

WHAT DO PRACTITIONERS HAVE TO SAY ABOUT REGENERATIVE ENDODONTICS? A SURVEY AT DR ISHRAT-UL-IBAD KHAN INSTITUTE OF ORAL HEALTH SCIENCES (DIKIOHS)

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ABSTRACT:

Introduction: The success of regenerative endodontics procedures requires practitioner's acceptance, but little or no evidence is available. This survey was conducted to know the opinion of practitioners at DIKIOHS towards regenerative endodontic procedures (REP).

Methods: 50 completed surveys were collected. The survey results showed that (93%) of the practitioners were agreed to the fact that more regenerative therapies should be incorporated into dentistry.

Result: In the opinion of 63% contestant's stem cell banking would be useful to regenerate dental tissues. 91% wants to save dental tissue n teeth through stem cell banking. The outcome of this survey suggests that endodontic practitioners are positive n supportive about future use of REPs.

Key Words: Dentine, pulp, stem cells, tissue engineering.

INTRODUCTION

There are very limited or no guidelines available related to REPs and on the use of stem cells in dental treatment. In our part of the world it is a cause of concern because dentists, researchers and general public could be unsure or unaware about the ethical boundaries that should be applied to regenerative and stem cell therapies. The term regenerative endodontics is referred as creation and delivering newly formed pulp or replacement of diseased, missing or traumatized pulp.^[1] The ethics and code of dental professional conduct needed to be updated to include guidance on controversial newer treatments n technologies, such as use



of stem cell therapies. It is necessary to update the ethics and code of professional conduct in order to maintain the self-respect of the dental professional and the patient we serve ^[2]. Potential technologies for regenerative endodontics include root canal revascularization, post natal stem cell therapy, pulp implant, scaffold implant, three dimensional cell printing, injectable scaffold and gene therapy. In order to establish ethical guidelines, it is necessary to survey the practicing endodontics about their view over REPs. The first evaluation of REPs defined them as biologically based measures deigned to predictably replace damaged, diseased or missing structures including dentine root structures as well as cells of

pulp dentine complex, with live viable tissue preferably of the same origin, that restore the normal physiologic function of the pulp dentine complex [3]. The term REP includes all treatments and procedures that accomplish pulp dentine regeneration from the simplest blood clot revascularisation method to the most intricate treatment by performing an extension of conventional root canal treatment which involve creating tissue engineered dental pulp constructed in the laboratory and implanting them into clean and shaped canal [4,5,6,7]. By employing stem cells, growth factors, three dimension tissue engineering scaffolds and tissue culture method we can perform tissue engineering [8]. Source of these stem cells, tissues, or DNA from donated teeth, blood or bone marrow is still controversial. The most ethical REPs may involve the use of patient's own cells or body tissues. It is important to understand the attitude of endodontic community towards this new dimension of treatment. The endodontist will be the first providers of REPs, they will guide n inform the patients about the new procedures. The aim of this survey is to know the opinions of endodontists towards REPs and to create the ethical guidelines and to assess the potential acceptance of REPs among endodontists.

MATERIAL AND METHODS

50 copies of questionnaire were distributed at DIKIOHS amongst residents, endodontists and general practioners, there were three parts, part

A consisted of dentist's professionals' status. Part B asked questions about the dentist's views, beliefs and judgments regarding the use of REPs and Part C included questions based on current endodontic practice. The Questionnaire consisted of 23 questions. The data was analysed by the number of responses as a percentage of the total responses to gain an understanding into the majority opinions of the participants.

RESULT

The completed questionnaire were collected from 23 residents, 7 endodontists and 20 general dentists at DIKIOHS. Some participants gave more than one reply to each question or did not reply to each question. The questionnaire results are shown in table 1.

TABLE 1. Survey of the practioners toward Regenerative Dental Treatments

A. Professional status:

1. Which is your field in dentistry?
 - a. Endodontists (n = 7)
 - b. Post graduate resident (n=23)
 - c. General Practitioner (n = 20)
2. How many years have you been in practice?
 - a. 0- 10 years 69.9%
 - b. 11-20 years 29.1%
 - c. More than 20 years 5%
3. Where is your primary place of practice located?
 - a. Rural 0%
 - b. Urban 68.9%
 - c. Suburban 0%
 - d. Academic environment 31.1%
 - e. Military 0%

4. Gender?
a. Male 64.6%
b. Female 35.4%
5. What is your age group?
a. 25-35 years 66.3%
b. 36-45 years 33.7%
c. 46-55 years 0%
d. 56 or more 0%
6. How frequently do you read scientific dental journals?
a. Every week 77.8%
b. Every year 22.7%
c. within the past 5 years 0%
d. Never 0%
7. Have you ever received continued education in stem cells and/or regenerative dental treatments?
a. Yes 12.4%
b. No 87.6%
- B. Ethical opinions, beliefs and judgment:**
8. Should regenerative therapy be incorporated into dentistry?
a. Yes 96.4%
b. No 0%
c. Maybe 3.6%
9. Do you think that dental stem cell banking will be useful to be able to regenerate dental tissues?
a. Yes 96.4%
b. No 0%
c. Unsure 3.6%
10. How many years do you think it will take for some regenerative stem cell therapies to be used in dentistry?
a. 0-10 years 83.6%
b. 11-20 years 10.2%
c. More than 21 years 6.2%

11. How many years do you think it will take before dentists are able to implant new teeth grown in a laboratory?
a. 0-10 years 36.8%
b. 11-20 years 55.1%
c. More than 21 years 8.1%
12. Would you be willing to attend a training course and/or continuing education courses to apply regenerative dental treatments?
a. Yes 90.9%
b. No 0%
c. Unsure 9.1%
13. What do you think would be the biggest obstacle to a patient accepting regenerative dental treatment?
a. Higher cost 58.2%
b. Fear of stem cells 30.9%
c. Other reasons 10.9%
14. Would you be willing to save teeth and dental tissue for future regenerative dental treatment?
a. Yes 84.5%
b. No 0%
c. Unsure 15.5%
15. Do you think that regenerative dental treatment will be a better treatment option than tooth implant placement?
a. Yes 63%
b. No 3.7%
c. Unsure 33.3%
- C. Clinical practice:**
16. Do you use any type of regenerative procedures in your practice, such as membranes, scaffolds or bioactive materials?
a. Yes 59.1%
b. No 40.9%

17. What is your assessment of regenerative dental treatment outcomes?

- a. Successful 41.4%
- b. Unsuccessful 3.5%
- c. Don't know 55.1%

18. After nonsurgical root canal treatment, would the healing of periapical tissues be enhanced by tissue engineering?

- a. Yes 31.5%
- b. No 1.8%
- c. Don't know 66.7%

19. Which of the following regenerative endodontic treatments is the most valuable?

- a. Healing of periradicular bone 3.2%
- b. Continued root development in immature teeth 20.6%
- c. Pulp tissue revitalization within a root canal 6.4%
- d. Tooth re-implantation 6.4%
- e. All of the above 63.4%

20. What percentage of cases in your practice involves necrotic immature teeth?

- a. Less than 10% 90.7%
- b. 11%-25% 9.3%
- c. 26%-50% 0%
- d. More than 50% 0%

21. What percentage of cases in your practice involves avulsed or traumatized teeth?

- a. Less than 10% 98.1%
- b. 11%-25% 1.9%
- c. 26%-50% 0%
- d. More than 50% 0%

22. What percentage of cases in your practice involves periradicular lesions?

- a. Less than 10% 0%

b. 11-25% 0%

c. 26%-50% 52.7%

d. More than 50% 47.3%

23. What do you consider to be the optimal treatment for necrotic immature teeth?

- a. Calcium hydroxide apexification 0%
- b. Calcium hydroxide application followed by MTA apical plug and backfilling with obturation material 47.7%
- c. MTA apical plug and back-fill with obturation material 24.6%
- d. Tribiotic paste and pulpal regeneration 27.7%

A-Professional status

Male participants were 64.6%, majority of the contestants were older than 25-35 years of age 66.3%, and most participants had at least 10 years of experience 65.9%. Most of them were practicing in urban areas 68.9%. Most of them do scientific journals reading every week 77.8%. Only few contestants had received continue education in stem cell or regenerative dental treatments 12.4%.

B-Ethical Options, beliefs and judgments

The majority of contestants thought that regenerative treatment should be incorporated into dentistry 96.4%. Almost all of the contestants 93.6% thought that the stem cell banking will be beneficial to regenerate dental tissues. More than two third of the contestants 83.6% also thought that regenerative stem cell treatments will be used in dentistry within next 10 years.

Half of the contestants 55.5% believe that in the next 11-20 years it will be possible to implant newly grown teeth in laboratory. 90.9% contestants were willing to attend training in REPs. Higher cost 58.2% and a fear of stem cell therapy 30.9% will be the biggest hurdle to patients accepting REPs. The majority of the practitioners 84.5% agreed to save teeth and dental tissue for use as a part of future REPs. REPs will be more successful treatment than implant that's what more than half of the practitioners thought 63%, others were unsure 33.3% and a few contestants 3.7% thought that implant will still be the better option.

C-Clinical Practice

59.1% practitioners were already doing some type of regenerative procedures, such as membranes, scaffolds, bioactive materials and revascularisation in their practice and others 40.9% have not yet used any regenerative treatment. Most of them 55.1% were unsure about the result of regenerative treatment, 3.5% said regenerative treatment will be unsuccessful and the remaining 41.4% thought that regenerative treatment will be successful. Two third of the practitioners 66.7% didn't know if the healing of peri-apical tissues could be enhanced by tissue engineering other 31.5% thought positive about peri-apical healing via tissue engineering except for one 1.8%. 22.6% regarded the most valuable application of REPs to be for the continued root formation in young immature teeth. 8.4% agreed that this treatment option could be used for pulp

tissue revascularisation within a root canal. Four 8.4% practitioners thought that REPs could be used to re implant avulsed teeth, and two 4.2% considered that REPs could use to heal peri radicular bone. Remaining 21 practitioners considered that REPs could be applied to root development, pulp revitalization and reimplanting avulsed teeth and to heal peri radicular bone 56.4%. The majority reported that necrotic immature teeth accounted for more than 10% of cases in their clinic 90.7%. The majority of the practitioners also reported that avulsed or traumatized come to their practices are less than 10% (95.1%). Peri radicular lesion are between 26%-50% of the cases presented in their practices 52.7%. Majority 47.7% thought that the optimal treatment for immature necrotic teeth is application of calcium hydro-oxide followed by MTA plug and back filling with obturation material. Only 27.7% considered application of tri biotic paste and pulpal regeneration to be the optimal treatment for necrotic immature teeth.

DISCUSSION

The purpose of this survey is to see the vision of endodontic practitioners to REPs and stem cell therapy. From this survey it is evident that endodontists are eager in the treatment expansion and are concerned in the procedures that rejuvenate tooth structure. Stem cell treatments and regenerative treatments have been under improvement since

human embryonic stem cell lines were first secluded more than epoch ago^[9].

Over the period of time many articles and research papers were published in scientific journals related to REPs and stem cell therapies^[10], hence it shows that clinicians are enthusiastic about new treatment modalities related to REPs. Stem cells found in the pulp of secondary and deciduous dentition raised the captivating possibility of taking dental pulp stem cells for tissue engineering^[11]. New progresses in the identification and characterization of dental stem cells, and in dental tissue-engineering approaches, suggests that in coming ten years bioengineering methodologies may efficaciously be used to regenerate dental tissues and whole teeth^[12]. In order for this tactic to reach clinical relevance in human, passable interest and information backed by research amongst the service providers is the prime essential. This survey was hence conducted to gather information about the level of alertness, knowledge and current clinical status about stem cell remedies and REP's amongst the endodontic residents of our institute. The survey disclosed a very keen response from the residents and endodontists. More than two third of participants were positive about its use in dentistry in the coming years, and nearly one third felt this new methodology would be successful to the level of likelihood of implanting laboratory grown teeth. This encouraging response could be due to the recent outpouring in public

discussions on this topic through various mediums including an increase in tissue engineering articles issued in scientific journals, talks built on stem cell therapies and news leading dental and medical tribunals^[13, 14].

Most contestants were willing to save teeth and dental tissues through REP's and favoured it over implants as a treatment option. However, almost all sensed a need to attend training in REP's, imitating an underlying lack of know how. Many of respondents another prerequisite to carry out REP's would be proper ethical parameter by the corresponding professional associations. Epelman *et al.* in their study also focused on the significance of such protocols to come in place^[15]. For REP's to become the mainstay of treatment strategies a solid research backing is necessary. REP's should be priced such that it is equally affordable to patients as other standard techniques.

In clinical practices, almost half of the contestants were doing some type of REP's, with a bulk of these limited to use of membranes, scaffolds or bioactive materials. Most of the contestants were aware of other REP processes but were unsure about its effects. Half of them were of the opinion that REP's could be used in various uses like healing of periradicular bone, continued root development in undeveloped teeth, pulp tissue regeneration within a root canal and tooth re-implantation. However, only one eighth contestants have found regenerative procedures valuable in

treating necrotic undeveloped teeth which constituted 20% of patients reporting to them. About half of the contestants still consider the application of calcium hydroxide followed by MTA apical plug and backfilling with obturation material to be the best cure for necrotic undeveloped teeth. This gives an insight to the fact that the contestants are not skilled in carrying out advanced regenerative endodontic procedures. There is a requirement for enduring education and training programs associated to all treatment that accomplish pulp-dentin regeneration from the simplest blood clot revascularization technique to the most advance treatment, which holds tissue-engineered dental pulp created in the laboratory and implanting them into cleaned and shaped root canals.

CONCLUSION

With the help of this survey we have got positive responses n attitude from the contestants about REPs. The pioneering nature of this survey prevented comparisons with the opinions, beliefs and attitude of the endodontists and other health care providers. To determine ethical guidelines more survey and researches are needed to be done and to assess the potential reception and limitations of delivering stem cell treatments to patient. It appears necessary to form ethical guidelines for the use of REPs.

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