






Evaluation of Impression Making for Fixed Prostheses among Dental Practitioners in Myanmar; A Preliminary Study

Shwe Yi Aung¹, Ye' Thiha¹ , Okkar Kyaw¹, Tin Moe Aung¹, Hsu Wai Hnin¹ , Wai Yan Myo¹ , Su Myat Noe¹ , Myat Nyan² 

1. Private Practitioner, Myanmar
2. Department of Prosthodontics, University of Dental Medicine, Mandalay, Myanmar

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Abstract

Dental prostheses are fabricated on the casts poured from the impression of prepared tooth surfaces. Obtaining an accurate impression is the first and foremost crucial step for fixed prostheses fabrication. Among various impression materials, alginate has been used for a long time for removable prosthodontic cases. However, alginate is not sufficiently accurate and less dimensionally stable for precisely fitting restorations in contrast to elastomers. Although variety of elastomers have been marketed in Myanmar, many clinicians may still be using alginate which is readily available, easier to manipulate and less expensive for all prosthodontic cases. This study was aimed to explore the proportion of clinicians using elastomers for fixed prostheses and to determine possible factors related to not using elastomers in general practice. Cross-sectional observational study was performed by collecting data through an online survey method. Pre-structured questionnaires created with google forms were sent to practitioners with Facebook Messenger. Chi-square test was used for association of choice of impression materials with location and clinical experience. In our study, 330 forms were sent out to practitioners and turnout was 179 (response rate was 54.24%). Among them, 78.2%, 16.2% and 5.6% of responses were from urban, suburban and rural areas respectively. 60.9%, 24.6% and 14.5% were practitioners with experiences of 5-15years, <5years and >15years respectively. The results showed that 45.3% used alginate materials while 54.7% used elastomeric material for fixed prosthodontics cases. Among the alginate users, reasons for not using elastomeric materials were 48% for 'cost', 25% for 'inadequate training and knowledge about impression materials', 11% for 'cost' as well as 'inadequate training and knowledge'. However, 6% chose multiple mixed responses while 10% did not give any response. Considerable proportion of clinicians are still using alginate for fixed prostheses. In addition to the cost of elastomers, having insufficient knowledge and training is possible reason for not using them.

Keywords: Alginate, elastomeric materials, fixed prosthesis

Introduction

Fixed prosthodontic treatment involves the replacement and restoration of teeth by artificial substitutes that are not readily removable from the mouth, in

order to restore function, esthetics, and comfort. To achieve predictable success in providing treatment, meticulous attention to every detail is crucial in each step of clinical and laboratory procedures [1].

Impression Making for Fixed Prostheses

In the process of prescribing prosthodontic treatment, impression making is one of the most critical steps for the success of the treatment. Various impression materials and techniques have evolved and the new impression materials have come into use over the years. All of them have advantages and disadvantages and are suitable for specific conditions [2]. The impression materials can be classified into elastic and non-elastic depending on the ability of the set material to be withdrawn over undercuts. Elastic impression materials can be subdivided into hydrocolloids - agar (reversible) and alginate (irreversible) and elastomeric impression- polysulfide, condensation silicone, addition silicone and polyether. All these materials are commonly used in general dental practice [3]. Among these materials, the addition polymerized silicone materials are widely used recently in fixed prosthodontics since they have many advantages: offering the greatest accuracy and dimensional stability of impression materials, the greatest resistance to dimensional change following disinfection/sterilization, no unpleasant taste or smell, a wide range of viscosities to suit different techniques, similar wettability to polyether, and availability of automixing, which reduces the incidence of voids, no restrictions on pouring within a specific time period.

Not all the impression materials are commercially available in Myanmar. However, alginate, impression compound, and some elastomers are easily available. The dental fixed prostheses are fabricated on the cast poured from the impression of the prepared tooth surfaces. Producing an accurate cast has been the most critical part in the fabrication of fixed prosthesis. As alginate (irreversible hydrocolloid) is water-based products, it is not sufficiently accurate and less dimensionally stable for fitting the fixed prostheses due to imbibition and syneresis. Therefore, alginate should be poured with gypsum

immediately after impression taking [3]. Among various materials, the alginate has been widely used for removable partial denture.

The elastomers have more accuracy and are more dimensionally stable. The polyvinyl siloxane (addition silicone) provides best fine details, elastic recovery and dimensional stability. In tooth supported and implant supported fixed prostheses, impression making requires an accurate record of the prepared tooth especially the prepared finish line. The gingival margin should be clean, accessible and the gingival sulcus should be wide enough while taking the impression [5].

In Myanmar, Alginate, is still a popular choice of material in general clinical practice for fabrication of prosthesis because it is easy for manipulation and has low cost compared to elastomers. This study was aimed to explore the proportion of clinicians using elastomers for fixed prostheses and to determine possible factors related to not using elastomers in general practice.

Materials and Methods

This cross-sectional observational study was performed by collecting data through an online survey among dental practitioners who are both specialists and general practitioners in the urban and non-urban areas of Myanmar. Initially, a questionnaire from previously published study was adopted and modified [2]. The modified questionnaire includes sixteen questions regarding location of dental clinic, education and experience of clinician, choice of impression materials for fixed prosthodontics, the use of impression trays, soft tissue management and disinfection of impression. The reason for not using elastomeric impression materials was also inquired. The questionnaire was sent to the 330 dental

practitioners practicing in Myanmar via Facebook Messenger. The names and personal detail of the practitioners were not recorded. The collected data was statistically analyzed by using chi-square test.

Results

The questionnaire was sent to 330 dental practitioners across the country and 179 responses were received. Out of the 179 practitioners who responded to the questionnaire, 78.2% were from the urban area and 21.8% were from the non-urban area. From the urban area, 41.43% of the participants used alginate impression materials and 58.57% of the participants preferred elastomeric impression materials. From the non-urban area, 58.97% and 41.03% of the participants utilized alginate and elastomeric materials in impression making respectively. There was statistically significant differences between the choice of materials by clinicians of urban and non-urban area ($p < 0.05$) (Figure 1).

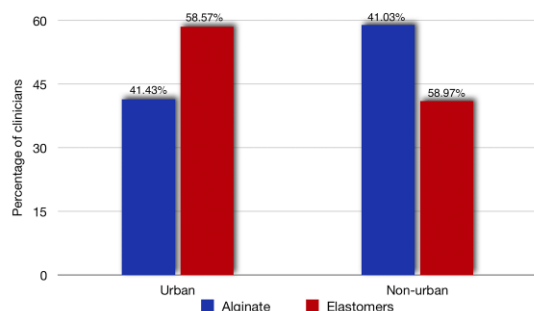


Figure 1. Bar chart showing choice of impression materials in relation to location ($p < 0.05$)

Among the participants, 14.5%, 60.9% and 24.6% were participants with clinical experience of less than 5 years, 5 to 15 years and more than 15 years respectively. In participants with clinical experience of less than 5 years, 46.2% used alginate impression material and 53.8% used elastomeric impression materials, while 49.5% and 50.5% of

participants with clinical experience of 5 to 15 years used alginate and elastomeric impression material respectively. In the category of participants having more than 15 years clinical experience, 34.1% used alginate and 65.9% used elastomeric impression materials. There was no statistically significant relationship between choice of impression materials by the clinicians and their clinical experiences ($p > 0.05$) (Figure 2).

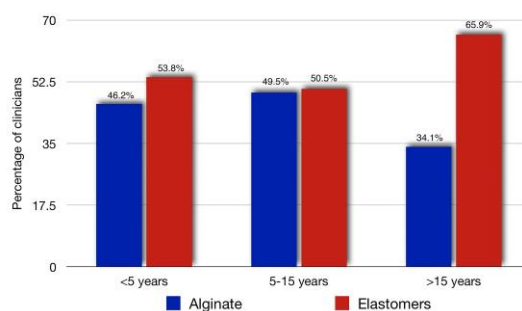


Figure 2. Bar chart showing choice of impression materials in relation to clinical experience ($p > 0.05$)

Among the participants, a total of 81 clinicians use alginate for impression making of the prepared teeth for fixed dental prosthesis. Concerning the reason for not using elastomers, 48% answered the 'cost' and 25% 'inadequate training and knowledge about impression materials and techniques'. 1% chose 'unavailability of materials' as a sole reason for not using elastomeric impression material. There were clinicians who chose multiple reasons for not using elastomers: 'cost' and 'inadequate training' (11%), 'inadequate training' and 'unavailability of material' (3%), Cost, inadequate training and knowledge, and unavailability of materials (1%). Ten percent of alginate users did not mention any reason (Figure 3).

For the impression making in fixed prosthesis fabrication, 24%, 2.8% and 73.2% of the participants used 'stock tray only', 'special tray only' and 'both stock tray and special tray according to cases' respectively. And then, only 0.1% of them

Impression Making for Fixed Protheses

'always' used tray adhesive, 13.4% 'often' used it, 29.6% 'rarely' used it and 55.9% 'never' used it. In the management of soft tissue before impression making, participants were allowed to choose multiple responses. Among 179 clinicians, the responses of two participants were not considered in analysis for their unreasonable responses. Among 177 participants, 53% used gingival retraction cords and 5% used other methods. Multiple responses were also recorded: gingival retraction cords and electro surgery (2%), gingival retraction cords, electro surgery and other methods for soft tissue management (1%), gingival retraction cords and laser (1%), gingival retraction cord and other methods (1%), all methods (1%) of the participants in the study. In contrast, 37% of participants take impression without tissue retraction for soft tissue management.

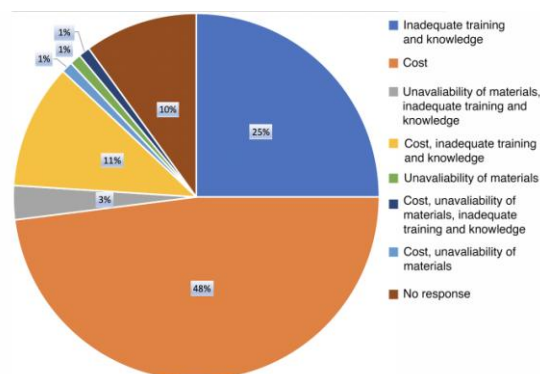


Figure 3. Pie chart showing the percentage of alginate users with various reasons for not using elastomers

Among the respondents, 31.3% always used disinfectant, 24.6% often used it, 27.9% rarely used it and 16.2% never used it before pouring the cast (Figure 4). Among those who use of alginate impression, 96% answered that they pour the cast immediately and 4% do not. From those who use of elastomeric impression, 71.8% answered that they wait for sometimes before pouring the cast and 28.2% do not wait. Regarding the level of their satisfaction on the impression making

training during undergraduate student, 4.5% were very satisfied, 51.4% were satisfied, 32.4% were indifferent and 11.7% were dissatisfied. Majority (89.9%) of participants answered that they want to attend a continuing dental education program on impression materials and technique for fixed prostheses.

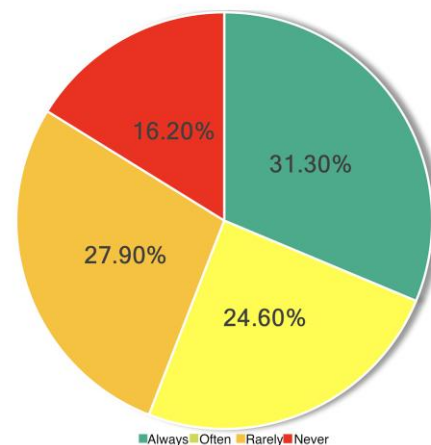


Figure 4. Pie chart showing the proportion of clinicians using disinfectant for impression

Discussion

The acceptable impression must be an exact record of all aspects of the prepared tooth and be free from air bubbles, tears and thin spots. The appropriate choice of impression materials, techniques, trays, the use of tray adhesive, soft tissue management, and the correct pouring time play important parts in achieving an accurate impression and corresponding master cast. The use of disinfectant after impression taking is also of vital importance for prevention of cross infection. As for impression making, elastomeric impression materials are the most superior in terms of recording finished lines, excellent reproduction of surface detail of the prepared teeth and dimensional accuracy. They are highly elastic and the setting time can be controlled with the amount of accelerator. But they are hydrophobic, require a very dry field, and difficult in recording the arches with undercuts for polyether [2].

Elastomers are currently the most widely accepted impression materials for fixed prosthesis fabrication. In case of using hydrocolloids, laminate technique (the agar-alginate technique) is better than using agar or alginate alone, individually as agar will record the prepared teeth accurately and the remaining arch is recorded with alginate [6].

The present study was performed to evaluate current dental practice regarding impression making for fixed prosthodontic treatment in Myanmar and to determine whether continuing dental education programs are necessary in this aspect. According to the preliminary results, elastomers are more likely to be used by clinicians in urban areas than in those practicing in non-urban areas. Alginate is used relatively more frequently than elastomers in non-urban areas although elastomers have been proven to be better than alginate for fixed prosthesis impression making. Cost may be the most common reason for not using elastomers. On the other hand, there was no statistically significant difference between the uses of these two impression materials depending on the clinical experiences.

Elastomers can be used with either stock trays or special/individual trays, depending on the impression technique. There are various techniques for making fixed partial denture (FPD) impressions: putty-wash impression, dual-phase impression and mono-phase impression. If stock trays are used, combination of high viscosity and low viscosity elastomers is necessary. In contrast, special trays provide even thickness of impression materials and elastomers are more accurate in uniform, thin layers of 2 to 3 mm. Since the use of stock trays may result in uneven bulk of impression materials and leading to distortion, the use of a custom tray is also recommended [7]. In the present study, 24% of dental practitioners answered that they do not use special trays while making the impression.

One of the reasons for inaccurate impressions especially with alginate is the lack of impression material retention or adhesion to the tray. In alginate impression, using tray adhesive in both stock tray and custom tray can reduce the occlusal contact error. Adhesives can prevent separation of impression materials away from tray during withdrawal of the impression from the mouth [8]. Regarding the use of tray adhesive before impression making, 55.9% of the dentists answered that they never used it. The availability of material in Myanmar market and promotion of the use of those materials should be brought into awareness.

In fixed prosthodontics treatment, one of the most challenging procedures is soft tissue management i.e. placing the gingival tissues away from the preparation margins. This can give an accurate impression by showing the finish line clearly. Gingival retraction cord has been used most commonly in fixed dental prosthesis treatment. But it can be painful and uncomfortable for the patients and also has a risk of epithelial attachment injury [8-11]. An electrosurgery unit may be used for tissue removal before impression making. However, it is not recommended as the concentrated electrical current at the tip can generate heat, which may cause mucosal necrosis and loss of osseous structure and there is also a potential for gingival recession after treatment [12, 13]. Laser provides excellent hemostasis and coagulation with minimal or no post-operative pain. But buying laser device is expensive and can cause retinal eye damage to dentists, dental assistants and patients if specific protective goggles are not used. Furthermore, new methods for managing soft tissue have emerged such as gingival retraction paste. The paste shows better effect on the health of the gingiva, the preparation of the tooth and the better cast. Additionally, the prosthesis adaption is as good as the retraction cord which makes the paste as an alternative to gingival retraction cord

[14]. In the present study, more than half of the practitioners used gingival retraction cord and 38% did not perform soft tissue management.

Using disinfectant after impression making is important to protect dental health care personnel who handle impressions or casts against exposure to cross infection brought about by contact with microorganisms such as viruses; hepatitis B, hepatitis C, herpes, HIV and Mycobacterium tuberculosis [15]. Only 31.3% of the dentists answered that they always used disinfectant before pouring the cast. Therefore, continuing education about usage of disinfectant before pouring the cast is highly recommended for promoting dental practice regarding impression making and disinfection in Myanmar.

The dimensional stability of irreversible hydrocolloid impression material is influenced by the storage time and environment temperature. Alginate tends to shrink by evaporating water as a result of syneresis when stored in open air or to expand by absorbing additional water as a result of imbibition when stored in water or very wet towel. Therefore, immediate pouring of the cast is recommended when alginate impression is used [3]. In our study, 4% of the clinicians did not pour the cast immediately in using alginate impression. In the use of elastomeric impression, sufficient time is allowed for the material to recover sufficiently from deformation that occurs during removal before the cast is poured. The recovery time for elastomeric impression materials varies from 30 mins to 2 hrs. The polymerization of additional silicone occurs without the release of sub-product, i.e., the material presents less dimensional change. However, if the cast is poured immediately after removal from the mouth, a secondary reaction that occurs during the polymerization can lead to the formation of hydrogen, which may cause pores in the casts [16]. In the present study, a significant percentage

of clinicians did not wait for some time before pouring the cast in elastomeric impression.

From the responses given by the 81 alginate users, 48% pointed out the cost of the elastomeric material. Until around 2000, importing new materials and technology was hampered substantially and limited because of the country's political situation and economic policy. Thus, university training had to focus mainly on alginate which was the only available material in Myanmar market at that time. Therefore, the group with clinical experience of more than 15 years was affected by this scenario. Even after 2000, elastomers were quite expensive and had limited supply. Only after 2010, more elastomers have been imported and become less expensive than before. It is reasonable that 25% of alginate users mentioned inadequate knowledge and training for not using elastomeric impression material in impression making. Current graduates after 2010 received more training on elastomers in university. However, more academic lectures and trainings for manipulation of elastomers should be emphasized by dental universities and dental associations for those dentists graduating before elastomers become readily available.

Limitations of study

The study was done with an online survey questionnaire which was created by using google form and was sent to the dentists across the country, Myanmar, via Facebook messenger. Although the questionnaire was sent to 330 clinicians with messenger, only 179 clinicians responded because some clinicians are neither familiar with online survey forms nor unable to assess the form due to technical reasons. In order to generalize the survey results, it is mandatory to reach to as many clinicians as possible to represent all dental clinicians in Myanmar. It is also recommended to use both online

and telephone interview methods as necessary in future studies. To achieve more responses from clinicians, the platform of surveying can probably be encouraged by interviewing in person during conferences and seminars. Questionnaire translated into local language may be more helpful for better understanding and clarification of the participating clinician on each complex question and responses. Additionally, provision of some form of incentive may improve the response rate.

Conclusion

Clinical practices in dentistry have changed significantly among general dental practitioners over the last few years. The availability of materials with various brands and qualities for prosthodontic works has made the scope of practice even broader than before. In addition, the easy access to the internet and social media allows the local general dental practitioners to connect with each other more easily and frequently. However, considerable proportion of clinicians in this study are still using alginate as an impression material for fabrication for fixed prostheses. In addition to the cost of elastomers, insufficient knowledge and training and unavailability of materials are possible reasons for not using them. Nevertheless, the materials with ideal properties, techniques and armamentarium are required for the long-term success of the treatment for fabrication of fixed dental prosthesis. More readily availability of commercial products and more continuing dental education programs still seem to be in need.

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