

ORIGINAL ARTICLE

Knowledge of Female Dental Students of KKU Regarding Pulp Revascularization Treatment

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ABSTRACT

Aim: To assess the knowledge of female dental students of KKU about pulp revascularization procedure.

Methods: A self-administered questionnaire was distributed to female students of 5th and 6th year and to dental interns. Collected data were analysed with descriptive statistics using SPSS (V19).

Results: 137 contributors filled the proforma. Highest percentage of students (35%) considered pulp revascularization as the best treatment for immature necrotic permanent teeth in terms of tooth survival and 45.3% believed to have strongest tooth structure with this procedure as compared to other options. 68.6% of the participants had never attempted this procedure. 53.3% of the students were not sure about the outcome of the treatment. Only 31.4% of the students were aware of need of post and core as a contraindication for procedure. 52.6% participants chose the option of little instrumentation with sodium hypochlorite irrigation for canal cleaning and 27.7% considered CaOH as a best intracanal medicament. According to majority of students (44.5%) continued root development with absence of signs and symptoms were the best indications of successful treatment.

Conclusion: Majority of the students had the knowledge of regenerative endodontics as a viable treatment option for immature permanent teeth with necrotic pulps but were unaware of the details of the procedure and case selection criterion. Students should be given detailed clinical knowledge of this procedure so that in their future clinical practice they consider it among other options either for treatment or do case selection for referrals to specialists.

Keywords: pulp revascularization; knowledge; dental students.

INTRODUCTION

Pulp revascularization is a part of regenerative endodontics and is relatively new development in endodontics.¹ Regenerative endodontics constitutes an innovative approach of the formation of new dental tissues to replace the dead and damaged ones and has been defined as: "biologically based procedures designed to replace damaged structures, including dentin and root structures, as well as cells of the pulp-dentin complex".¹ Revascularization of necrotic immature permanent teeth was initially described in the case reports published by Iwaya et al in 2001 and Banchs and Trope in 2004.^{2,3} These reports made bases for such cases in succeeding years. Basic treatment protocols were later modified by investigators and clinicians, as is evident from different case reports found in literature.⁴ However, no single protocol has been designated as a standard for this procedure and no evidence based guidelines could be formulated.⁴

Revascularization procedure can give promising results in terms of continued root development and regeneration of lost pulp-dentin complex as compared to conventional treatments for necrotic teeth with immature apices.⁵ Though CaOH apexification or MTA barrier techniques have high success rate, chances of root fractures are quite high with these procedures. This could be quite devastating to patients, where restoration of teeth after tooth loss is not possible with implants, because of incomplete jaw growth.⁴

Most of the cases regarding regenerative endodontics have been reported by endodontists.⁶ as it is an emerging field; lot of research is currently in progress about its different aspects like disinfection protocols, scaffolds, growth factors, cellular proliferation etc. Many dentists get its detailed knowledge during post-graduation only.⁷ However, the basic knowledge of regenerative endodontics is part of undergraduate curriculum in different parts of world.⁸ It is important that general dentists should have a basic know how of this treatment option so that instead of attempting conventional treatment therapies, they may choose to go for this treatment modality also or choose suitable patients for referral to endodontist for pulp revascularization procedure.

In college of dentistry, King Khalid University (KKU) regenerative endodontics is a part of endodontic syllabus and is taught to the students of 4th year and 6th year. It is expected that these students should be able to carry out these procedures during internship under the supervision of endodontic staff or be able to consider this treatment option as a practicing dentist in later years in professional life. Many studies have been carried out to seek the level of knowledge and opinion of post graduate students regarding regenerative endodontics.^{7, 9} However, no study has been done to find out the same among the undergraduate students.

So, this study was carried out to see the knowledge of female dental students of KKU regarding different steps of pulp revascularization treatment.

METHODS

Self-administered questionnaire was distributed to the female dental students of levels 9, 10, 11 and 12 (5th year and 6th year students) and tointerns of female dental college of KKU. First section of proforma was about level of education and if the participant had any knowledge of pulp revascularization treatment. Second section constituted different questions regarding pulp revascularization protocol. Students who didn't know about this procedure at all had not to proceed to fill second section. After data collection, statistical analysis was done using descriptive statistics on SPSS (Vol 19).

RESULTS

Total of 156 responses were obtained. 137 out of 156 participants had knowledge of pulp revascularization treatment and proceeded to fill the second section of questionnaire.

117 of these were from students of level 9, 10, 11 and 12 (5th year and 6th year students) and 20 were from dental interns. (Table 1)

Pulp revascularisation option was chosen by highest percentage (35%) of students as a treatment of choice for immature teeth with necrotic pulps (Table 2). This was followed by

CaOH apexification and apical MTA plug (26.3% and 21.9% respectively). Majority of the students (45.3%) believed that pulp revascularization procedure resulted in strongest tooth structure compared to other procedures used to treat immature teeth with necrotic pulps. 68.6% of students had never attempted this procedure. Great percentage of students was not sure about the outcome of attempting pulp revascularization procedure (53.3%) while 26.3% believed it to be a successful procedure. 47.4 % of students believed that it should not be attempted in patients who could not attend dental clinics over longer period of time. 31.4% had a knowledge that future need of post and core for tooth requiring treatment is a contraindication for pup revascularization procedure. Most of the students (52.6%) chose the option of little instrumentation with sodium hypochlorite irrigation as a standard protocol for canal cleaning in this procedure. Most students (27.7%) had the knowledge of CaOH as a best intracanal medicament to disinfect root canal. According to majority of students (44.5%) continued root development with absence of signs and symptoms were the best desirable outcome of pulp revascularization procedure.

Table 1: Number of participants from different levels of BDS

Level of education in dental graduation	n	%
Level 9	32	23.4
Level 10	30	21.9
Level 11	31	22.6
Level 12	24	17.5
Internship	20	14.6

Table 2: Responses about pulp revascularization procedure

In terms of tooth survival what treatment is considered as the best for an immature tooth with necrotic pulp	n	%
A. Apexification with CaOH	36	26.3
B. Apical MTA plug with gutta percha back- fill	30	21.9
C. Root canal treatment with gutta percha obturation	20	14.6
D. Pulp revascularization	48	35
E. Tooth extraction followed by dental implant	3	2.2
Which treatment if successful is believed to result in strongest tooth structure?		
A. Apexification with CaOH	13	9.5
B. Apical MTA plug with gutta percha back- fill	37	27
C. Root canal treatment with gutta percha obturation	25	18.2
D. Pulp revascularization	62	45.3
Have you ever attempted pulp revascularization procedure?		
A. Only once	14	10.2
B. Sometimes	21	15.3
C. Always	08	5.9
D. Never	94	68.6
What is your assessment for pulp revascularization treatment outcomes?		
A. Successful	36	26.3
B. Unsuccessful	28	20.4
C. Not sure	73	53.3
Pulp revascularization procedure is not attempted if:		
A. Apex is very wide open	29	21.2
B. Patient cannot attend dental clinics for multiple visits	65	47.4
C. Patient needs post and core for restoration	43	31.4
During pulp revascularization procedure, cleaning of the root canal is achieved by:		
A. Thorough mechanical preparation	11	8
B. Copious irrigation with sodium hypochlorite	33	24.1
C. Little instrumentation	21	15.3
D. B and C	72	52.6
Which intracanal medicament is considered to be the best for disinfecting canal with necrotic pulp during re-vascularization procedure?		
A. CaOH	38	27.7
B. Triple antibiotic paste	37	27
C. CaOH-chlorhexidine combination	25	18.3
D. Not sure	37	27
What is the best treatment outcome of pulp revascularization procedure?		
A. Radiographic healing of periapical tissues	22	16
B. Absence of signs and symptoms	25	18.3
C. Continued root development	29	21.2
D. B and C	61	44.5

DISCUSSION

In immature teeth with necrotic pulps, simple RCT without the introduction of apical barrier is not suggested because of lack of apical stop against which the obturation could be carried out.¹⁰

Attempting such procedure results in apical leakage of sealer and less well condensed obturation.¹¹ CaOH apexification procedure or introduction of apical MTA plug had been the treatment options to address this problem before the introduction of pulp revascularization procedure.¹² It has been reported that survival rate for teeth that were treated with revascularization was 100% versus 95% for MTA apexification cases and 77.2% for calcium hydroxide apexification cases.¹²

Though the highest percentage of students selected the option of pulp revascularization as a treatment of choice for immature permanent teeth with necrotic pulps but still this percentage was only 35%. Significant number of students believed in carrying out conventional treatments for such cases and selected the options of CaOH apexification, apical MTA plug or just gutta percha obturation. This could be either due to lack of knowledge about the potential problems with these treatment options or having no experience of pulp revascularization procedure.

It has been claimed by the researchers that pulp revascularization procedure results in continued development of root.¹³ This results in closure of previously open apical foramen and increase in thickness of root dentinal walls.⁵ Other endodontic options, though may save the immature tooth with necrotic pulp, but result in tooth structure with very thin dentinal walls that is liable to fracture at any time in the life of the tooth.¹⁴ 45.3% of the respondents believed that pulp revascularization procedure if successful resulted in the strongest tooth structure compared to other endodontic treatment options like CaOH apexification, apical MTA plug or straight away RCT with gutta percha obturation.

Even if dentists don't opt for the regenerative endodontics for immature teeth, it is important to have knowledge of continued development of tooth and stronger tooth structure from this treatment compared to that from other treatments. Lack of knowledge of 54.7% of dental students about it, emphasizes the need for more detailed learning of this relatively new treatment modality.

71.5% of the students had never attempted pulp revascularization procedure. However, rest of the students had attempted it once or more during their training period. This might have been executed under supervision of specialist doctors on selective cases especially in paediatric clinics.

In pulp revascularization procedure, open apex allows for the establishment of regeneration procedure through the migration of cells generated from undifferentiated cells of apical dental papilla.¹⁵ One of the major contraindications to this treatment is severe crown fracture necessitating future need of post and core for restorative procedure.¹⁶ This is because the coronal root canal is filled with MTA or other restorative material in revascularization procedure and the future access to root canal is not possible for any treatment where this space is needed for insertion of post etc.

Only 31.4 % of students considered the factor of future need of post and core for the tooth as a contraindication to start the said treatment. This reflects the lack of knowledge of the rest of the students in this regard and possible improper case selection for treatment or referral in future clinical practice.

Instrumentation is avoided in pulp revascularization procedure to avoid damage to thin dentinal walls and stem cells.¹⁷ Initially scouting file is introduced to see the working length. Necrotic tissue is removed by irrigation with sodium hypochlorite and infection is tried to be controlled by intracanal medicament.¹⁸ Clinicians have either used sodium hypochlorite for canal irrigation or have coupled it with very little instrumentation.¹⁹

Majority of students (52.6%) in this survey believed in using sodium hypochlorite in association with light instrumentation for canal cleansing. 8% of participants still think that through mechanical preparation is indicated in these cases. As this irrigation and disinfection protocol is very important for successful treatment outcome, students and interns must have a sound knowledge regarding this protocol.

Both calcium hydroxide (CaOH) and triple-antibiotic paste (TAP) have been used as intracanal medicament in revascularization cases.²⁰ Though both of these materials have been found to be equally effective, one study shows more increase in root length and its wall thickness with the use of TAP.²¹ However, using it in high concentration results in damage to stem cells. CaOH, however, promotes stem cell survival.²² So either CaOH or low concentration of TAP may be used to control intracanal infection. Majority of students considered CaOH as the best intracanal medicament in the present survey. Choosing this as the best one might be based upon its usage as an intracanal medicament in routine root canal procedures that the students and interns carry out during their clinical training. Chlorhexidine has been found to have detrimental effect on the survival of stem cells and should not be used in regenerative procedures.²³ Choosing this option as a best intracanal medicament by 18.3% of students shows their lack of knowledge.

The treatment outcome can be considered as highly successful if the treated tooth starts responding positively to vitality testing along with its continued root development.²⁴ However, these objectives have not been achieved in all the cases reported to date. Therefore, absence of signs and symptoms and peri apical healing are the factors still considered sufficient to describe the case as successful.²⁴ In different case reports, the success rate based on the criterion of peri apical healing of tissues is described to range between 90 to 100 percent after regenerative endodontic procedures.²⁵

It is important to know about success criteria and success rate of any treatment for considering that treatment option in clinical practice. In the present survey, 53% of students were not sure if revascularization treatment resulted in positive results or not. 26% of students believed it to be a treatment with positive outcome. Majority of the students considered the continued root development and absence of signs and symptoms as the most desirable treatment outcome. This shows some awareness about the regenerative endodontics.

CONCLUSION

Majority of the students had the knowledge of regenerative endodontics as a viable treatment option for immature permanent teeth with necrotic pulps but were unaware of the details of the procedure, case selection criterion and possible outcomes of the procedure.

Students should be given detailed clinical knowledge of this relatively newer field in dentistry so that in their future clinical practice they consider it among other treatment options and be able to do proper case selection and referral to specialists.

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