



Knowledge, awareness, and practice of postgraduate students towards tooth fragment reattachment procedure and biological restorations – A cross-sectional survey

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ABSTRACT

Aim - Fragment reattachment offers an effective and economical approach to re-establishing esthetics and functions after any traumatic injury which leads to tooth fracture. The current study intends to assess and determine postgraduate students' understanding of the fragment reattachment procedure and biological restorations as well as their awareness about it. **Material and methods:** The cross-sectional survey of postgraduate students was conducted using a self-administered questionnaire. Responses to questions about fragment reattachment techniques' knowledge, awareness, and practice were recorded. Descriptive statistical analysis was performed. **Results:** Two hundred ninety-three subjects participated in the current study. Out of the 293 subjects, 247 (84.3%) had experienced tooth fracture and only 102 (34.81%) had performed tooth reattachment during postgraduate training. Supra gingival fractures (66.8%) involving enamel and dentin (Ellis Class II) were the most encountered type (47.27%). The storage medium and bonding material preferred were saline and dual cure composite resins, respectively. 191 (65.19%) participants did not perform fragment reattachment procedures and the main reason for the same was lack of fragment availability (45.03%). 290 (98.98%) participants never used extracted teeth for restorative purposes and 209 (71.33%) participants did not know about different procedures in biological restorations. All the participants responded that they neither received clinical training for biological restorations nor did they have a tooth banking system nearby. **Conclusions:** Postgraduate students had theoretical knowledge about the fragment reattachment procedures but did not perform them mainly because of non-availability of the fragment, no clinical knowledge & training and concerns regarding questionable success of the procedure. Majority of participants were unaware about all the procedures under the concept of biological restorations and also never used extracted teeth for restorative purposes.

Keywords: Biological restoration; coronal tooth fractures; dental trauma; Ellis fracture; Ellis Class II; prevalence of crown fracture; supra gingival fracture; traumatic dental injuries

INTRODUCTION

Traumatic dental injuries (TDI) occurring to the anterior tooth lead to loss of function and esthetics. It also causes deleterious social and psychological impact on the patient's health. The reported prevalence rate of TDI varies between different geographical regions.¹

Prevalence of TDI in different regions of India ranges from 1% to 76%.² Prime etiological factors associated with such injuries include fall, sports, accidents and physical violence.¹ In most of the cases an uncomplicated crown fracture (enamel and enamel-dentin) is experienced.²

Various treatment modalities are reported in literature for restorative rehabilitation including bonded composite resin restorations, post and core, full coverage restorations and fragment reattachment procedure.³ With the advancements made in the field of bonding systems, fragment reattachment appears to be a procedure that is simple, time saving, cost effective and clinically relevant.³

Literature citing present the fact that clinicians and resident doctors, in spite of having knowledge about the procedure of fragment reattachment could not use it in their routine dental practice due to various reasons including lack of fragment availability, lack of clinical training and ill-fitting fragment.^{4,5}

The lack of literature pertaining to the evaluation of postgraduate students' knowledge, awareness, and practice related to the fragment reattachment procedure in central India is the basis for the current study.

MATERIAL AND METHODS

A survey questionnaire form was modified, formulated⁴ and was independently validated by subject specialists. Pilot test was conducted on subjects for assessing technical details and understanding of the respondents. Any form of discrepancies was rectified and the final questionnaire had 12 questions that were framed around participants' knowledge, awareness, and practice of the fragment reattachment and biological restorations. Questionnaire had aspects addressing experience of tooth fracture, type of fracture, choice of treatment, clinical choices for the procedure and reason for not performing the procedure. Questions also assessed knowledge about biological restorations, use of extracted teeth for restoration, training received and availability of tooth banking system. An attempt was also made for estimation of prevalence of tooth fracture and its types. The questionnaire was circulated amongst post graduate students in central India region, both in manual and electronic form. Forms with incomplete responses were excluded. Participants were assured that no personal information was collected during the data collection for receiving non biased responses.

RESULTS

Data was tabulated and descriptive statistics was performed. Two hundred ninety three responses were considered for data evaluation after exclusion of incomplete responses. Table I-IV summarize the descriptive statistics (percentages) of the responses received.

Table I – Questions regarding Fracture fragment experience and management

Sr.No	Questions	Responses	N=293	%
1.	Have you experienced tooth fracture in your clinical practice?	Yes	247	84.3%
		No	46	15.7%
2.	If yes then, what was the type of fracture experienced more frequently?	Supra gingival	165	66.8%
		Sub gingival	82	33.2%
3.	If yes then, which type of supra gingival (Coronal) fracture were experienced?	Ellis Class I - Only Enamel	51	30.91%
		Ellis Class II – Enamel & Dentin	78	47.27%
		Ellis Class III – Enamel, Dentin & Plup	36	21.82%

Out of 293 participants, 84.3% (247) experienced tooth fracture in their post graduate clinical experience. 66.8% (165) Supra-gingival fractures were observed with Ellis class II (47.27%) being the most predominant one (Table I). 248 (84.64%) participants had knowledge about the fragment reattachment procedure but only 102 (34.81%) performed it (Table II). Their choice of luting agent was dual core resin (55.88%) and storage media was saline (76.47%).

Table II – Practice & Material choices for Fracture fragment reattachment procedure

	Questions	Responses	N=293	%
1.	Do you have any knowledge about fragment reattachment procedure?	Yes	248	84.64%
		No	45	15.36%
2.	Have you performed the fragment reattachment procedure?	Yes	102	34.81%
		No	191	65.19%
3.	If you have performed fragment reattachment procedure, then what was your Choice of luting Agent	Glass Ionomer Cement	20	19.61%
		Flowable Composite	25	24.51%
		Dual core Composite	57	55.88%
4.	If you have performed fragment reattachment procedure, then what was your Choice of storage Media	Saline	78	76.47%
		HBSS	20	19.61%
		Milk	04	03.92%
		Others	00	-

191 (65.19%) participants did not perform the procedure due to non-availability of the fragment (45.03%), no clinical knowledge & training (28.27%) and concerns regarding questionable success of the procedure (26.7%) (Table III).

Table III – Reason for not performing Fracture fragment reattachment procedure

Sr.No	Questions	Responses	N=293	%
1.	Have you performed the fragment reattachment procedure?	Yes	102	34.81%
		No	191	65.19%
2.	If you have not performed the fragment reattachment procedure, What was the reason	Lack of Knowledge & Training	54	28.27%
		Lack of fragment Availability	86	45.03%
		Questionable success of the procedure	51	26.7%

290 (98.98%) participants never used extracted teeth for restorative purpose and only 84 (28.67%) knew about the various procedures under the label of biological restorations. 100% participants acknowledged the lack of workshop/training for biological restorations and lack of tooth banking system. (Table IV).

Table IV – Biological Restorations

Sr.No	Questions	Responses	N=293	%
1.	Have you used extracted human tooth for therapeutic purposes?	Yes	290	98.98%
		No	03	01.02%
2.	Do you know about various procedures under biological restorations?	Yes	84	28.67%
		No	209	71.33%
3.	Have you attended workshop/training on biological restorations?	Yes	293	100%
		No	00	00
4.	Do you have tooth banking system in your region?	Yes	293	100%
		No	00	00

DISCUSSION

The results from the current survey study provides details on postgraduate students' knowledge, awareness, and practice regarding fragment reattachment procedure and biological restorations and also reports the prevalence of traumatic injuries with its types. The conceptualization of the current study is based on the fact that traumatic dental injuries present as a public health scare globally and fragment reattachment procedure can provide a viable alternative solution that can be learnt and practiced at postgraduate level.

Researchers are constantly working for identification and development of a restorative material that matches the tooth's biomechanical properties and provides an ideal restorative solution. The clinical behavior of contemporary dental materials appears to be nearly similar to that of tooth structure but ideal biomechanical behavior match is lacking. The use of natural tooth structures i.e. enamel and dentin for the restorative rehabilitation appears to be the gold standard as stated by the researchers.⁶ Fragment reattachment procedure provides such an alternative that can be set as gold standard for clinical rehabilitation of fractured tooth.

The result of the study presents the fact that 84.3% participants had experienced tooth fractures during their post graduate clinical experience. 66.8% fractures were supra-gingival in nature and most of them were predominantly Ellis class II (47.27%) i.e. enamel-dentin fractures, followed by Ellis class I (30.91%) and Ellis class III (21.82%). Contrary to the current findings regarding the type of fracture, Fakhruddin KS et.al, Taiwo OO and Kumar A et.al. stated that enamel fractures occur more frequently (63.7-80%) than enamel-dentin fracture (15.9- 17.2%).^{7,8,9} Whereas Livny A¹⁰ observed that enamel fractures account for 41% and enamel-dentin for 42.5% of all dental injuries. Also Lam R et.al., Díaz JA et.al. and Eyuboglu O et.al reported predominance of enamel-dentin fractures in permanent dentition (32%).^{1,11,12,13}

84.64% participants had knowledge about the fragment reattachment procedure but only 34.81% performed it. The main reasons cited for not performing the procedure were non-availability of the fragment (45.03%), no clinical knowledge & training (28.27%) and concerns regarding questionable success of the procedure (26.7%). Similar findings have been reported in literature that in spite of having knowledge about the fragment reattachment, post graduate trainees were unable to put it to use in their clinical practice.⁵ Authors in their previous survey conducted on general and specialist practitioners regarding fragment reattachment procedure observed that 78.5% had knowledge about the procedure but only 34% performed it in their clinical practice. Reason stated for not performing the procedure included lack of fragment availability and clinical training.⁴

The preferred storage media was saline (76.47%), followed by Hanks Balanced Salt Solution (19.61%) and milk (03.92%). The choice of the bonding agent was dual core resin (55.88%). This finding can be attributed to the probable increase in awareness about the advances made in the resin materials amongst the post graduate students. Dual core resin material provides better polymerization control, easy application and short curing time.¹⁴ All these properties can improve the performance of fragment reattachment procedures.

98.98 % participants never used human extracted teeth for therapeutic purposes and 71.33% had no knowledge about the various procedures under biological restorations. The initial reported literature regarding biological restorations includes Chosak and Eidelman (1964)¹⁵ for using natural tooth fragments for restoration and Santos and Bianchi (1991)¹⁶ for introducing the term 'Biological Restoration'. Over the years it has been established that biological restorations have several clinical benefits as well as have enhanced emotional, social, and psychological benefits amongst the patients. Thus, lack of knowledge and practice about the fragment reattachment as biological restoration, is a matter of concern. Present

literature provides biological restoration's classification proposed by Gunwal MK et.al¹⁷ and Srivastava N et.al.¹⁸ Gunwal MK et.al¹⁷ has also proposed a definition for the biological restorations as "The procedures in which a sterile natural enamel and/or dentin tissue is used to reinstate the carious, fractured, missing and defective structures of the tooth, so as to re-establish the biofunctional requirements, and maintain a healthy stomatognathic system."

Current study also highlights that none of the participants received any kind of training for performing the biological restoration procedures. This is a relatable finding regarding lack of knowledge and practice of biological restorations including the fragment reattachment procedure. There can be multiple limitations to biological restorations but one of the main reasons can be attributed to lack of availability of tooth and / or a tooth banking system.¹⁸

Current survey might have its limitations in terms of certain bias while data collection and reporting. However, authors have made an effort to reduce these biases and have also provided important information about postgraduate students' knowledge, awareness, and practice regarding the technique of fragment reattachment and biological restorations. Although the sample size may be limited, it provides vital information regarding fracture types and the extent of fracture.

CONCLUSION

Postgraduate students had knowledge about the fragment reattachment procedure but did not perform it mainly due to non-availability of the fragment, no clinical knowledge & training and concerns regarding questionable success of the procedure. Majority of post graduates did not know about all the procedures coming under the biological restorations and also never used extracted teeth for restorative purpose. Awareness and adaptation of biological restorations in routine clinical practice can be created by conducting training programmes and providing tooth substrate through establishment of tooth banking system.

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