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Cognizance of dentists regarding guided bone regeneration in treatment of dental implant cases

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Abstract

Guided Bone Regeneration (GBR) in this era plays an essential role in the regeneration of sufficient bone for the success of implant therapy. It is a surgical procedure which makes use of various grafts i.e. autogenous bone grafts, allografts and also membranes which prevent the epithelial migration into the area of interest. Successful Guided Bone Regeneration depends mainly on the following biologic principles i.e. wound closure by primary intention, new blood vessel formation, space formation/preservation, and strength of both the initial blood clot and implant unit.

Objective: To assess the awareness of guided bone regeneration among dentists.

Material and Methods: A self-administered questionnaire was circulated among postgraduate students, dentists of our institute and various dental colleges and private practitioners in the Delhi-NCR region, the sample size chosen was 400. The respondents were asked 16 questions out of which 6 questions were based on their general information and 10 questions were asked to assess their awareness for the Guided Bone Regeneration procedure.

Results: Based on the results of this study, it was seen that the awareness of Guided Bone Regeneration procedures amongst dentists still needs to be updated. The majority of the respondents though having performed the procedure, still lack comprehensive knowledge of guided bone regeneration and were oblivious of the benefits of guided bone regeneration.

Conclusion: Guided Bone Regeneration should be carefully understood and performed in implant cases wherever indicated so as to benefit the community by increasing the success rate of dental implants.

Key Message: Prediction of the regeneration of bone necessitates a high level of manual dexterity, meticulous knowledge of principles of wound healing and indications and contraindications for the procedure. Further understanding, professional training and courses in this subject shall enhance the quality of implant placement and play a pivotal role for a better and consolidated plan for guided bone regeneration.

Keywords: Awareness, barrier membrane, dental implants, guided bone regeneration, osteogenic

Introduction

Bone is composed of one-third of organic matrix mainly collagen and non-collagenous protein and two third of inorganic matter i.e. minerals like calcium, and phosphate along with hydroxyl, and carbonate ions^[1]. The bone makeup is deliberated in such a way that it is able to impart physical properties that help in load resistance and safeguard and support delicate body organs and parts.

Various changes in the pattern and dimensions of the trabeculae of cancellous bone due to the forces which are transferred to the jaw during teeth activities. Due to physiologic forces acting on the tooth, the alveolar process is constantly undergoing remodelling. Tooth structure loss due to any cause (physiologic, pathologic, traumatic, extraction etc) may result in obliteration of the parts of periodontium and bone, largely the alveolar ridge undergoes major dimensional changes, referred to as “disuse atrophy”^[2].

Some studies clearly show that the edentulous site i.e. with no teeth, reduces in all dimensions. Simultaneously there occurs adaptive alteration in the gingival tissue in relation to the extraction site that clinically may show as deformations of the jaw. Bringing back the original form of the alveolar process is necessary for both functional and aesthetic recovery; if the edentulous site is to be treated with implant-supported prosthesis.

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Thus, it necessitates the restoration of dimensions of the same [3, 4]. Bone remodelling entails the consolidative activity of localized tissues and viable cells, which in turn lay out itself to accommodate various types of bone grafts, planned to restore the lost or damaged bone. Many techniques are being carried out for bone regeneration for over years which include tissue engineering, guided bone regeneration, distraction osteogenesis, and bone grafting etc [2].

Guided Bone Regeneration (GBR) in this era plays an essential role in the regeneration of sufficient bone for the success of implant therapy. It is a surgical procedure which makes use of various grafts i.e. autogenous bone grafts, allografts and also membranes which prevent the epithelial migration into the area of interest. New blood vessel formation i.e. angiogenesis and abundant blood supply plays a critical role in the regeneration of bone at the site of the defect [5]. Osseous regeneration by guided bone regeneration relies on the relocation of bone-forming cells to the bone defect site and the prohibition of cells which will hinder the formation of bone [6-8]. GBR is based on the pioneering studies of compartmentalized wound healing developed in the 1980s [9-12]. It has been shown in animal and human studies [13-15] that when a barrier membrane is placed over a bony defect, it restrains the epithelial and connective tissue from entering the wound and improves the quality of the regenerated bone.

Research Question

Nowadays placement of Dental Implants is a widespread procedure performed by various dentists. But sometimes it becomes a challenge to place dental implants in bone deficit sites. For this, dentist has to perform a Guided Bone Regeneration procedure wherever required. Performing GBR procedures is a specialised domain. The untrained clinician cannot perform this procedure. So it is highly recommended that clinicians must be well versed with it otherwise it will cause great damage to the patient community.

Keeping this very fact in mind this study was designed to check the awareness level of the dentists about GBR procedure's negative impact in the "Need and Demand" of GBR. Thus it was considered to study:

1. Whether the dentists are aware of the Guided Bone Regeneration procedure?
2. Whether the dentists have proper skills and Procedure knowledge?
3. Whether the dentists are aware of the latest graft material available commercially?

Material and Methods

A self-administered questionnaire (Annexure-I) was circulated among the postgraduate students, dentists of our institute and

various other dental colleges and private practitioners in the Delhi-NCR region, the sample size chosen was 400. The respondents were asked 16 questions out of which 6 questions were based on their general information and 10 questions were asked to assess their awareness for the guided bone regeneration procedure. The questions were related to the number of surgeries, in-depth knowledge and confidence levels for the technique. The responses from dentists were collected and the results were prepared and presented in bar charts.

Inclusion Criteria: Postgraduate students and dentists who were placing implants frequently in their patients were included in the study.

Exclusion Criteria: Postgraduate students and dentists who were not placing implants were excluded from the study.

Results

The results for this research survey were presented in tabular form based on the data that was collected from 400 dentists (Table-1) from various dental colleges and private practitioners in the Delhi-NCR region.

42% of respondents have performed a Guided bone regeneration procedure whereas the remaining 58% stated that they haven't performed GBR. 60% of respondents have assisted GBR procedure while the remaining 40% stated that they haven't assisted with the procedure. According to the data collected, 23% of respondents had done GBR in cases ranging 1-5, 17% of respondents had done GBR in cases ranging 6-10, and 5% of respondents had done GBR in cases ranging from 11-15. Also, 55% of the respondents answered NIL to the number of GBR procedures performed. 31% of respondents were confident about performing the GBR procedure while the remaining 69% stated that they were not confident of performing the procedure. 45% of the respondents had less than 25% knowledge for GBR, 30% of the respondents had knowledge between 25-50%, 20% of the respondents had knowledge between 50-75% and only 5% of respondents had more than 75% of knowledge for GBR. 83% of respondents were aware of the graft available commercially and the remaining 17% were unaware of the grafts available commercially. 40% of the respondents have used the barrier membrane for the GBR procedure and the remaining 60% haven't used the barrier membrane for the GBR procedure. Out of the 400 respondents, 79% of respondents have not harvested autogenous bone from intra-oral sites. Only 21% of respondents harvested autogenous bone from intraoral sites.

Table 1: Questionnaire Analysis

S. No.	Question	Response
1.	Have you performed Guided Bone Regeneration procedure?	
	a) Performed	184
	b) Not Performed	216
2.	Have you assisted with the Guided Bone Regeneration procedure?	
	a) Assisted	120
	b) Not Assisted	180
3.	How many GBRs have you performed?	
	a) 1-5	92
	b) 6-10	68
	c) 11-15	20
	d) NIL	220
4.	Are you confident of performing GBR?	
	a) Confident	162
	b) Not Confident	238

5.	Depth of Knowledge you have in GBR procedure?	
	a) < 25%	180
	b) 25-50%	120
	c) 50-75%	80
	d) >75%	20
6.	Are you aware of the different types of grafts available commercially?	
	a) Aware	266
	b) Not Aware	134
7.	Have you ever used a barrier membrane for GBR Before?	
	a) Used Barrier Membrane	180
	b) Not Used Barrier Membrane	220
8.	Have you ever harvested autogenous bone from intraoral sites e.g.: Ramus, Symphysis for GBR?	
	a) Harvested	142
	b) Not Harvested	258
9.	Have you ever tried to perform ridge preservation for future implant placement?	
	a) Tried	156
	b) Not Tried	244
10.	Have you undertaken professional training or attended courses or classes on Guided Bone Regeneration?	
	a) Undertaken Training	134
	b) Not undertaken training	266

Annexure-I

This is a Questionnaire to evaluate the awareness of Guided Bone Regeneration among dental surgeons. Self-assessment for awareness of GBR.

1. Name: _____ Optional *

2. Gender

- a) Male
b) Female

3. Level of Education.

- a) B.DS. (Bachelor of Dental Surgery)
b) Postgraduate Student
c) M.D.S (Master of Dental Surgery)

4. Are you practicing in a college set up or are you into private practice? -----

5. If in College, kindly specify the name of the college.

6. If the Postgraduate select your Specialization Field

- a) Oral Medicine & Radiology
b) Conservative Dentistry and Endodontics
c) Public Health Dentistry
d) Periodontology
e) Oral & Maxillofacial Surgery
f) Prosthodontics and Crown & Bridge
g) Pedodontics and Preventive Dentistry
h) Orthodontics & Dentofacial Orthopaedics
i) Oral Pathology & Microbiology

7. Have you performed Guided Bone Regeneration procedure?

- a) Performed
b) Not performed

8. Have you assisted with the Guided Bone Regeneration procedure?

- a) Assisted
b) Not Assisted

9. How many GBRs have you performed?

- a) 1-4
b) 6-10
c) 11-15
d) NIL

10. Are you confident of performing GBR?

- a) Confident
b) Not Confident

11. Depth of knowledge you have in GBR?

- a) < 25%
b) 25-50%
c) 50-75%
d) > 75%

12. Are you aware of the different types of graft materials available commercially?

- a) Aware
b) Not aware

13. Have you ever used barrier membranes for GBR before?

- a) Used barrier membranes
b) Not used barrier membranes

14. Have you ever harvested autogenous bone from intraoral sites e.g. Ramus, or Symphysis for GBR?

- a) Harvested
b) Not harvested

15. Have you ever tried to perform ridge preservation/ ridge expansion for future implant placement?

- a) Tried
b) Not tried

16. Have you undertaken professional training or attended courses or classes on guided bone regeneration?

- a) Undertaken training
b) Not undertaken training

Ridge preservation or ridge expansion for future implant placement was performed by only 28% of respondents and the remaining 72% of respondents haven't performed ridge preservation. As per the responses to the questionnaire, 17% of respondents have undertaken professional training or attended courses or classes on GBR and the remaining 83% haven't undertaken any training or courses for the same.

Discussion

Guided tissue or bone regeneration is based on the idea in specific cells contribute to the development of specific

tissues. Melcher described the concept of selective cell re-population of defects to enhance healing ^[16]. It has been hypothesized that prohibiting the unwanted cells from occupying the wound area with a barrier membrane and by flavouring the reproduction of particular tissue cells to acquire wound healing with a desired type of tissue manifests a new connective tissue attachment and cementum formation which leads to the formation of periodontal ligament cells in the wound area ^[17].

Successful Guided Bone Regeneration depends mainly on the following biologic principles i.e. wound closure by primary intention, new blood vessel formation, space formation/preservation, and strength of both the initial blood clot and implant unit. Primary closure leads to an undisturbed wound healing and angiogenesis offers critical blood supply and undifferentiated mesenchymal cells ^[18].

The results of the study clearly revealed that the awareness of Guided Bone Regeneration procedures amongst dentists still needs to be updated. The majority of the respondents though having performed the procedure, still lack the comprehensive knowledge of guided bone regeneration and were oblivious of the benefits of guided bone regeneration.

The data which has been provided by the Oral Surgeons Association have shown that more than 60% of the middle-aged people have lost at least one permanent tooth due to various dental reasons like tooth trauma, failed dental treatment, periodontitis etc. And more than 20% of adults in old age have lost almost all permanent teeth ^[19]. The statistics reveal an increased demand and usage of dental implants being placed which is more than one lakh which almost equates to the hip and knee joint placed per year ^[20]. As per the data suggests there has been a great rise in the popularity of Dental implant therapy in dental educational institutes and private practice. But many cases of implant therapy may pose a challenge due to alveolar bone deficiencies which may require regenerative procedures. Keeping in mind that not all the patients are ideal candidates for implant placement, one should be thorough with the depth of knowledge of current regenerative techniques.

Based on the results of the study, though performed GBR only 5% of respondents had more than 75% of the depth of knowledge for GBR and the remaining had less than 75% knowledge about the same. Most of the respondents who performed GBR were also not confident since they also had performed GBR in very few cases, anywhere in between 1-15. Lack of adequate knowledge and clinical practice of the procedure may definitely jeopardize the success rate of implant therapy.

There were large number of respondents who were aware of the commercially available grafts but the majority of them were not confident enough to perform the Guided Bone Regeneration procedure. Also, most of the participants in the study responded positively to the use of barrier membranes but also the majority of them have not harvested bone from the intraoral sites e.g.: Ramus, and Symphysis. The reason for not harvesting bone from the intraoral site could be the inappropriate knowledge of the location of the important adjacent anatomical structure which may lead to various complications e.g.: Nerve damage ^[21], lack of specialized training and lack of infrastructure. To avoid this, one should ensure adequate knowledge and training regarding oral anatomy and the prevention and treatment of complications. The decrease in the incidence of complications and increase in certainty of bone augmentation could be achieved with the introduction of new biomaterials and adherence to the proven

clinical protocols ^[22].

Nowadays, it has been noticed that there is an increase in knowledge of the advantages of dental implants in the community. The Dentists placing implants in the patients should definitely know the pros and cons of the procedure. They should be thorough with the indications and contraindications of the therapy or else it may lead to Implant Failure and will put a negative impact on the community. So, the dentists should analyse the strategies put in place to minimize the negative impacts and maximize the positive impacts. Guided Bone Regeneration can only be sustainable if it is carefully managed and performed so the negative impact on the community can be avoided. One should know why to perform, how to perform and when to perform Guided Bone Regeneration. Dentists around the world should be geared up and prepared to help the community in attaining the finest aesthetics for teeth with the most recent awareness of the techniques which augment the bone for future implant placement ^[23].

Conclusion

Nowadays, there is a superfluity of diverse techniques to regenerate the 'insufficient' bone dimensions which encompasses various grafts i.e. autogenous bone grafts, allografts placement, connective tissue grafts, growth factors etc. Looking at the clinical scenario, it is often tough to envisage the efficiency of ridge augmentation procedures using various membranes and grafts. Implant placement is nowadays frequently practised and will definitely gear up in the coming times. Keeping in mind the current scenario of the rising popularity of implants, the dental professionals must be well-versed to deal with the implant-related complications and failures which will affect the success rate of implant therapy. Prediction of the regeneration of bone necessitates a high level of manual dexterity, meticulous knowledge of principles of wound healing and indications and contraindications for the procedure. Further understanding, professional training and courses in this subject shall enhance the quality of implant placement and play a pivotal role for better and consolidated plan for guided bone regeneration. Dentists of Society should think harmoniously and act unitedly for the welfare of the society.

Conflict of Interest

Not available

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