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Short Communication

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Assessment of Crown and Fixed Partial Denture Workquality: A Survey among General Dentists and Specialists in Tripoli, Libya

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ABSTRACT

Anecdotal evidence suggests that impression materials and techniques used in general dental practice for fixed partial dentures vary from those taught in dental schools. Very few studies have been done in Tripoli, Libya to assess the trends of fixed partial denture practice done by private practitioners. This survey used a questionnaire which was designed to assess the quality of crown and fixed partial denture work amongst dentists in Tripoli, Libya.

A questionnaire consisting of 12 questions was distributed randomly among 200 specialists and general dentists who work in private clinics and public health centers in Tripoli; out of which 146 were filled, giving a response rate of 73%. The results showed that, 23.25% of general dentists never make a primary impression before their work, 60% of them always make a primary impression, while (98%) of prosthodontists always make a primary impression. Only (47.8%) of general dentists use retraction cord while 52.3% of the surveyed general dentists never applied retraction cord in crown and bridge practice. Amongst the prosthodontists, 92.85% use gingival retraction cord, 7.14% use electrosurgery for gingival retraction. 38.63% of the surveyed general dentists in this study never disinfect the impression before sending it to the dental laboratory, while (45.7%) of prosthodontists always disinfect the impression and 42.2% often, and only 12.1% never.

Results showed that 53.49% of the surveyed general dentists never use temporary crown and bridge after tooth preparation, and 46.51% use temporary crown and bridge after tooth preparation, on the other hand 93% of prosthodontists use temporary prosthesis after tooth preparation. Amongst the prosthodontists, and general dentists glass ionomer cement is most commonly used for cementation of fixed partial denture, followed by adhesive resin cement and zinc polycarboxylate cement.

It was concluded that, the ideal materials, technique, and armamentarium are required for the long-term success of the fixed prosthodontics work.

Most of the prosthodontists used recommended impression materials and techniques, which were not followed by the majority of general dentists.

Keywords- *Survey; Fixed partial denture; Impression materials; Prosthodontists.*

INTRODUCTION

As more patients demand crown and bridges for replacement of missing teeth and endure the high cost, the quality of crown and bridge therapy becomes of increasing professional and public concern.[1]

The success of fixed prosthodontics treatment depends upon patient selection, diagnosis, treatment planning, impression making, communication with the dental laboratory, cementation of the prosthesis, patient's satisfaction and proper follow up. All these things are taught in dental colleges in Libya to the undergraduate students as part of the prosthodontics curriculum. Generally it has been observed that many private dental practitioners pay more attention to the quantity of patients, cost and time for the treatment. Very few follow the proper protocol and care about the quality of the treatment.[2,3]

High failure rates in crown and bridge work recorded in previous study done in Tripoli (65% in 2015), which gives an indication for the importance of the assessment of the fixed prosthodontics work.[4]

There is no studies have been done in Tripoli to assess the quality of crown and fixed partial denture work done by general dentists and specialists. This survey used a questionnaire which was designed to assess and investigate the quality of crown and fixed partial denture work followed by dentists in Tripoli.

MATERIALS AND METHODS

A questionnaire consisting of 12 questions was prepared

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and randomly distributed among 200 general dentists and specialists who work in private clinics and public health centers inTripoli. Demographic details were obtained including educational qualifications, and specialization, regardless of age, sex and experience. The questionnaire was anonymous and consisted of questions on the preoperative, operative and postoperative stages and materials and techniques that are usually used in fixed prosthodontics work. The questionnaire was distributed by handing it personally. Out of which 146 questionnaires were filled giving a response rate of 73%. The data was sorted, checked for completes and consistency, and summarized.

Questionnaire for crown and fixed partial denture work:

Before you start fixed prosthodontics treatment:

1. Do you take a preoperative radiograph for abutment tooth/teeth?

Never ☐ Rare ☐ Often ☐ Always ☐

2. Which material do you routinely use for making primary impressions before tooth preparation?

· Irreversible hydrocolloids (alginate) ☐

· Others ☐ (please specify ……

·I don't make primary impressions ☐

3. What do use routinely for gingival retraction?

· Plain gingival retraction cord ☐

· Gingival retraction cord with chemical ☐

· Electro-surgery ☐

· Laser ☐

· Rotary curettage ☐

· I don't practice gingival retraction ☐

4. Which material do you routinely use for making final impression?

· Condensation silicone ☐

· Addition silicone ☐

· Polyether ☐

· Polysulfide ☐

· Irreversible hydrocolloids (alginate)

· Others ☐ (please specify ……

5. If you are using elastomeric impression materials then which impression technique do you follow?

· Single mix (monophase) technique ☐

· Double mix technique (one step) / putty-wash technique (one step) ☐

· Double mix technique (two step) ☐

i) putty wash technique with spacer ☐

ii) putty wash technique without spacer ☐

6. Which type of impression tray do you use for final impression

Stock (ready-made) tray ☐ Special (custom made) tray ☐ Both of them ☐

If you use a stock tray, which type?

Metal ☐ Plastic ☐ Both ☐

7. Do you chemically disinfect the impression after removing it from the patient's mouth?

Never ☐ Rare ☐ Often ☐ Always ☐

If you do, which material do you use ……

8. Do you do intra-occlusal records (bite) for multiple teeth replacement?
Never ☐ Rare ☐ Often. ☐ Always ☐

If you do which material do you use? ……

9. Which material do you use for pouring impression?

· Dental plaster (type II) ☐

· Dental stone (type II) ☐

· Dental stone (type III) ☐

· Dental stone (type IV). ☐

10. Do you articulate the casts prior to sending laboratory?

Yes ☐ No ☐

11. Do you give provisional prosthesis after tooth preparation to all patients?

Yes ☐ No ☐

12. Which material do you use for cementation of fixed partial denture?

· Glass ionomer ☐

· Zinc phospate ☐

· Zinc polycarboxylate ☐

· Adhesive resin cement ☐

· Others. ☐ (Please specify)……

RESULTS

The data was collected anonymously, in this study the response rate was 73%, 63% were bachelor degree holders, 37% were master degree and PhD degree holders. Among the specialists, 48% were prosthodontists.

The survey results show the following:

20% of the general dentists (general practitioners) rarely took a preoperative X-ray before commencing fixed prosthodontics work, 30% often and 50% always, while 92% of prosthodontists always take a preoperative x-ray before starting fixed prosthodontics work.

23.25% of general dentists never make a primary impression before their work, 60% of them always make a primary impression and alginate is their material of choice, while 98% of prosthodontics always make a primary impression, 62.7% of them use alginate as a primary impression material, while 35.3% use condensation and addition silicone (Figure 1).

Only 47.8% of general dentists use retraction cord while 52.3% of the surveyed general dentists never applied retraction cord in crown and bridge practice. Amongst the prosthodontists, 92.85% use gingival retraction cord, 7.14% use electrosurgery for gingival retraction.

Amongst the prosthodontists, 35.29% use condensation silicone 64.71%, use addition silicone for final impression in fixed prosthodontics. Amongst the other practitioners 55.1% use alginate, condensation silicone 27.5%, addition silicone materials 17.4% were also selected but less frequently (Figure 2).

Amongst the prosthodontists, 25% use putty wash technique [one step], 75 % use putty wash technique [two step] without spacer. Amongst the other practitioners, 42.9% use putty wash technique [one step], 47.1% use putty wash technique [two step].

Amongst the prosthodontists, 92.85% use stock tray, 7.14% use special tray. Amongst the other practitioners, 95.23% use stock tray, 4.76% use special tray.

38.63% of the surveyed general dentists in this study never disinfect the impression before send it to the dental laboratory, while 45.7% of prosthodontists always disinfect the impression and 42.2% often, and only 12.1% never.

76.93% of the surveyed prosthodontists always do intra-occlusal records for multiple teeth replacement, and (23.08%) often. While 54.76% of general dentists never

do intra-occlusal records for multiple teeth replacement, (4.76%) rare, 30.95% often, and 9.52% always.

Type III dental stone was mostly used by specialist 72.27% and 54.5% by general dentists.

Articulation of casts prior to sending laboratory by specialists and general dental practitioners was 36.66% and 21.95% respectively.

Results showed that 53.49% of the surveyed general dentists never use temporary crown and bridge after tooth preparation, and 46.51% use temporary crown and bridge after tooth preparation, on the other hand 93% of prosthodontists use temporary prosthesis after tooth preparation (Figure 3).

Amongst the prosthodontists, glass ionomer cement is most commonly used for cementation of fixed partial denture 34.6%, followed by adhesive resin cement and zinc polycarboxylate cement 23% each, and 19.4% of prosthodontists use zinc phosphate. Amongst the other practitioners, glass ionomer cement is also most commonly used for cementation of fixed partial denture 46.04%, followed by adhesive resin cement 20.63%, zinc polycarboxylate cement 22.22%, and 11.11% of general practitioners use zinc phosphate cement.

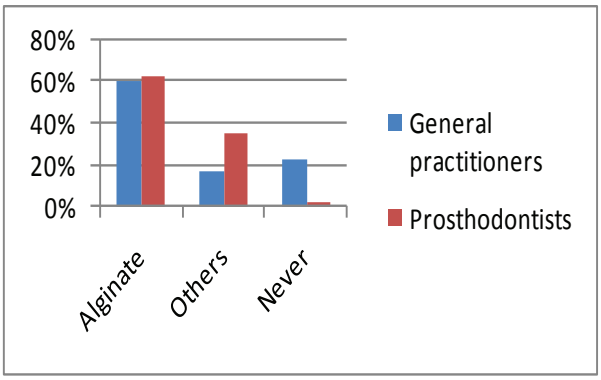

Figure 1: Showing the usage of primary impression by practitioners in %

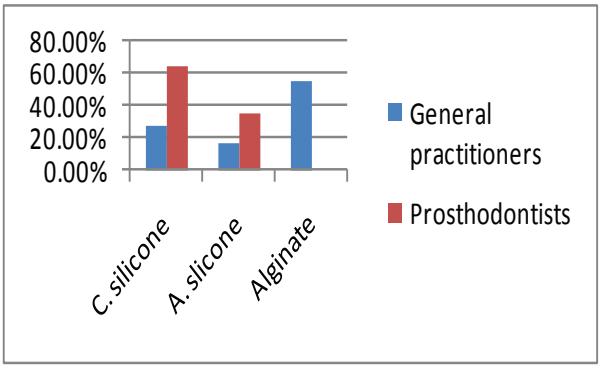

Figure 2: Showing the type of final impression material being used by the practitioners in %.

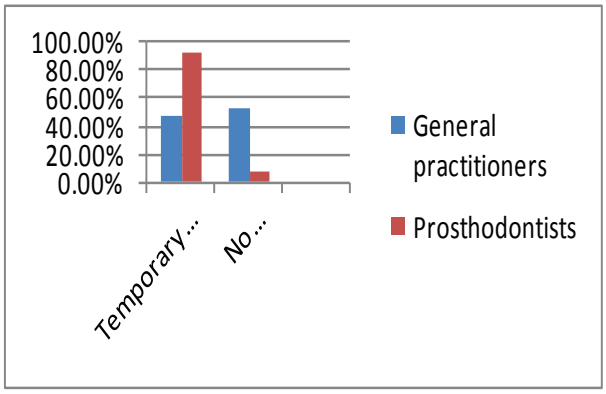

Figure 3: Showing the use of temporary prosthesis by practitioners in %

DISCUSSION

Completed questionnaires were obtained from 146 dentists, giving an overall response rate of 73% which is considered adequate and comparable with responses obtained from similar previous studies.

Radiographs provide essential information to supplement the clinical examination. Detailed knowledge of the extent of bone support and the root morphology of each standing tooth is essential to establish comprehensive crown and bridge treatment plan.[1,6] The majority of the surveyed dentists, 92% of prosthodontists always take a preoperative X-ray before starting fixed prosthodontics work, while 20.0% of the general practitioners rarely take a preoperative x-ray before commencing fixed prosthodontics work, 30% often and 50% always.

Diagnostic impressions are of utmost importance for the treatment plan in fixed partial dentures. The diagnostic models when assessed will give the treatment outcome that is planned and any other treatment if required before proceeding with the fixed partial denture treatment.[5]

The result of a previous survey shows that most commonly used impression material for the diagnostic purpose is irreversible hydrocolloid (alginate). Irreversible hydrocolloid is popular, primarily, because of their low cost and ease of use compared to other impression materials. In a recent study 62.7% prosthodontists and 60% general dental practitioners used irreversible hydrocolloid impression material for making diagnostic impression. Some of the general dental practitioners 23.25% never make primary impressions.

In fixed prosthodontics treatment planning, one of the challenging procedures is management of soft tissue i.e. to maintain the normal appearance of healthy gingiva. Appropriate, reversible, gingival displacement and tissue management are required, which facilitates making the final impression so it accurately records the prepared finish line and some unprepared tooth structure apical to the finish line.[3] The gingival retraction cord was the choice for 92.85% prosthodontists and by 47.8% general dentists while 52.3% of the surveyed general dentists

never applied retraction cord in crown and bridge practice. Also this result was in agreement with Baba *et al*. 2014[7] and IMRAN *et al*. 2016[8] and Kumbuloglu *et al*.[9] They found that, the gingival margin quality of the impression and clinical application procedures were affected by the retraction systems.

It was found in the current survey that 64.71% of prosthodontists used addition silicon for impression after tooth preparation. These findings are in agreement with Kalra *et al*.[10] and Baba *et al*. 2014.[7] Polyvinyl siloxane impression materials (addition silicones) have the best fine detail reproduction and elastic recovery of all available materials. Because there is no by-product, they possess remarkable dimensional stability and are odorless, tasteless and pleasant for patients. They are provided in wide range of viscosities, rigidities, and working and setting times.[11]

Further support to the result was offered by Rafael Pino *et al* 2013[12] also found the addition silicones produced more accurate stone casts than the condensation silicones.

The result of a survey shows that irreversible hydrocolloid is most commonly used by 55.31% of general practitioners for impression after tooth preparation. But they are not accurate enough for final fixed partial denture impressions. Irreversible hydrocolloid tear easily, must be poured immediately after removal from the mouth, have limited detail reproduction and they are dimensionally unstable.[3]

Amongst the prosthodontists, 25% use putty wash technique [one step], 75% use putty wash technique [two step] without spacer. Amongst the other practitioners, 42.9% use putty wash technique [one step], 47.1% use putty wash technique [two step]. One step putty wash technique reduces chair time to allow one impression with two materials, but a simultaneous shrinkage of materials with different viscosities and characteristics occurs. Furthermore, the reproduction of details may be performed by the putty material and not by the light-body material.

Stock impression trays both metal and rigid plastic were most selected in this survey which prosthodontists, 92.85% and the other practitioners, 95.23% use stock tray. This finding concurs with A. B. Mohamed and Neamat Hassan Abu-Bakr 2010.[1] The widespread use of stock trays may be related to their low price and armamentarium. Amongst the prosthodontists, 7.14%use special tray, a possible explanation for this result might be that special trays are not indicated that, these trays can not be used on the same day of its fabrication because most acrylic resin shrinkage occurs during the first 10 h. The application of an adhesive tray is needed also to provide better adhesion of the material to tray.[13]

(38.63%) of the surveyed general dentists in this study never disinfect the impression before send it to the dental laboratory, while 45.7% of prosthodontists always disinfect the impression and (42.2%) often, and only 12.1% never. These results were in agreement with Winstanley *et al*. 1997[14], who found that a cross infection control was not routine.

76.93% of the surveyed prosthodontists always do intra-occlusal records for multiple teeth replacement, and (23.08%) often. While 54.76% of general dental practitioners never do intra-occlusal records for multiple teeth replacement, 4.76% rare, 30.95% often, and (9.52%) always.

A Survey shows that 72.27% of prosthodontists and (54.5%) of general dental practitioners prefer dental stone (Type III) as a material of choice because of its low cost. Moreover the findings Arvind *et al*. 2013[15], were in disagreement with our results, as in the impressions should be poured in type IV stone owing to its obvious higher mechanical properties (high strength and greater abrasion resistance) as compared to type III stone. The final prosthesis accuracy of fit depends on this factor as well.

Articulation of cast is not common in general dental practitioners, but 36.66% of the prosthodontists articulated the cast prior to sending to laboratory.

Results showed that 93% of the surveyed prosthodontists and 46.51% of the general dentists use provisional prosthesis after tooth preparation. The provisional prosthesis needs to be fabricated to serve for a limited period of time, have a biologic, mechanical, and esthetic role. Avoiding provisional prosthesis can lead to marginal discrepancy and periodontal inflammation at the time of cementation of final prosthesis.[16] The success of fixed prosthodontics often depends on the care with which the interim restoration is designed and fabricated.[2]

Luting cement based on traditional glass ionomer cement is most commonly used for cementation of fixed partial denture in this survey. The former cements have a low film thickness and proven longevity as luting material, which explains their almost universal use for the cementation crown and bridge restorations.[1] Also the result of a survey shows that adhesive resin cement commonly used for the cementation crown and bridge restorations. Adhesive resin cements have many benefits, specifically include increased retention, improve strength and reduce marginal leakage.

CONCLUSION

Within the limitation of this study it is concluded that the majority of the surveyed general dentists mainly used alginate as a final impression material for fixed prosthodontics work. It was also observed, the absence of application of retraction cord and temporary restoration in their practice for fixed prosthodontics work.

The rare use of primary impression, disinfection of impression by most of general practitioners was observed.

It was found that the recommended materials and techniques were followed by most of the prosthodontists but not by most of the general practitioners.

The data obtained from the present study is a cause of concern as it highlights unacceptable practice in fixed prosthodontics work in Tripoli.

If the ideal procedure is not followed, it will lead to a compromised fit of the final prosthesis and failure of the treatment.

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