

Dentist's Perspective Regarding Usage of Different Fixed Prosthesis Removal Systems in Islamabad and Rawalpindi

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ABSTARCT

Background: Crowns and multi-unit fixed partial dentures have a limited lifetime. They fail for a number of reasons. The removal of provisional crowns and bridges is generally simple, however for permanent crowns, it becomes more challenging. Careful removal of FPD can help a dentist simplify a resto or endo procedure. The aim of this article was to analyze the different methods available for the removal of crowns and bridges and their awareness among dental practitioners

Study Design & location: This was a cross-sectional study based on a questionnaire. The questionnaire was filled by a total of 250 general and specialist dentists who were practicing in various individual and group-based dental practices as well as private and government setups of Islamabad and Rawalpindi.

Methodology: The questionnaire comprised a total of 13 questions to find out dentists' views about the usage of different system's available for dental crowns and FPD removal. Participants were selected by random sampling. The results were then analyzed using SPSS version 23. Frequencies, percentages of different variables used in the study were calculated to identify the co-relation among different attributes. P-value of less than or equal to 0.05 was considered statistically significant.

Results: The study reflected that out of those who answered, 247 dental professionals (98.5 %) preferred using hemostats or Morrell sliding hammer or a combination of both as they offered better control of force. A small percentage (approx 2%) of dentists used diamond or carbide burs as their **first** preference to trim off old crowns. Clinicians rarely used laser due to its high cost and less availability and its effectiveness primarily related to Porcelain jacket/ Zirconium crowns.

Conclusion: It was concluded from this study that the majority of dentists preferred Morrell type crown remover with sliding hammer due to its ease of availability, universal acceptance, simple to use and because as it offered better control of force as opposed to spring-lock type

Keywords: Crown and bridge removal, Crown and bridge disassembly, Crown and bridge failure.

INTRODUCTION

Fixed partial dentures (FPDs) have a limited life duration. They often have to be removed due to functional, biological or aesthetic failures [1]. Removing them after cementation can result in trauma and fracture or harm to the underlying abutment teeth, the periodontium or the prosthesis itself. Prosthesis luted with adhesive resin cements in particular are difficult to remove[2]. FPDs might also have to be taken out due to recurrent caries, the need for RCT, material breakage or periodontal diseases biologic. Moreover, the loss of retention or post fracture, periodontally compromised abutment, root fracture, over contoured and rough restorations may also require removal of dental prosthesis [3-4]. Restorations of such prosthesis or abutments may result in failure [5,6]. Several instruments are available to remove the failed FPDs, but most of these apply forces upon the underlying teeth. This might result in discomfort to the patient [2]. Taper of the preparation, restoration design and structure, cement used, and the removal systems are factors that can affect the removal of a cemented FPDs [9]. The FPDs may be a provisional one luted with temporary cement. Their removal is usually by simple and easy means involving hand instruments which breaks the weak bond between the restoration and tooth. The permanent FPDs restorations are fabricated from

metal, metal-ceramic or ceramic only and cemented with permanent cements, their removal are more challenging due to resin or glass ionomer cements used [8]. Different systems have been mentioned in this literature for the safe removal of FPDs [1] [8] [10-15]. A clear understanding of the mechanism of action of each instrument and system is necessary for safe and effective removal of FPDs[1]. The aim of the article was to survey different dentists' preferences for removing fixed partial dentures and provide an overview of modern and current available systems and technologies. Furthermore it highlighted the different options for each clinical condition.

Table 1: Cause of cause of crown and bridge failure

Biological	Mechanical	Aesthetical
Caries	Cementation	Color
Endodontic treatment	Defective margins	Contour
Periodontal	Post and core failure	
Occlusion	Breakage of attachments	
Metal allergies	Fractured porcelain surfaces	
Endodontic re- treatment		

FPD and dental crowns may have to be removed due to biological, functional or esthetic reasons: ⁽¹⁾ Different

techniques and systems have been discussed in the literature for the safe removal of FPDs^{[1],[8],[10-15]}

Table 2: Classification of crown and bridge removal systems

Conservative	Semi-Conservative	Destructive
Richwill crown remover system	Wamkey	Tungsten carbide burs
Ultrasonic instruments	Metalift crown remover system	Christensen crown remover/crown splitters
Pneumatics (air driven)	Higa crown remover system	
Sliding hammers		
Crown tractors		
Matrix bands		

For deciding on a specific system, a careful assessment of the clinical scenario needs to be made.

In general, this includes:

1. Accessibility and analyzing between saving the restoration and risking damage to the adjacent and opposing teeth needs to be done.
2. Knowledge of the previous used material is useful when considering to apply traction forces. This, however, is not always the case as a dentist may be removing another clinician's work. Torsion forces could damage the underlying abutment.
3. Torquing forces should be parallel to the long axis of the tooth to reduce the risk of abutment fracture.
4. Aesthetic failures like those in fractured porcelain, should be managed more economically if the crown or bridgework is salvagable as an intact unit.
5. Medical contra-indications (these affect the technique that can/ should be used e.g. The use of ultrasonics is contraindicated in patients with hepatitis-B, herpes and cardiac pacemakers
6. Restorability of retainers. If the underlying abutment teeth turn out to be non-restorable, time, money and confidence of the patient and the practitioner is wasted
7. Periodontal support and mobility should be assessed before considering the use of a technique.

MATERIAL AND METHODS

Different dental colleges in Islamabad and Rawalpindi as well as private individual and group dental practices in these 2 cities were given the questionnaire. A 100 % reponse rate was achieved using on-spot answer collection and follow up with emails and personal contacts. A total of 250 dental practitioners answered the questions. Data was collected based on the answers. The dental practitioners were later e mailed and/ or given hand-outs of data regarding the topic as a brief CME activity/ refresher course.

RESULTS

A total of 250 practitioners participated in the study. The response was received either on spot or followed up via email and phone calls. Most of the practitioner's (96%) preferred sliding hammers/ Morrell crown removers¹. A small percentage (4%) preferred burs as their first choice to remove crowns to save time. Others opted to use high-speed dental burs for fixed cases that were difficult to remove by conventional means or that risked damaging the

underlying teeth. Most opted to use burs if the prosthesis did not come off using sliding hammers. Lasers were being used to remove Zirconia/ porcelain jacket crowns by a small number (3%) of practitioners due to the high cost of the armamentarium. For porcelain and Zirconia crowns, dentists used GC pliers with rubber grips or burs if the crown was not going to be reused. Safe-relax or similar pneumatic systems¹⁴ were in use by approximately 10% of the practitioners. Richwill system, was not being used because the practitioner's felt comfortable with other appliances and because the other systems were more easily available.

Table 3:

Of the given systems overleaf, which crown/ bridge removal systems/instruments are you aware of?		
i.	Richwill crown remover system	Nil
ii.	Higa crown remover	NIL
ii.	Sliding hammer/ Morrel crown remover	100 %
v.	Spring lock-release hooks	67%
v.	High speed dental burs – diamond, carbide, metal cutting	88%
vi.	Safe-relax pneumatic system	3%
ii.	Laser systems	1 %
ii.	Metalift crown remover system	1%
x.	Hemostats - for temporary crowns	46%
k.	GC plier	10%
ii.	Wamkeys	10%
ii.	Christensen crown splitter or equivalent [elevators]	15%
ii.	Medesy crown splitter pliers	5%

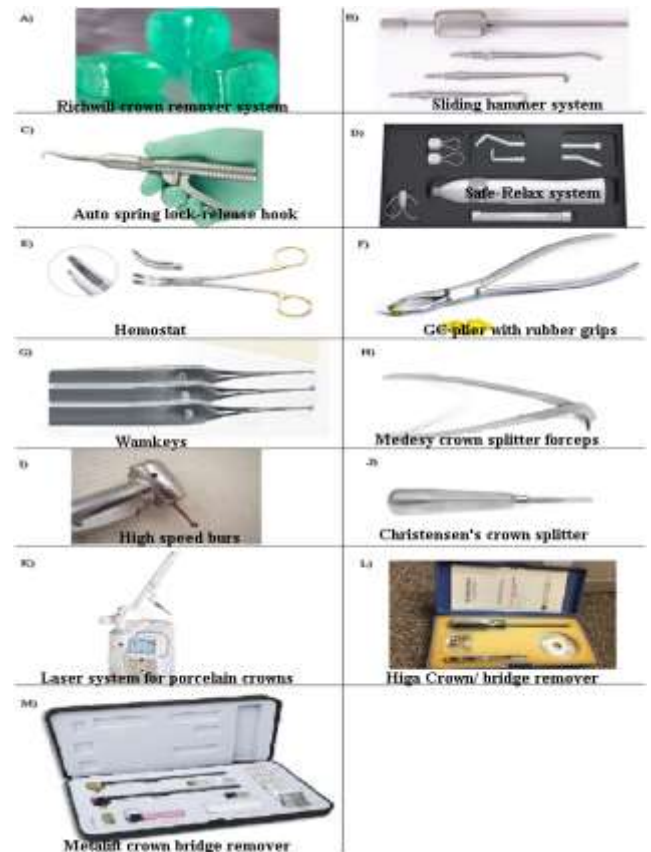


Figure 1

DISCUSSION

From the many systems and techniques discussed, it is tough to come up with a general solution for coronal disassembly. Selection of the best crown removal system depends on a particular clinical situation. The advantages and disadvantages of various crown disassembly techniques [Table 1] should be kept in mind before a final decision is made. Any back action hammer will serve best if there is a sound underlying tooth structure with a favorable path of insertion provided the luting agent is of conventional type. If the abutment is grossly decayed or periodontally compromised, the use of back action hammer is contraindicated. The safest options in such situations are the use of ultrasonics, lasers or splitting the crown and prying with a spreader. Irrespective of the luting agent employed, splitting and spreading of the crown can be done for preventing the damage to the abutment during retrieval. Any device in the category that permits safe removal of the crown can be employed if reuse of the crown is desired. In case of nervous patients, air-driven (pneumatic) crown removers that work by breaking the luted cement seal via vibrations rather than the typical pounding forces can be suggested. An active instrument can be an option in case of thin abutment vulnerable to fracture, crowns with unfavorable path of insertion and also in dowel core treated teeth. This system can also be used when adhesive cements are employed. Lasers were less frequently used due their limit to be used for porcelain/ Zirconium crowns. Although such systems are available on rental basis from dental suppliers. It is essential to know the use and application of each instrument/ material for successful and atraumatic removal of temporary fixed partial dentures.

CONCLUSION

It was noted that most dental practices in the fore mentioned cities were using Hemostats or sliding hammers/ Morrell crown removers. The next most common choice was that of high speed diamond or carbide burs. Practitioners specifically opted to use burs if the prosthesis did not come off using sliding hammers. Air driven/ pneumatic systems were less commonly used. Other systems such as crown tractors and Richwill system were not being used.

Limitations: This study was limited to the cities of Islamabad and Rawalpindi and such does not represent the general perspective of dentists' all over Pakistan. Dental interns (house surgeons) were not included in the study. A set number of systems were discussed that are most common. As dental technology and competition among the

big names of dental suppliers increases, newer instruments are being introduced with little modifications which were not discussed here.

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