Awareness On Management of Screw Fracture Among Dental Students and Practitioners

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Abstract

Dental implants have been a life-enhancing modality for partially and completely edentulous patients. Implants can successfully support a cemented or screw-retained single crown. However, this modality is not without complications. Despite the high success rate of implants, it is not free of complications and dental implants occasionally fail due to biological factors or technical complications. The technical problems of implant-based restoration components including abutment screw fracture and peri-implantitis are deeply related to dental implant system failure, and an increase in related complications are also being reported. A set of 12 questions was formulated and distributed among the study. The participants were asked to fill the questionnaire. The survey was conducted in an online forum. A total of 100 validated entries were collected. Data was entered into Microsoft Excel and analysed in SPSSV20. Associations between categorical variables were determined using Chi-square. P<0.05 was considered statistically significant. 69.6% of the participants believe that screw loosening is the most common complication in single tooth implant. 57% of the participants responded screw loosening might lead to screw fracture. 50% of the participants responded screw fracture occurs at a rate of 1-5%. 31 of the participants believe management of screw fracture can occur through implant removal and retreatment, fabrication of cemented cast cast and pore, screw fragment retrieval. 82% of the participants are aware about the screw removal kit. Thus awareness on management of screw fracture among dental students and practitioners was established.

Keywords: Screw fracture, screw loosening, abutment, implant, management, innovation

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INTRODUCTION

Dental implants have been a life-enhancing modality for partially and completely edentulous patients. Implants can successfully support a cemented or screw-retained single crown. However, this modality is not without complications[1]. Despite the high success rate of implants, it is not free of complications and dental implants occasionally fail due to biological factors or technical complications[2]. The technical problems of implant-based restoration components including abutment screw fracture and peri-implantitis are deeply related to dental implant system failure, and an increase in related complications are also being reported[3,4]. Technical complications include loss of retention, screw loosening, and fractures of porcelain/framework/screws[5].

Abutment screw fracture is an uncommon (range from 0.5% to 8%) but challenging technical complication in implant-retained restorations and may occur due to bruxism, unfavorable superstructure, overloading, malfunction, premature occlusal contacts, metal fatigue after screw loosening, and com-ponent misfit[6]. Although the medical literature tends to use several terms to refer to adverse problems or their risks, “complication” is still the most widely used term in the literature on dental implants. Using the word "complication" does not automatically imply inaccuracy during treatment planning, execution, or follow-up or a direct negative impact on the patient [7].

The skilful efforts of dental team members (including laboratory technicians) play an essential role in preventing these negative
impacts on the patient, as does the consistent willingness of the patient to adapt to or acknowledge minor deviations from ideal aesthetic appearance, shape or function[8–10]. The osseointegration and the passive fit of the prosthesis determines the success of a dental implant. Implants lack the mobility of the periodontal ligament as it is ankylosed with the bone, and hence distortion or misfit in the implant – abutment interface cannot be accommodated[11]. The compromise in the passive fit with lead to screw fracture, loosening, increases plaque accumulation, occlusal discrepancies resulting in loss of osseointegration and implant failure. Hence implant impression is one of the most important steps in achieving a passive fit by accuracy.

Fracture of the abutment screw can be rare but a disturbing complication of implant prosthetic treatment[12]. The primary reason for screw fracture is undetected screw loosening. Screw loosening can occur due to inadequate tightening, excessive occlusal forces, overloading, fatigue, malocclusion, repeated loosening and retightening of screw, non passive fit of superstructure, parafunctional habits[13,14]. Removal of the fractured abutment screw is a challenging process for the clinician.

Various techniques have been described in literature to retrieve a fractured abutment screw. For screw fractures that occur above the head of the implant, retrieval is relatively easy and can be accomplished using instruments such as explorers, straight probes or hemostats to hold the screw and rotate it out[15][9]. For fractures occurring below the implant head, implant retrieval kits supplied by dental implant companies can be used. Alternatively, methods involving drilling of a hole or slot in the screw and engaging modified self-made screwdrivers or ultrasonic tips have also been described[16,17]. Our team has extensive knowledge and research experience that has translated into high quality publications[18–26],[27–32],[33–38]. The aim of the study is to create awareness on management of screw fracture among dental students and practitioners.

Materials And Methods

This study was carried out in an online setting with the advantage of flexible data retrieved and the disadvantage of statistical error while recording. The questionnaire consisted of 12 questions, and was distributed in the online forum “Survey plant”. The questionnaire was based on screw fracture management among dental students and practitioners. All the data was analysed by multiple logistic and tabulated in MS excel sheet and variables were added and imported to SPSS. Using SPSS Version 20.0, descriptive statistics were carried out and figures were plotted to arrive at final inference.

Results And Discussion

100 participants participated in the survey, they were categorised according to their occupation in which the undergraduate category was 64% and post-graduate category was 34% and the dental practitioners were 2%(Figure 1). In which 35% were males and 65% were females (Figure 2), out of which 70% of them acknowledge that screw loosening is the most common complication for single implant(Figure 3), Most of the population agree frequent screw losing leads to screw fracture which is about 58% (Figure 4). Most of the population is aware that screw fracture occur when prosthesis is under functional cyclic loading which is about 79% (Figure 5). Frequency of screw fracture occur about 51% (Figure 6) and 26% of them responded that the factors associated with screw fracture are screw loosening, inadequate treatment plan and design, component misfit, inadequate screw tightening and excessive loading (Figure 7). 50% agree there is a slight wobble of abutment during functional load and other 59% disagree (Figure 8). Most of the population think that management of screw fracture includes implant removal and re-treatment, fabrication of a cemented cast post and core and screw fragment retrieval which is about 31% (Figure 9). 69% believe that small diameter implants show lower fracture torque and yield strength (Figure 10). 81% of the population are aware of screw removal kits (Figure 11). The most conservative approach in case of screw fracture was to retrieve the broken screw which is about 45% (Figure 12). By comparing gender and frequency of screw fracture 18% of males responded that they are high and 17% responded they are not high. 61% of females responded high. This indicates that females believe the frequency of screw fracture is higher and statistically significant. Chi square test showing P value =0.003 which is found to be statistically significant (Figure 13). By comparing gender and awareness on screw removal kit 25% of males responded that they are aware of the screw removal kit and 10% were not aware about the screw removal kit. 44% of females responded that they are aware about the screw removal kit. This indicates that females are more aware about the screw removal kit than male and statistically significant. Chi-square test showing P value =0.00 which is found to be statistically significant (Figure 14).

Conclusion

From the above study it can be concluded that the majority of the postgraduate students are more aware of screw fracture than the undergraduate students. Thus knowledge and awareness on management of screw fracture should be more established.
among undergraduate students.

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Author contribution

All the authors have equally contributed to the study.

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Conflict of interest

None Declared

REFERENCES


Figure 1: The bar depicts the question “Occupation?” Out of which 64% are undergraduate students and 34% are postgraduate students and 2% are dental practitioners.
Figure 2: The bar depicts the question “Gender?” Out of which 65% are females and 35% are males.

Figure 3: The bar depicts the question “Screw loosening is the most common complication for a single implant?” Out of which 70% responded yes and 30% responded no.

Figure 4: The bar depicts the question “Frequent Screw loosening leads to screw fracture?” Out of which 58% responded yes and 42% responded no.
Figure 5: The bar depicts the question “Is the fracture of Screw occur when prosthesis is under functional cyclic loading?” Out of which 79% responded yes and 21% responded no.

Figure 6: The bar depicts the question “What is the frequency of screw fracture?” Out of which 26% responded 5-10%, 51% responded 1-5% and 23% responded less than 0.5%.

Figure 7: The bar depicts the question “What do you think are the factors associated with screw fracture?” Out of which 26% responded to all of the above which is screw loosening, inadequate treatment plan and design, component misfit, inadequate screw tightening and excessive loading.
Figure 8: The bar depicts the question “There is a slight wobble of Abu during functional load?” Out of which 50% agreed and 50% disagreed.

Figure 9: The bar depicts the question “Management of screw fracture includes?” Out of which 31% responded to all of the above that is implant removal and re-treatment, fabrication of cemented cast post and core and screw fragment retrieval.

Figure 10: The bar depicts the question “Small diameter implants show lower fracture torque and yield strength?” Out of which 69% responded true and 31% responded false.
Figure 11: The bar depicts the question “Are you aware of screw removal kits?” Out of which 81% responded yes and 19% responded no.

Figure 12: The bar depicts the question “What is the most conservative approach in case of screw fracture?” Out of which 45% responded to retrieve the broken screw and 36% responded to remove the entire implant.

Figure 13: Bar chart showing association between gender and frequency of occurrence of screw fracture. X-axis represents gender and Y-axis represents percentage of responses of participants. 12% males and 39% females responded that the frequency range is 1-5% (red). Chi square test showing p=0.003 (p>0.05 indicating statistically significant).
Figure 14: Bar chart showing association between gender and awareness on screw removal kits. X-axis represents gender and Y-axis represents percentage of responses of participants. 16% males and 65% females responded that they are aware of screw removal kits (blue). Chi square test showing p=0.00 (p>0.05 indicating statistically significant).