TEACHING AND PRACTICE OF REPAIR OF RESIN MODIFIED GLASS IONOMER RESTORATIONS IN DENTAL INSTITUTIONS OF KARACHI

Muhammad Hasan BDS, FCPS resident (operative dentistry)*; Farhan Raza Khan BDS, MCPS, FCPS, Msc. (Clinical Research)*

* Dental Section, The Aga University Hospital, Karachi (Pakistan)

Address for correspondence: Flat no. 511, 5th floor, marium arcade, main amir khusroo road, karachi, pakistan – 74800.
Phone: +92 333 383 1183.
Email: hasan82@msn.com

Abstract: Replacement of a restoration leads to excessive cutting of the otherwise healthy tooth structure which affects the integrity of teeth. Repairing existing glass ionomer restorations may appear to be a good alternative to complete replacement of the restoration which presents no evidence of failure on clinical exam. The objectives of the study were to determine the proportion of faculty advocating the teaching of repair of resin modified glass ionomer restorations to dental students in the dental institutions of Karachi and to explore the factors that affect the decision making process of defective restorations repair. An 11 item questionnaire was provided to the faculty members of the dental institutions in Karachi. Nine out of ten dental institutions participated in the survey. Up to 72% of the respondents stated that glass ionomer restorations (RM GIC) repair is advisable in some situations, whereas, 50% of the respondents stated that they have performed such type of interventions and have achieved success. Around 57% stated that they teach such procedures to students and 52% of the respondents stated that the course of instruction is at clinical level mainly. Up to 57% of the respondents teach the repair of defective resin modified glass ionomer restorations when encountered and the present mode of teaching is mainly at the clinical level (52%). Patient’s existing oral hygiene and occlusal relationship appeared to be the most important factors in decision making process for repairing existing resin modified glass ionomer restorations.

Keywords: defects, glass ionomer, repair, replacement, resin modified.

Introduction

Dentists are accustomed to the fact that the restorations that are below the standard quality should be replaced with new ones (2, 3). The replacement of existing restorations with localized defects places the teeth on additional harm (4). This leads to excessive cutting of the otherwise healthy tooth structure which affects the integrity of teeth. Presently, there are no well-established guidelines on appropriate criteria and measures required for the repair of defective restorations. On the other hand, a few publications do consider the repair of defective restorations as a justifiable substitute to the replacement (5, 6, 15, 16).

Moreover, in the present literature, the repair of partially lost fissure sealant is an established technique. Repairing restorations could be addressed as a disregarded topic and is yet to be recognized a tooth structure preservation strategy.

Glass ionomer restoratives have been around in the dental profession since 1972. As restoratives, these materials have been employed especially in children as well as in cases where rampant caries is present. These materials are well known to provide many
advantages such as chemical bonding, biocompatibility and fluoride release especially in the presence of fluoride in their environment (18-20). However, these materials have little application in the stress bearing areas due to their poor strength and low fracture resistance (21, 22). Based on these short comings, several attempts had been given to improve their fracture and abrasion resistance. The additions include both inorganic and organic components to glass ionomer restoratives or polyacrylates (23, 24). Organic additives, such as vinyl monomer, have been used to reduce catastrophic failure due to brittleness and improve wear resistance (25).

The present forms of glass ionomer restoratives are glass ionomer restorative materials that are hybrids of both conventional glass ionomer cements and visible light-activated composite resins.

There are studies which have reported contour-loss of existing conventional glass ionomer cervical restorations as a result of their continued mechanical (abrasion) and chemical (erosive) insult (26). While looking into the same problem, several investigators have performed various in vitro researches to repair existing conventional glass ionomer restorations with either like or unlike brand of resin-modified glass ionomer restoratives. Such repairs have shown to be fruitful (27, 28).

Repairing existing glass ionomer restorations may appear to be a good alternative to complete replacement of the restoration which presents no evidence of failure on clinical exam. Therefore, in certain scenarios it may be a wise decision to leave the otherwise healthy restoration (especially in those hard to reach cervical areas) and protect the integrity of the pulp as well as conserve the existing tooth structure by performing minor repairs by addition of either a resin composite, dental amalgam or resin-modified glass ionomer restorative (RM-GIC) patch.

The objective of the current survey was to gain an insight of whether such repairs are being performed and taught in dental curriculum or not. Similarly, this survey demonstrated to be a preliminary evaluation of various academic teaching and practices at dental institutions of Karachi. It also served to evaluate the factors that affect the decision making process behind replacement and/or repair.

Materials and methods:

In the month of June 2010, a second survey in series was conducted regarding the repair of resin modified glass ionomer repair. The first survey was done on the repair of defective resin composite restorations. Likewise to our previous survey, several questionnaires comprising of 11 items each were distributed amongst the faculty members within the restorative dentistry department in all the dental institutions of Karachi. In order to complete the questionnaire, one week was provided to survey respondents after which a reminder was given. After the end of July, no further reminders were given to the faculty members and the forms were collected and analyzed through SPSS version 19.0. Even though this was a survey based study, ethical approval was still sought from the hospital’s ethical review board (REF. 1638-Sur-ERC-10).

Similar to the previous survey regarding the repair resin composite restorations in the dental institutions of Karachi, this questionnaire also requested information regarding participant’s personal experience with resin modified glass ionomer repair procedures, scientific limitations, patient related limiting factors in decision making process and success with such procedures. The questionnaire also sought most valid reason and indications for performing and teaching such repair procedures, existing method of teaching and anticipated life of repaired resin modified glass ionomer restorations.

The responses were calculated as percentages based on the number of faculty members in restorative department and dental institutions in the Karachi who responded. As this study was descriptive in design, therefore, frequency distribution of the entire variables was determined. The mean and standard deviation of all quantitative variables such as age, years in teaching and practice were determined. Furthermore, descriptive analysis was carried out on each variable to study the responses.
Results:

The total number of respondents in this survey was 40. All the respondents were from various dental schools within the city of Karachi, Pakistan. Based on our surveys results, the majority of the respondents (65%) had some form of postgraduate qualification while the remaining 35% of the respondents were lecturers. Out of all the survey respondents, around half of them (52%) were holding a private practice.

Up to 72% of the respondents believed that the repair of resin modified glass ionomer is advisable in certain situations. Furthermore, up to 50% of respondents stated that they have performed such repairs with success. Around 57% of the respondents stated that they teach repair strategies of defective resin modified glass ionomers to their students and the course of instructions is usually in the form of clinical dentistry (52.5%). About 42% of the respondents agreed that the most valid reason for repairing such faulty restorations is preservation of tooth structure followed by increasing the longevity of the defective restoration (15%) and reducing potential harmful effects on the dental pulp (10%). Interestingly, up to 22% of the respondents were unable to choose their legitimate reason (as mentioned in the survey questionnaire) for performing restoration repairs.

Up to 47% of the respondents believed that the new restorative patch added to the existing defective resin modified glass ionomer restoration does provide a leakage free joint. In contrast, 42% of the respondents did not comment on the nature of interface produced between the old and new restoration. Moreover, 35% of the respondents stated that lack of predictability is the main limiting factor in the decision making process to support such reparative procedures followed by lack of scientific evidence and absence of an established technique.

![Fig2. Personal experience of respondents in terms of success with resin-modified glass ionomer repair (n=40).](image)

![Fig3. Academic teaching of repairing defective resin modified glass ionomer restorations to students in dental institutions of Karachi (n=40).](image)

![Fig4. Existing mode of teaching, if being taught (n=40).](image)

![Fig5. Most valid reason for repair as chosen by respondents (n=40).](image)

As selected by the survey respondents, patient’s existing oral hygiene (37%) and occlusal relationship (25%) were the two main clinical considerations which affect the case selection process. On enquiring the anticipated longevity of repaired resin modified glass ionomer restorations, half of the respondents believed it to be a definitive...
measure (32%) which would be semi-permanent while the other half took it as a transitional measure only which would last less than a year.

![Image](image.png)

**Fig 6.** Reasons for not including repair of restorations in formal academic teachings (n=40).

![Image](image.png)

**Fig 7.** Most important factor considered during the decision making process by respondents (n=40).

Based on our results, nine out of ten dental institutions participated in this survey; hence the overall response rate was 90%. The findings of dental institutions in Karachi were similar to the findings of surveys conducted internationally on resin composites (8, 9).

**Discussion:**

In certain scenarios, at times it is necessary to perform direct repair of restorations, including that of resin modified glass ionomer restoratives (especially after its initial placement). The scenarios which call for repair include over-finishing, fracture of the existing restoration, surface voids and under-fillings. A few studies report that in order to perform successful repair of resin modified glass ionomer restoration, it is important to do it in the immediate phase as ageing of this restorative tends to reduce the shear bond strengths between the old and new resin modified glass ionomer’s interface (29). Furthermore, in author’s opinion, it is suggested that some form of surface treatment is carried out in order to remove the salivary pellicle from the existing restoration. This will enhance the bonding between restorations. This surface treatment can be easily achieved by application of pumice slurry or polyacrylic acid.

Similar to our previous survey conducted on the repair of resin composite restoration (17), the rationale to this study was to evaluate whether dental institutions in Karachi are teaching their students to repair resin modified glass ionomer restorations. We were also interested to know the grounds on which it is being taught. Moreover, it also served to evaluate the factors that affect the decision making process behind replacement and/or repair of defective yet otherwise healthy restorations.

As found through this survey, the views behind performing repairs of resin modified glass ionomer restorations is to conserve the existing tooth structure (42%), to increase the longevity of the defective restoration (15%) and to eliminate damaging effects to the pulp (10%). The percentages show the responses chosen be respondents as their legitimate reason for performing repairs. These reasons are similar to the views reported in other internationally conducted surveys on resin composite repair in 2000 and 2001 (8, 9). In addition to this, a few studies have shown preservation of tooth structure when repair have been taken as the form of intervention (12-14).

In our previous survey of repairing resin composite restorations, we found that about 90% agreed to the repair of defective resin composite restorations whereas around 70% of the total respondents stated that they have actually performed such type of interventions and have achieved success (17). In contrast to this, up to 72% of the respondents in this survey believed that repairing resin modified glass ionomer restorations is advisable in certain situations. Additionally, 50% of the respondents stated that that they have performed such repairs with success.

Also, only 57% of the respondents were actually teaching management strategies for salvaging defective resin modified glass ionomer restorations to their students. This was being done in the form of clinical dentistry only (final year of undergraduate dentistry). This would be probably due to the fact that in early stages of undergraduate studies, more focus is given on teaching simple restorations. This is done at theoretical and preclinical levels. Only when the students gain some confidence in performing standard quality restorations; they are...
provided with advance forms of restorative management which would include salvaging existing restorations which show no signs of generalized defects.

Similar to the responses achieved in resin composite survey, the respondents were reluctant to teach repair of restorations to students. As stated by the respondents, lack of predictability, lack of scientific support and absence of an established technique are the main limiting factors in the decision making process to support such reparative procedures. Moreover, 42% of the respondents believe that the interface between the existing and newly added resin modified glass ionomer restoration is not leakage free. Likewise, 32% of the respondents believed that addition of resin modified restoration to an existing restoration is a transitional measure (lasting less than 12 months) while 20% believed that it can be used as a temporary alternative to restoration replacement for only 4 to 6 weeks.

Therefore, it not currently included in the formal academic teaching. In addition to this, up to 60% of the respondents stated that they would include teaching of such procedures in the formal academic teaching in the next 5 years. These findings are different from the views expressed by majority in other surveys where teaching of defective resin composite is included in formal academic teaching. Repairing resin modified glass ionomer restorations for small defects is a justifiable alternative to complete replacement. This is also supported by the evidence which has shown that majority of the defects are localized in nature, for example, secondary caries (1). Definitely, there is a strong need to change the views of faculty members to incorporate the teaching of more conservation approaches into the curricula of dental institutions within Karachi. In order to do so, more scientific evidence is needed to support the cause. Presently, there are not many publications which speak of repairing defective restorations.

We also assessed the level of qualification of our respondents in order to correlate their responses. In our survey, up to 65% of the respondents held some form of advanced qualification. In our opinion, advanced qualification would help the clinician in proper case selection and employing sound management techniques. Although in this survey, we were unable to find any significant differences in opinions between the lecturers and academic clinicians. Other factors chosen by the respondents which may affect the decision making while planning a repair procedure were patient’s existing oral hygiene (37%), and occlusal relationship (25%).

The overall response rate in Karachi city turned out to be 90%. This is parallel to the response rate achieved in our previous survey of repairing resin composite restorations (17). Also, fifteen (100%) of British and Irish dental schools, 24 (75%) of 32 German dental schools and 9 (82%) of 11 Scandinavian dental schools responded to the European survey, for an overall response rate of 83%. Similarly, 52 (81%) of 64 North American dental schools responded to their survey, hence their response rate was 81% (8, 9).

While the response rate in our survey was very high but not much in favor of repair of resin modified glass ionomer restorations (RM-GIC). Besides this, resin modified glass ionomer restorations are not taken as permanent restoratives in dentistry as well which may be a factor in choosing this material for an abutting-restoration. In contrast to this, in our previous survey, the respondents favored repair of resin composite restorations which carry localized defects (17). This may be due to the reason that resin composites tend to have superior bonding ability and provide a wider variety of shade selection as compared to resin modified glass ionomer restorations. Though, a consensus is still lacking in favor of the best repair protocol even for resin composites.

Conversely, the repair of existing restorations is not taken as a legitimate alternative to restoration replacement by some dental schools. In a survey carried out in Europe, more than half (50%) of the German dental schools did not consider repair procedure as a reliable technique especially when secondary caries are present (8). Similar to the previous survey on resin composites (17), we did not ask our respondents the type of material preferred for the repair of resin modified glass ionomer restorations as this may hold a personal preference instead of the material’s evidence based selection.

As mentioned earlier, there is a need for experimental research in order to reach a better consensus for repair versus replacement. Moreover, well-planned researches would also lead us to the best repair protocol, establishment of clinical guidelines and incorporation of an evidence based approach towards our patients. Similarly, it is recommended that the clinicians who are performing such procedures should properly document their cases. In addition, the patients receiving such reparative procedures should be monitored with
well-planned follow-ups for evaluation of treatment outcomes. A limitation to our surveys is that these are at the moment restricted to the views of dental institutions of Karachi only. Therefore, we would recommend that such surveys are conducted at a national level to better understand the views of dental institutions throughout the Pakistan. Furthermore, this would also reflect the dental curricula that are being taught at various places all over Pakistan.

Conclusion:
1. Up to 72% of the respondents believe that the repair of resin modified glass ionomer is advisable and possible in certain scenarios. Moreover, half of the respondents believe that they have achieved success with such interventions.
2. Up to 57% of the respondents teach the repair of defective resin modified glass ionomer restorations when encountered and the present mode of teaching is mainly at the clinical level (52%).
3. The most valid reason for repair is preservation of tooth structure (42%).
4. Patient’s existing oral hygiene and occlusal relationship appeared to be the most important factors in decision making process for repairing existing resin modified glass ionomer restorations.

Similar to the previous survey on the repair of resin composite restorations, this article may serve as a preliminary guide for the clinicians as well as to the students. Furthermore, it would also provide an insight to those who evaluate the dental curricula in the dental institutions of Karachi, Pakistan.

References

Downloaded from www.jrdindia.org - 23 -


