

Knowledge, Attitude and Practice of Inter-occlusal Record Materials among Private Dental Practitioners in Nagpur City: A Cross Sectional Study

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Abstract

Background: Majority of general dental practitioners provide fixed dental prosthesis in India. Thus, obtaining an accurate centric relation record is extremely important. The ideal material and technique combination for inter-occlusal records allows the intraoral placement of direct restorations without extensive adjustment.

Aim and Objectives: The purpose of this cross-sectional study was to understand and to evaluate dental practitioner’s knowledge on inter-occlusal recording materials, its usage, their clinical implications, and their

correlation with the laboratory in restorative procedures practiced by the dental practitioners in Nagpur City.

Materials and Methods: A questionnaire comprising 11 questions were framed and circulated among general dental practitioners except prosthodontists, and the results were statistically analyzed.

Results: Most of the practitioner’s preferred wax (66.6%) as an inter-occlusal recording material over polyvinyl siloxane and polyether. Majority of the dental practitioners (54.7%) prefer to place an inter-occlusal recording material over the quadrant which is involving prepared

teeth. About 59.5% clinicians trimmed the inter-occlusal record before sending to the laboratory.

Conclusion: From this survey, it has been concluded that the practitioner's attitude toward the use of inter-occlusal record materials is found to be deviated from well-recommended prosthodontic quality guidelines.

Keywords: - Bite registration, Inter-occlusal record, Inter-occlusal wax, Polyvinyl siloxane, Laboratory technician.

Introduction

Prosthodontics is a branch which requires correlation between dental practitioner and dental technician to fabricate an intraoral prosthesis with acceptable fit, function, comfort, and esthetics. The prosthesis should be made in such a way that it should be in harmony with the existing stomatognathic system.^[1,3]

Obtaining an accurate centric relation record is extremely important. The use of exercises to relax the musculature or the use of temporary restorations to break up old patterns of habit may be necessary. Some dentists use the Hawley type "bite plane" to eliminate posterior guidance, while others utilize tranquilizers and muscle relaxants before attempting to make a centric relation record. If the centric occlusion of a restoration is not in harmony with centric relation, mobility of the abutment teeth may increase or develop.^[4]

According to GPT 8: "The inter-occlusal record is a registration of the positional relationship of the opposing teeth or arches."^[5]

Inter-occlusal records are desired to register jaw relationships for mounting dental casts on articulator, for planning occlusal rehabilitation and also for construction of removable and fixed partial dentures. A range of materials including plaster of Paris, wax, zinc oxide

eugenol paste, resin, and elastomers are presently used for this procedure.^[4]

The causes of occlusal inaccuracies attributable to the inter-occlusal record can be divided into three main groups.

Anatomic and physiologic characteristics of the patient: These take effect during the making of the record and include such factors as (1) vertical displacement of the condyle (superiorly or inferiorly), (2) displacement of the teeth because of the flexibility of the periodontal attachments, (3) flexing of the mandible during opening and closing movements, (4) compression of soft tissue in edentulous areas, and (5) mandibular positional variation due to muscular activity.

Dentist-induced causes: These are related to variations in the manner with which the dentist manages the patient and the material during the clinical phase.

Properties of the inter-occlusal record material and technician manipulation of the record during use: Of importance are dimensional changes caused by temperature, polymerization shrinkage, chemical reaction, stress, and mechanical manipulation which occur during the procedures necessary to use the record.^[6]

The ideal material and technique combination for making inter-occlusal records would allow the placement of indirectly fabricated prosthesis in the patient's mouth with no occlusal adjustments.^[4, 7, 8]

A survey conducted in the UK from the dental technician's perspective on communication methods and production techniques used by dentists and dental technicians for the fabrication of fixed prosthesis reported that only 11% of occlusal records received by dental laboratories were accurate and usable, and the rest were either not usable or not accurate and discarded. This cross-sectional study was carried out among private dental

practitioners to understand their knowledge and skill on handling inter-occlusal records.^[1,9]

A well-trained and disciplined practitioner understands that the use of accurate records, will minimize the need for intraoral adjustments before prosthesis delivery and can therefore reduce overall treatment time and cost.^[10,11]

Therefore, the purpose of this cross-sectional study was to understand and evaluate dental practitioner's knowledge on inter-occlusal recording materials, its usage, their clinical implications, and their correlation with the laboratory in restorative procedures practiced by the dental practitioners in Nagpur region.

Materials and Methods

- The data was collected by means of pre-validated questionnaires distributed among 100 dental practitioners except Prosthodontists in Nagpur City.
- The questionnaire sheet consisted of a total of 11 questions (Table 1)
- Questions aimed to collect general information, qualification, specialty of the dentist, knowledge and materials choice for inter-occlusal records, techniques used for manipulation of particular inter-occlusal material, checking, handling, and storage of records and mode of transfer of records to the laboratory technicians.
- The returned questionnaire was reviewed for completeness and analyzed statistically. The answers were represented in the form of percentage.

Table 1: Questionnaire of selection, usage, and techniques of inter-occlusal record materials

1. Qualification

- a. B.D.S
- b. M.D.S

2. Do you use an inter-occlusal recording material/bite registration material?

- a. Yes
- b. No
- c. Not always
- d. Not aware of this procedure

3. Which kind of material do you choose?

- a. Wax
- b. Zinc oxide eugenol
- c. Acrylic resin
- d. Polyether bite registration paste
- e. Polyvinyl siloxane bite registration paste
- f. Combination of different materials
- g. If any other, specify it _____

4. How do you manipulate the inter-occlusal recording materials?

For wax

- a. Hot water
- b. Controlled water-bath heating temperature of

121°-131° Fahrenheit/50°C-55°C

c. By direct heating

For polyvinyl siloxane/polyether

a. By direct syringing on occlusal surfaces of the mandible using a mixing dispenser

b. Using tray to carry it into position

For zinc oxide eugenol

a. Using a metal foil

b. Using wax as a medium and relining it with zinc oxide eugenol

For acrylic resin

a. Using a resin coping

b. Using a tray to carry it

If any other, specify it _____

5. Where do you prefer to place an inter-occlusal recording/bite registration material during recording procedure?

a. Over the teeth which are prepared

b. In the quadrant which is having missing teeth

c. All around the quadrant which is involving prepared teeth

d. Over the full arch

6. Do you use a tray for manipulation of inter-occlusal recording/bite registration materials?

a. Yes

b. No

c. Not always

d. If yes, then specify it _____

7. Do you trim or finish the inter-occlusal recording material/ bite registration material after it has set and before sending to laboratory?

a. Yes

b. No

8. In what time interval, you transfer the inter-occlusal record/ bite registration record to the laboratory?

a. Within 1 h

b. 1-24 h

c. 24-48 h

d. 48-72 h

9. When you transfer the inter-occlusal/bite registration record to the laboratory, you use

a. Hand articulated casts with inter-occlusal record between the casts

b. Separate casts and inter-occlusal record

c. Impression and record

10. If you do not send the material to the laboratory for a particular time, how you do the storage of the record?

a. Coldwater (12°C)

b. Tap water (28°C)

c. Room temperature (25°C)

d. Polyethylene bag filled with water and sealed

11. Do your laboratory/laboratory technician insist for usage of inter-occlusal record

a. Yes

b. No

c. Not always

Results (Table 2)

- The response rate was (n=100). There were 59 BDS and 41 MDS in the survey. The results of this study showed that a significant number of dental practitioners (84%) use inter-occlusal recording materials for the fabrication of crowns and bridge work. The most commonly used inter-occlusal recording material was wax (66.6%), and polyvinyl siloxane (5.9%) and zinc oxide eugenol and acrylic resin (3.5%) were the least used material and (23.8%) practitioners use all types of record materials.
- For manipulation procedure, most of the practitioners manipulate wax by direct heating over flame (47.6%). Very few dental practitioners prefer polyvinyl siloxane and polyether, and out of them i.e. (4.7%) preferred a method of direct syringing on occlusal surfaces using a mixing dispenser.
- During recording procedure, the majority of the dental practitioners (54.7%) prefer to place an inter-occlusal recording material over the quadrant which is involving prepared teeth, (17.8%) took records by placing the material over the full arch, and (27.3%) place the material over the prepared teeth only.
- About (59.5%) of dental practitioners do trimming and finishing of record after it has set and before sending to laboratory.
- Majority (58.3%) of them transfers the record to laboratory in 1–24 h and (28.5%) transfer within 1 h.
- A concerning finding of this survey was that practitioners send separate casts and inter-occlusal record (29.7%), (28.5%) send impression and record, and (41.6%) send hand articulated casts with inter-occlusal record between the casts.
- Around (21.4%) use cold water for the storage of record if the wax record is not sent to the laboratory for a particular time, (35.8%) store it at room temperature. About (28.5%) of practitioners store it in tap water while (14.3%) keep it in a polythene bag with water and seal it.
- About (63%) of dental practitioner said that laboratory technician insists for the usage of inter-occlusal record while (24%) said that they don't always ask for the record.

Table 2 : Subcategories of the questionnaire with answers in percentage

General information	
1. Qualification wise distribution	
- B.D.S	59%
- M.D.S	41%
2. Use of inter-occlusal recording materials	
- Use it	84%
- Not always	10%
- Never use it	6%
3. Inter-occlusal recording material you choose	
- Wax	66.6%
- Polyvinyl siloxane bite registration paste	5.9%
- Polyether bite registration paste	0
- Zinc oxide eugenol and acrylic resin	3.5%
- All of the above materials	23.8%
Manipulation technique applied by the dental practitioners	
1. Manipulation of inter-occlusal recording materials	
- For wax	
By direct heating	47.6%
Hot water	19%
- For polyvinyl siloxane/polyether	
By direct syringing on occlusal surfaces of the mandible using a mixing dispenser	4.7%
Using a tray to carry it into position	1.1%
- For zinc oxide eugenol	
Using wax as a medium and relining it with zinc oxide eugenol	2.4%
- For acrylic resin	
Using a tray to carry it	1.1%
2. Preference to place an inter-occlusal recording material during recording procedure	
- Over the full arch	17.8%
- All around the quadrant which is involving prepared teeth	54.7%
- Only over the teeth which are prepared	27.3%
3. Usage of a tray for manipulation of inter-occlusal recording materials	
- Yes	14%

- Not always	24%
- Never	62%
Finishing and handling of a record	
1. Trimming or finishing of an inter-occlusal recording material after it has set and before sending to laboratory	
- Yes	59.5%
- Never	40.5%
2. The time interval for transferring the inter-occlusal record to the laboratory	
- 1-24 h	58.3%
- Within 1 h	28.5%
- 24-48 h	13.2%
3. Transferring of inter-occlusal record to the laboratory,	
- Separate casts and inter-occlusal record	29.7%
- Impression and record	28.5%
- Hand articulated casts with inter-occlusal record between the casts	41.6%
Storage of a record	
1. If the material is not sent to the laboratory for a particular time, then how the storage of the record	
- Cold water, i.e., 12°C	21.4%
- Room temperature, i.e., 25°C	35.8%
- Tap water, i.e., 28°C	28.5%
- Polyethylene bag filled with water and sealed	14.3%
2. Does laboratory technician insist for the usage of inter-occlusal record	
- Yes	63%
- Not always	24%
- Never	13%

Discussion

Fabrication of crowns and bridges are performed by most of the dental practitioners. In addition to exacting the technical requirements involved in the use of inter-occlusal recording materials, the methods and techniques of registration, storage, and transport of record to the laboratory should be judiciously followed. ^[3, 12, 13] These,

to a greater extent, depend on the individual skill and approach of each dental practitioner.

The results of this survey were assessed, and it was found that the majority of the dental practitioners did not use the recommended inter-occlusal recording materials and techniques. Although wax is dimensionally unstable and gets distorted easily, it is yet the most versatile and widely accepted material. ^[4] This is due to its cost and ease of

manipulation. [14] Recently, polyether and polyvinyl siloxane have been developed as impression materials and are now being marketed as inter-occlusal registration materials.

Records of impression plaster are accurate, rigid after setting and do not distort with extended storage; however, it is difficult to handle because the material is fluid and unmanageable before setting. Zinc oxide eugenol paste is simple to use, sufficiently rigid, and easy to store, but it is extremely variable and consistently resulted in an open cast relationship. Acrylic resins are dimensional unstable due to continued polymerization shrinkage. [4]

The above inter-occlusal record material affects the accuracy of the mounting casts on the articulator; however, vinyl polysiloxane seemed to improve both horizontal and vertical stability due to its inherent rigidity and dimensional stability. [15, 16]

For manipulation procedure, most of the practitioners manipulated wax by direct heating over flame. Ideally, wax should be manipulated using water bath at a temperature of 54°C–60°C (130–140° Fahrenheit) before record making. [17]

When few teeth are missing, segmental records should be made and in case of distal extension bases, and where multiple teeth are missing, records should be made over the full arch. [18]

Furthermore, >50% do trimming and finishing of record after it has set and before sending to laboratory. This step is very important for mounting procedure and to check reproducibility of the record, so the record should be accurate without any flush. [19] If finishing of record is not done, it may cause open cast relationship and which may cause changes in the final prosthesis. [10]

Majority of the dental practitioners transfer the record to laboratory in 1–24 h. The ideal time required for the record to be articulated for polyether inter-occlusal

records must be within 48 h. Polyvinyl siloxane inter-occlusal records must be articulated within 24 h and wax and zinc-oxide eugenol should be articulated within 1 h to get accurate registration. If the wax is not articulated within 1 h, distortion may occur in it because of volatiles loss and stress release property. [20,22]

It is seen that hand articulation is the procedure that can be accepted for transferring of record. Hand articulation of casts is a more reliable and accurate method of relating the casts at maximum intercuspation rather than sending an impression and record separately to the laboratory. [23] Majority of dental practitioner practiced the same.

In this survey it was seen that most of the practitioners store the records in room temperature water if it is not sent to the laboratory for a particular time. If the wax is used, it should be stored in chilled water, and other records should be kept in open air. [24]

More than 50% of the dental practitioners said that laboratory technician insists for the usage of inter-occlusal record; however, dental practitioners should know the conditions where inter-occlusal records should be used rather than after being insisted by laboratory technicians. [25, 26]

Limitation

The limitation of this study is that sample belongs to a local area i.e. Nagpur City and so result cannot be generalized to all the dental practitioners.

Conclusion

Most dentists often deal with crowns or simple fixed prosthesis that requires occlusal adjustment. Proper impressions and mounting of casts can reduce or eliminate the problem. Thus, it is important that dental students, and subsequently dentists, should excel in fixed prosthodontics. Results of this survey shows that dental practitioners do not use recommended (polyvinyl siloxane/polyether) inter-occlusal record materials and

frequently use wax in fixed prosthodontic procedures. General practitioners are unable to keep up with recently introduced materials and techniques and use more conventional methods. This necessitates the need for training the undergraduates in inter-occlusal record making and communicating the same to the laboratory and immediate and in-depth attention from instructors in dental schools and continuing dental education programs. From this survey, it has been concluded that the practitioner's attitude and knowledge about the use of inter-occlusal record materials is found to be deviated from well-recommended prosthodontic quality guidelines.

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