after gingival retraction?
   a) Yes b) no c) occasionally
9. If bleeding is present what is your preferred astringent?
   a) Ferric sulphate b) aluminium chloride c) epinephrine
10. Do you notice gingival recession after mechanical method of gingival retraction?
    a) Yes b) no c) sometimes
11. According to your experience when do you perform gingival retraction?
    a) Equi gingival margin b) sub gingival margin
12. Which method of gingival retraction you prefer in terms of patient comfort?
    a) Mechanical b) cordless
13. Which method of gingival retraction you prefer in terms of your comfort?
    a) Mechanical b) cordless
14. Do you feel marginal integrity has improved after gingival retraction?
    a) Yes b) no

Fig. 5.

DISCUSSION

An accurate impression of the prepared hard and soft tissues can be obtained for the fabrication of fixed partial restorations only when the gingival tissue is managed properly. According to Nahid Y Ashri et al This is especially true when the location of the finish line is at, or within, the gingival sulcus.[2] Lylajam et al stated that gingival retraction should provide sufficient space for bulk of the impression material so that the impression does not tear on its removal.[3]In this study 68% performed gingival retraction techniques. It was not mentioned whether it was done for all restorations or only for few selected cases.22% of the practitioners performed gingival retractions only for selected cases. This might be because of local gingival factors which were unable to perform gingival retraction.9% did not practice gingival retraction techniques completely.

Samira Adnan etal stated that the contour, consistency and any pain originating from the gingiva or supporting tissues should be evaluated. No bleeding or minimum bleeding should be seen. Gingival indices can be utilized to identify healthy and diseased gingival tissues.[4] In this study 85% performed routine gingival examination before gingival retraction. 25% of the practitioners do not take up gingival examination. Gingival examination is essential before a gingival retraction procedure because it might damage the delicate gingival tissues leading to worsening of the prosthesis.

Based on gingival health the common technique followed by majority of practitioners are (75%) who performed chemico mechanical in case of compromised gingival health. Moldi et al evaluated that 60.3%of the dentists indicate the use of chemico mechanical method.[5] 25% of the dentists follow mechanical is all cases. Samira Adnan et al stated that, In damaged gingiva, which is difficult to isolate and is more likely to get damaged during the retraction and displacement process[4] mechanical method of gingival retraction cannot be performed. Donovan et al reported 16.97% of the dentists using mechanical method of gingival displacement.[6] The classic method for tissue retraction involves using retraction cord. The cords are packed with cord plugger to retract the gingiva and leave the prepared tooth margin exposed to the impression material.[7]

According to this study 60% use braided type of retraction cord for soft tissue displacement. Braided cords have a tight weave, and hence are easier to place into the gingival sulcus without fear of fraying[4] which was stated by Samira Adnan et al. Braided cords have good absorbency when used in combination with chemicals.13% use knitted cords in their practice. Knitted cords have interlocking loops which in shaping and passively blending to the gingival sulcus. Twisted cord is used b by 27% of the practitioners. This type of cord has the ability to fray while removing. Acoording to KD Prasad et al inflammation of the sulcus can get exacerbated due to contamination of the sulcular wounds by the fibers of the cord.[8]

Size of the retraction cord used by the participants were, 40% used 000 whereas 37% used 00 and 23% used 0. The increase in the diameter of the cord may increase the fluid absorbency and provide adequate space for the impression material[9] was stated by Sushant et al.

Single cord impression technique was followed by 75% of the participants. This could be due to the ease of the method. Ashish R Jain et al stated that this technique is indicated when making impressions of one to three prepared teeth with healthy gingival tissues.[10] According to Jignesh Chaudri et al Double cord impression technique was followed by 25% of the practitioners. This technique is routinely used when making impressions of multiple prepared teeth and when making impressions when tissue health is compromised.[11]

Bleeding of gingiva is a common factor in case of inflamed gingiva. If bleeding is present impression making would become a difficult task. In this study 50%of the practitioners experience bleeding of gingiva in all the cases, whereas 32% experience bleeding from gingival only sometimes in rare cases. If bleeding was present hemostasis was achieved by using an astringent such as ferric sulphate, aluminium chloride or epinephrine. Ferric sulphate was used by 46%of the participants. Nahid Y Ashri et al stated that, It has a concentrated solution to coagulate bleeding finish line and can act as an effective astringent. Usually homeostasis is achieved within 1-3 minutes[2] and keeps the sulcus wide for 30 minutes.[12] Howard E Strassler et al stated that, Biological effects of ferric sulphate is more satisfactory than aluminium chloride.[13] In this study aluminium chloride was preferred by 44% of the practitioners. Krishna D Prasad et al stated that, Aluminum chloride is an agent that acts by precipitation of tissue proteins but causes less vasoconstriction than epinephrine.[11] Among the medical impregnated cords aluminium chloride creates the least irritation[12] which was stated by Safari S et al Epinephrine was used by 10% of the dentists n this study.[15] Nahid Y Ashri et. al stated that ,Epinephrine cord can cause elevation in blood pressure and tachycardia, especially if the gingival tissue is bleeding due to laceration. In fact it has been demonstrated that no clinical benefit in gingival retraction could be recognized between an epinephrine containing cord and other cords.[2]

Gingival recession has been a noticed factor in cases of mechanical method of gingival retraction.49% of the population has noticed gingival recession after gingival retraction. The time period within which gingival retraction has occurred has not been mentioned.41% has noticed gingival recession only in few cases. The types of cases in which gingival retraction has been noticed were not collected. A significant increase in the sulcus

width >0.2 mm after retraction by the three materials (Ultrapak1), (Expasyl) and (Korlex-GR) with significant gingival recession, however, Yang et al reported that the Ultrapak 1 produced the greatest amount of recession and was also significantly more painful compared to the other 2 materials. This was also true in the study done by Kazemi et al.[16]

In this study 80% of the dentists choose gingival retraction technique for sub gingival finish line. This is obvious that sub gingival finish lines are difficult to be recorded and so gingival retraction has been required in such cases.20% has also used for equiv gingival finish lines. This might be done to record better impressions of finish line.

Patient comfort is the most important factor in dentistry. The type of gingival retraction should have ease to the patient.74% choose cordless over mechanical(26%) in terms of patient comfort. Although patient comfort is an important factor, practitioner's comfort and technicality of the procedure should be known by the practitioner. 51% choose mechanical type of gingival retraction in terms of their comfort. This could be because of the availability of the material and the ease of practice of that technique. 49% choose cordless gingival retraction in terms of their comfort. Magic Foam Cord is an expanding polyvinyl siloxane material designed for easy and fast retraction of the sulcus without the potentially traumatic and time consuming packing of retraction cord . According to Parul Arora Sachdev et al this technique eliminates chances of tearing of the sulcus, cleans blood, delivers impression material in the sulcus with more accuracy.[12] Most of the studies on cordless techniques are demonstrations of their clinical use; their effects on the gingival and periodontal tissues are not well documented.[17]

Gingival retraction is recommended for recording the accurate margin and also for replication of the fixed dental prosthesis back in the oral cavity. For this marginal integrity is a important factor where failing to produce marginal integrity will lead to marginal leakage and secondary caries formation leading to failure of the restoration. According to Jignesh Chaudiri et. al, The placement of margin or finish line in relation to the gingival margin has direct bearing on fabrication of restoration and health of the periodontal tissue of the prepared abutment teeth.[8] In this study 73% reported that there was a increase in marginal integrity after gingival retraction. Cinthya Massari et al stated that, The proper impression of the preparation margin is critical for marginal adaptation and the emergence profile of the restoration.[18]

CONCLUSION

Soft tissue retraction is one of important factors for reproducing the preparation done on the hard tissue. Proper replication is important to achieve a better restoration with accurate marginal integrity. According to this study, gingival retraction is being followed by majority of the practitioners of which mechanical method of retraction is the most commonly followed. Marginal integrity was improved after gingival retraction. If gingival retractions are practiced regularly for all fixed partial dentures better results can be achieved after the placement of the prosthesis.

Questionnaire

The questions included in this survey are: (Fig:5).

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