

Research Article

A Survey of the Professional Opinions of Dentists in Kuwait in the Use of Periodontal Regenerative Surgical Procedures for the Treatment of Infra Bony and Localized Gingival Defects

Abdulwahab A, Chatzopoulou D and Gillam DG*

The London School of Medicine and Dentistry, Queen Mary University of London, UK

***Corresponding author:** Gillam DG, Institute of Dentistry Bart's and The London School of Medicine and Dentistry, Queen Mary University of London, Turner Street, London E1 2AD, UK**Received:** September 14, 2018; **Accepted:** October 11, 2018; **Published:** October 18, 2018**Abstract**

Aim: This questionnaire-based study evaluated the attitude and knowledge of periodontal regeneration procedures by Kuwaiti dentists. Furthermore, the study aimed to validate the results of a previous cross-sectional postal questionnaire conducted by Siaili et al., [1], based on UK-based dentists with a specialty or a special interest in periodontology.

Material and Methods: A cross-sectional questionnaire was completed involving 31 questionnaires and conducted from Kuwaiti dentists by e-mail (pilot phase) together with the 98 Kuwaiti-based dentists (main phase). The questionnaire consisted of 21 questions involving both multiple choices answers and open-ended or dichotomous options and was divided in two broad sections addressing: 1) the general profile of dentists and 2) their preferences regarding the management of intrabony, interradicular and marginal tissue recession defects together with their opinions on smoking and use of antibiotics in regeneration procedures. Data were analyzed and entered using SPSS version 21 (IBM UK, Guildford) and frequency tables constructed, any associations between the variables were tested at the 5% level significance ($p \leq 0.05$).

Results: Kuwaiti Dentists (M 90: F 39; mean age: 35.7 ± 7.2 years) completed 129 questionnaires. The use of guided tissue regeneration procedures with absorbable membranes was the most popular option for the regeneration of intrabony defects. The use of connective tissue grafts and coronally advanced flaps were the most frequently chosen treatment modalities for root coverage procedures. A reasonable level of participants using special flap techniques for regenerative procedures was also reported. 90.4% of respondents prescribed antibiotics of which Amoxicillin /Metronidazole (33.6%) was the most reported. 73.4% of the participants did not consider smoking to be a contraindication for periodontal regeneration procedures.

Conclusion: The results from the present study would suggest that Kuwaiti dentists were aware of current innovations in periodontal regeneration, however there were conflicting responses regarding the exclusion criteria of smokers prior to the regenerative procedure and the prescription of post-operative antibiotics following regenerative procedures compared with the evidence from the published literature. The use animal-derived materials for regenerative procedures was not acceptable to most of the participants in the study.

Keywords: Questionnaire-based study; Interest; Preferences; Periodontal regeneration; Treatment

Introduction

According to Siaili et al., [1] reconstructive periodontal surgery is one of the most dynamic therapeutic procedures in periodontology and yet, the ultimate goal of regeneration of the periodontal supporting tissues remains unpredictable and challenging. Several treatment modalities have been introduced by clinicians for both intra-bony and root coverage procedures although the predictability of the root coverage depends on several factors, which should be modified and corrected before undertaking any surgical procedure

[2-5]. The choice of whether to include regenerative materials, is therefore important as well as the type of surgical procedure to enable complete root coverage. According to Chambrone et al., [6-8] the Sub-Epithelial Connective Tissue Grafts (SCTG) procedure was considered the most predictable and efficient treatment for complete root coverage. Coronally Advanced Flap (CAF) with or without use of Enamel Matrix Derivatives (EMD) and Free Gingival Graft (FGG) procedures however also show a high success rate in root coverage [9-11]. A previous cross-sectional postal survey by Siaili et al., [1],

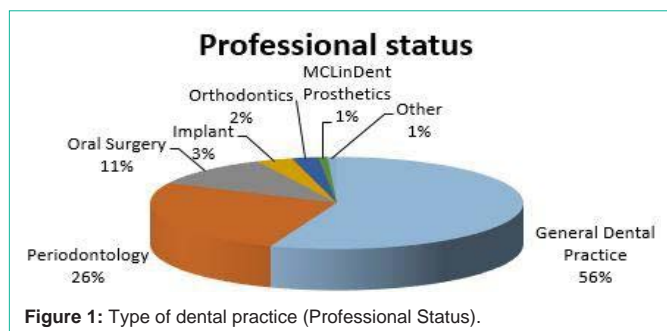


Figure 1: Type of dental practice (Professional Status).

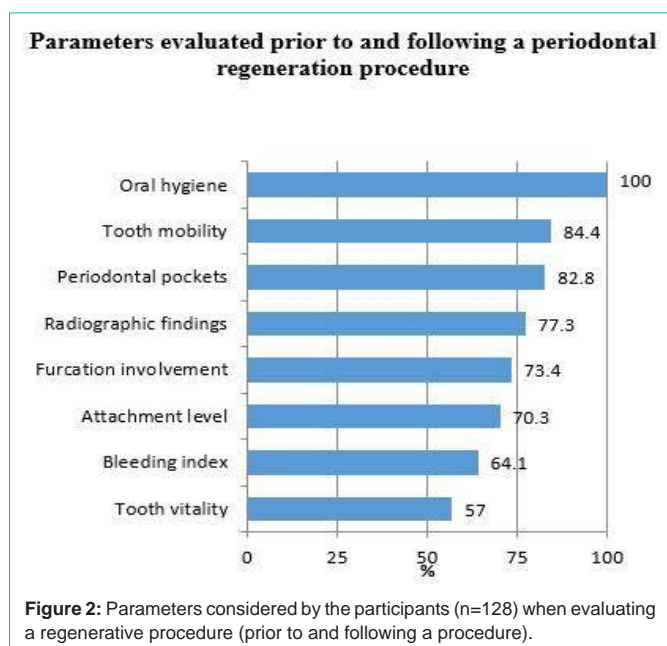


Figure 2: Parameters considered by the participants (n=128) when evaluating a regenerative procedure (prior to and following a procedure).

based on the responses from UK-based Dentists with a specialty or a special interest in periodontology evaluated their opinions from everyday clinical practice in regard to the use of traditional and new regenerative techniques and materials. One of the outcomes from this study was on the participants' responses on the management of both intra-bony and marginal tissue recession defects and their attitudes to 1) the administration of systemic antibiotics following a regenerative surgery procedure and 2) the management of cigarette smokers when planning these procedures.

Aim of the Study

The aim of the present questionnaire-based study was to evaluate the awareness and preferences of practicing Kuwaiti-based dentists with a specialty or a special interest in periodontology when using periodontal regeneration procedures.

Materials and Methods

Questionnaire design (General overview)

The questionnaire was specifically designed to: 1) assess the interest and knowledge of the dentists in performing regenerative and root coverage procedures; 2) record the variety of materials and surgical techniques utilized for regeneration; 3) give special attention to the range of application and the frequency of usage of "novel"

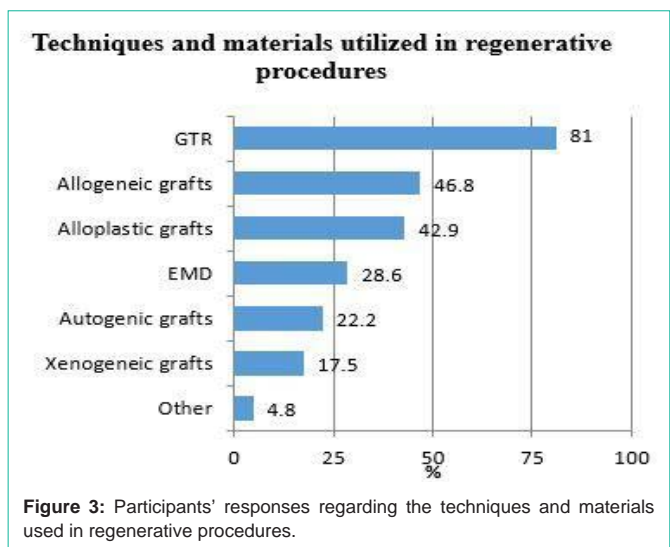


Figure 3: Participants' responses regarding the techniques and materials used in regenerative procedures.

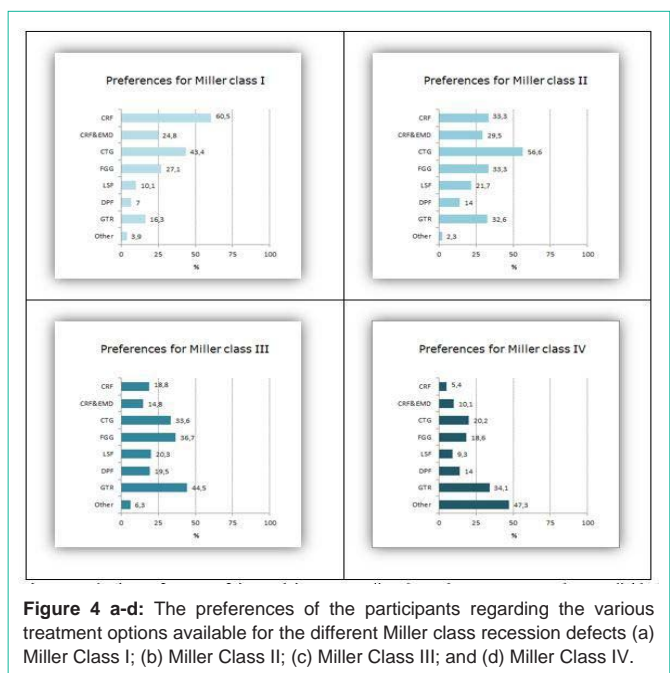


Figure 4 a-d: The preferences of the participants regarding the various treatment options available for the different Miller class recession defects (a) Miller Class I; (b) Miller Class II; (c) Miller Class III; and (d) Miller Class IV.

products (e.g., Enamel Matrix Derivatives [EMD]) and innovative surgical techniques (e.g., special flap designs) in periodontal regeneration; 4) evaluate the factors that may determine the decision-making process when considering management and treatment approaches in periodontal regeneration procedures during routine clinical practice, 5) compare the collected data with the published data on periodontal regeneration and 6) validate the findings of a previous study by Sialli et al. [1]. Most of the questions provided an opportunity for the participants to provide multiple answers although some of questions were of an open-ended or dichotomous nature (yes or no). The questionnaire consisted of seven A4 pages; all the clinical pictures and some of the diagrams were in color. An introductory letter for participants was sent with each questionnaire.

The design of this study was assessed by the Queen Mary University of London Research Ethics Committee, London, UK with

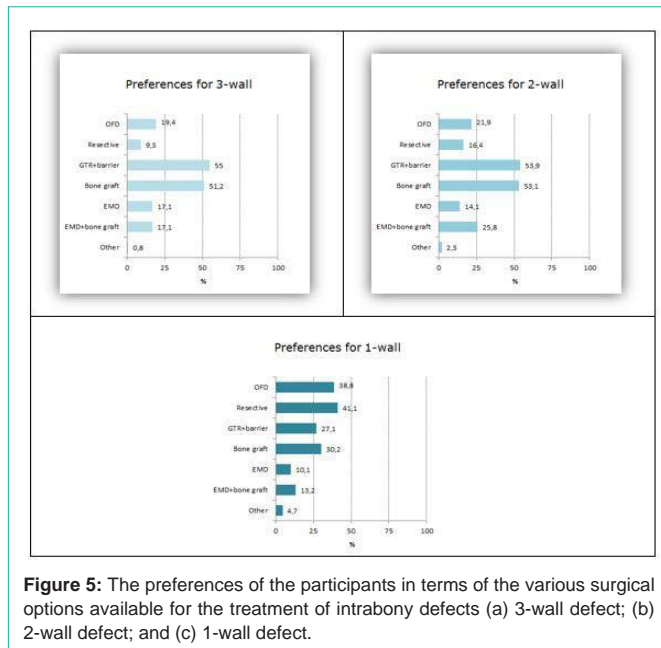


Figure 5: The preferences of the participants in terms of the various surgical options available for the treatment of intrabony defects (a) 3-wall defect; (b) 2-wall defect; and (c) 1-wall defect.

the conclusion that no ethical concerns were present and the survey was characterized as “extremely low risk” (Reference: QMREC1343b).

Prior to conducting the main study, a small pilot study was conducted using a cross-sectional self-administered questionnaire during which 31 questionnaires were given to Kuwaiti dentists *via* emails. The initial analysis of the pilot data helped enhance the final layout of the questionnaire by minor modification and rephrasing of the key questions prior to distributing to Kuwaiti dentists.

The final version of the cross-sectional self-administered questionnaire survey was completed following revision and distributed in Kuwait by one of the investigators (AA). All questionnaires were completed within a two weeks period (17th to 31st December 2014).

Statistical analysis

Analysis of the data collected from the participants was entered using SPSS version 21 (IBM UK, Guildford) and frequency tables constructed. For the description of median, standard deviations, minimum and maximum values for continuous data and frequencies and relative frequencies (proportions) for categorical data were calculated. Missing responses to questions were coded as “missing values” and were not included in the final analysis of the data. Microsoft Office Excel 2007 was used to formulate charts and figures for the presentation of the frequencies and the results of the tests concerning the association between variables. Other statistical tests were also employed in order to study the relations between the different questions. For example, a Kruskal-Wallis test was used to evaluate the homogeneity of distributions of a variable, at least ordinal, through groups of a categorical variable. A Chi-square test was also used as an association test between two categorical variables, for instance, to compare the proportion of utilization of special flap techniques by intervals of the number of subscriptions. Analysis of variance models were built to compare the means of a continuous variable (years of graduation, number of subscriptions, etc.) through different groups of a categorical variable. A Levene test was conducted

to assess homogeneity of variances. A Kolmogorov-Smirnov test was conducted to contrast the adjustment to normal distribution of a continuous variable, the contrast is a linear combination which allow comparison between different parameters and means. Irrespective of the result, a large sample size enables a greater precision when estimating unknown parameters. The Significance level used in the analysis was 5% ($P=0.05$) and for an ANOVA model, a statistical power of 80.7% was determined in order to detect an effect size of medium magnitude ($d=0.5$), assuming a 95% confidence level.

Results

Thirty-one Kuwaiti dentists participated by e-mail in the Pilot Study (PS) with 98 Kuwaiti-based dentists completing the questionnaire in Kuwait (main study MS)]. The data consisted of a descriptive set of variables collected from a sample of 129 individuals ($n=98$, 76% [MS] and $n=31$, 24% [PS]) from different clinical disciplines with an interest in the regenerative procedures used in restorative dentistry and/or periodontology. 119 questionnaires were handed out by AA in Kuwait for the main study and 98 were returned with 21 questionnaires not returned.

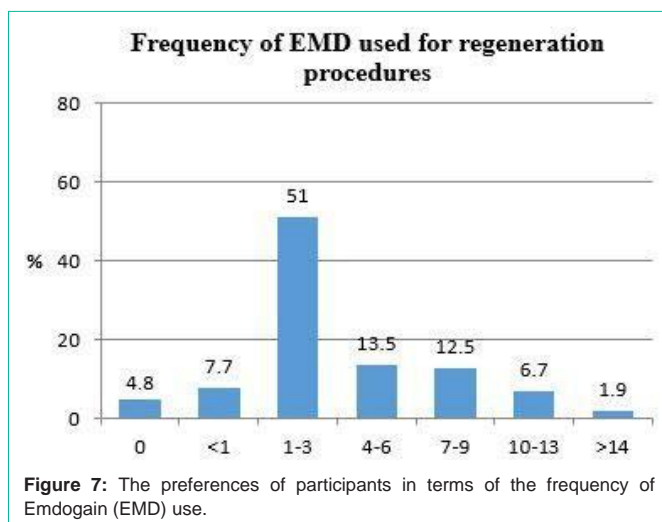
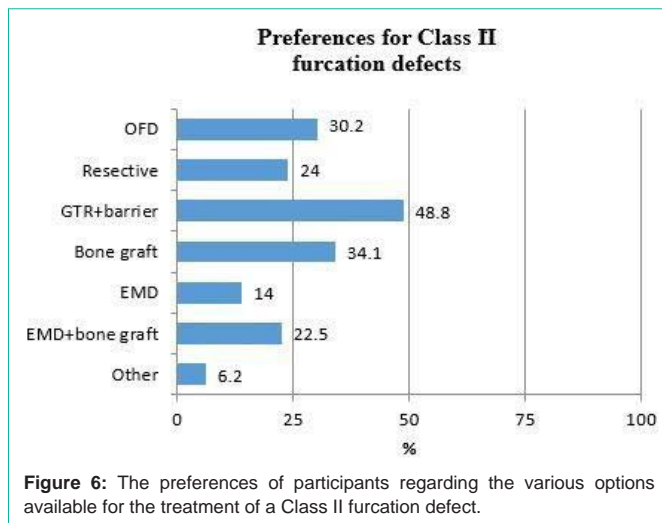
Descriptive statistics

The quantitative variables were described by mean, standard deviation, range and median and for the categorical data, absolute and relative frequencies were used. The mean (\pm standard deviation) age of the participants was 35.7 ± 7.2 years (range 26-61). Ninety subjects were male (69.8%) and 39 were female (30.2%). The mean time (years) from graduation was 9.8 ± 7.0 years (range 0-33). 62.2% of the participants had \leq ten years of experience since graduation (Table 1). The descriptive results of the present study were compared to those of a London-based survey conducted by Siali et al., [5].

The type of practice environment (Professional Status) for more than half of the participants (55.8%, $n=72$) was a General Dental Practice. Of the remaining practice settings, Periodontology (26.4%, $n=34$), Oral Surgery (11%, $n=14$), Orthodontics (0.8%, $n=1$), Implantology (2.3%, $n=3$), Prosthodontics (0.8%, $n=1$) and other (3.1%, $n=4$) were recorded (Table 1, Figure 1).

69.8% of participants reported that they did not subscribe to a periodontal journal with 30% of the participants ($n=39$) reported that they subscribed to a number several periodontology journals ranging from one (19.3%, $n=25$) or two (7.8%, $n=10$) journals. When asked about their interest in performing regenerative procedures (Q 5c and Q 6) the reported mean interest of the respondents in performing regenerative procedures was moderate (6.5 ± 2.3). Most of the participants scored 4 to 6 (38%, $n=49$) or 7 to 9 (41.1%, $n=53$) on a 1-10 Visual Analogue Score (VAS) scale. The mean percentage of periodontal regenerative procedures reported by the respondents out of their overall total of treated cases was $27.5\% \pm 25.5$.

When asked which clinical parameters were important prior to and following a periodontal regenerative procedure (Q 7) all the participants indicated that oral hygiene was the main factor they would consider during the decision-making process. From the remaining parameters, tooth mobility was reported to be important by 84.4% of the participants ($n=108$), followed by periodontal pockets (82.8%, $n=106$), radiographic observation (77.3%, $n=99$), furcation involvement in multi-rooted teeth (73.3%, $n=94$), CAL level (70.3,



n= 90), bleeding index (64.1, n= 82) and tooth vitality (57%, n=73) (Figure 2).

The preferences of the participants in terms of the techniques and materials utilized in regenerative procedures are detailed in (Figure 3) (Q 8). Guided Tissue Regeneration (GTR) was reported to be the most popular clinical strategy (81.0%, n=102), followed by allogeneic (46.8% n=59) and alloplastic grafts (42.9% n=54), Enamel Matrix Derivatives (EMD) (28.6%, n=36), Autogenic grafts (22.2%, n= 28) and Xenograft (17.5%, n= 22).

The preferences of the participants regarding the various treatment options available for treating the different Miller class classification defects (Class I-IV) are shown in (Figure 4 a-d). (Q 9-12).

The most popular techniques for treating Miller Class I were CRF/CAF (60.5%, n=78) and Connective Tissue Graft (CTG) (43.4%, n=56). None of the other choices were reported by more than 25% of responders.

Regarding the treatment choices for Miller Class II, CTG was the most popular option (56.6%, n=73), although other choices, for

example CRF/CAF, FGG, GTR and CRF+EMD, were selected by over 30% of participants. The most popular treatments for gingival recession that was diagnosed as Miller Class III were GTR (44.5%, n=57), FGG (36.7%, n=47) and CTG (33.6, n= 43). The treatment of Miller class IV defects involved several different strategies to the responses on the questionnaire at questionnaire (47.3%, n=61), for example, extraction was the most commonly reported option (55.2%, n=32).

The preferences of participants in terms of the surgical options available for the treatment of intra-bony defects (3-, 2- and 1-wall) (Q 13-15) are detailed in (Figure 5 a-c).

The participants' responses to the diagnosis and treatment of 3- and 2-wall intra-bony defects involved similar treatment options, for example GTR with a resorbable barrier membrane and bone graft were mentioned by more than 50% of participants, while EMD was mentioned by 17.1% (n=22) and the least popular option was the resective procedure (9.3%, n=12). The participants' responses regarding the treatment of a 1-wall defect indicated that the OFD (n=50, 38.8%) or resective surgical (n=53, 41.1%) options were the preferred choices.

The participants' responses regarding the treatment of a Class II furcation defect indicated that a GTR procedure with a resorbable barrier was the most common option (48.8%, n=63). OFD and bone graft were commonly used by 30-35% of the participants, while EMD was the least preferred option for the management of a Class II furcation (n=18, 14%) (Figure 6) (Q 16).

In terms of the participants' responses regarding the frequency of application of a commercially available EMD product in periodontal defects (Q 17), one to three times per month was the most usual (51%, n=53) (Figure 7).

When asked whether they used a special flap design (Q 18), 42% of participants (n=53) indicated that they use special flap techniques for regenerative procedures. Papilla preservation (35.8%, n=19) and a coronally displaced flap (18.9%, n=10) were the most commonly used designs.

In response to Q 19 whether to include or exclude smokers, 73.4% (n=94) of participants indicated that they did not consider the need to exclude smokers from regenerative procedures. However, those participants who did exclude smokers suggested several possible complications they considered likely to occur if a surgical procedure was performed, for example impaired healing (39.4%, n=13), poor prognosis (27.3%, n=9), treatment results failure (21.2%, n=7) or vasoconstriction (24.2%, n=8).

When asked whether they would prescribe systemic antibiotics for their patients (Q 20) 90.4% (n=113) of participants reported that they would prescribe antibiotics for their patients.

From the participants' responses to Q. 20, $\geq 50\%$ of the participants would prescribe antibiotics to $\geq 50\%$ of their patients. The mean percentage of patients who would be prescribed antibiotics by the participants was $55.0 \pm 33.8\%$ (range 0-100) (Figure 8).

Prescribing a combination of amoxicillin and metronidazole was the most popular option (n=38, 33.6%), with the individual use of doxycycline (n=7, 6.2%) and penicillin (n=5, 4.4%) being the least

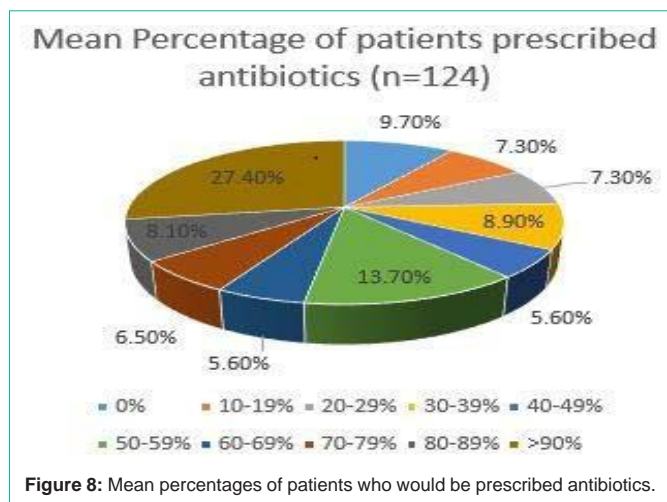


Figure 8: Mean percentages of patients who would be prescribed antibiotics.

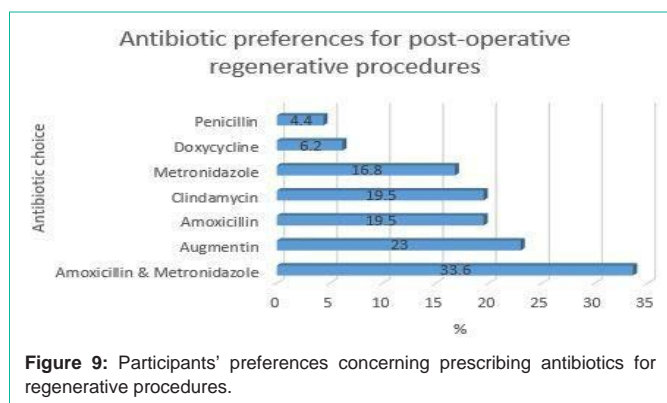


Figure 9: Participants' preferences concerning prescribing antibiotics for regenerative procedures.

preferred antibiotics prescribed in regenerative procedures (Figure 9).

The responses to the question of whether the participants anticipated their patients would reject an animal-derived regenerative material as part of the procedure (Q 21) indicated that 87% (n=107) of participants believed their patients would reject an animal-derived material.

The mean percentage of patients who would not consent to the use of this type of material was $37.4 \pm 30.9\%$ (range 0-100). Therefore, according to the participants' responses, at least 30% of patients would reject the material.

Although one who have anticipated that the participants' levels of professional experience (e.g., years from graduation, subscription to journals and interests in periodontology) would be a determining factor in some of the opinions derived from the analysis of the questionnaire, there were no significant associations between the selected variables.

Discussion

The aim of the present study was to assess the awareness and preferences of practicing Kuwaiti dentists with a specialty or special interest in periodontal regeneration procedures and to compare these findings with the evidence available in the dental literature, in particular the study by Siaili et al., [5]. The present study was conducted in Kuwait with an initial target group of 31 (pilot phase)

Table 1: General characteristics of the participants.

	Frequency (n)	Relative frequency (%)
Number of responders:		
General Dental Practice	72	(55.8%)
Specialist Practice	57	(44.2%)
Gender		
Male	90	(69.8%)
Female	39	(30.2%)
Age	35.7 ± 7.2 years (range 26-61)	
Years since Graduation (n=127)		
9.8 ± 7.0 years (range 0-33)		
< 5 years	34	(26.8%)
6-9 years	45	(35.4%)
10-19 years	35	(27.6%)
20-29 years	9	(7.1%)
30-39 years	3	(2.4%)
Not graduated	1	(0.8%)

and, subsequently, with 98 practicing dentists (main phase) with a specialty or special interest in periodontology. The response rate for the pilot study was 24.0% (n=31) and for the main phase was 76.0% (n=98) and as such the sample size was acceptable for statistical analysis.

Compared to their British counterparts in the Siaili et al., [1] study, Kuwaiti professionals were (on average) ten years younger and therefore had less clinical experience from graduation. The UK-based survey involved more participants with specialized dentistry training compared to that practiced by the Kuwaiti dentists (e.g., 41% periodontology and 34% restorative in the UK compared to 26.4% periodontology and 55.8% general practice dentists in Kuwait). The mean interest of the participants in performing regenerative procedures was moderate (6.5 ± 2.3) which was slightly less than in the Siaili et al., study [1] (average 6.5 to 7.6). The mean percentage of periodontal regenerative procedures performed by the participants out of their overall total of treated cases was 27.5% which was higher than that recorded in the UK study (14%).

Most of the participants also considered several clinical parameters prior to and following a periodontal regeneration procedure, for example oral hygiene, tooth mobility and periodontal pockets (selected by more than 80% of participants). It was observed that the majority of participants assessed the oral hygiene level of their patients prior to and following the periodontal regeneration procedure, which is in agreement with the Siaili et al. study [1]. One of the most important factors to be considered in periodontal regeneration procedures is the assessment of CAL [5], however, in the present study, the assessment of the CAL was only the sixth choice by the participants which was not in agreement with Siaili et al. [1]. There were also some differences in the responses to the other clinical parameter such as probing depth, radiographic examination and furcation involvement. According to the results from previous studies, the flap design is of critical importance in regenerative procedures as this facilitates both the full coverage of the surgical site as well as wound stability during the healing process [11].

The chosen treatment modalities for the four selected clinical situations was based on the Miller Classification [12] to evaluate the participants' responses to root coverage procedures (Q 9-12). The first section involved the choices of treatment modalities for 'the most predictable' outcome for the clinical cases (Miller Class I & II defects) with the second section requesting a response from the choices to the treatment options for 'least predictable' outcomes based on a Miller Class III & IV recession defects. From the responses it was evident that the most popular technique to treat Miller Class I defects was a CRF/CAF procedure (60.5%) followed by CTG (43.4%) and FGG (27.1%) procedures respectively. These results were at a variance with the Siaili et al. study [1] where a CTG procedure was the most common choice for a Miller Class I defect (63.6%). A CTG procedure was however the most popular choice when treating a Miller Class II defect (56.6%) which was in agreement with evidence from the published literature, indicating the superiority of CAF with or without EMD and CTG in root coverage procedures [10,13]. The treatment choice for a Miller Class III defect however was mainly treated by GTR procedures (44.5%) although other choices included a CTG and FGG procedure, whereas a treatment choice for a Miller Class IV defect included the extraction of the involved teeth.

The participants' responses regarding the materials and techniques used in the management of intrabony defects were dependent on the number of remaining walls surrounding the defects. It was observed that different treatment modalities were selected for the management of 3-wall defects in comparison to 1-wall defects, where resection was the preferred choice (Q 13-15). The majority of participants chose similar treatment options for both 3- and 2-wall intrabony defects. GTR with a resorbable barrier membrane and bone graft were preferred by $\geq 50\%$ of professionals. For the treatment of a 1-wall defect, OFD or resective surgery was the recommended choices. These findings are consistent with results from the published literature [3,14]. One major difference between the treatment choices in the present study and the Siaili et al., study [1] was the popularity of EMD alone or combined with bone graft for the treatment of 3- and 2-wall defects by British dentists although there was agreement in the treatment of 1-wall defects using OFD and resective surgery. This difference may be related to either religious issues or the availability of materials in Kuwait. The most preferred choice out of the available bone grafting materials was allografts followed by alloplastic grafts. GTR was the preferred choice for periodontal regenerative procedures. This choice may be based on the evidence that both DFDBA and autogenous grafts showed new attachment formation whereas alloplastic graft materials showed the formation of repair rather than regeneration [14-15]. The participants were also asked about their preferences for the treatment of Class II furcation involvement. The majority of participants chose the GTR with a resorbable barrier for the treatment of a Class II furcation involvement although other choices included a bone graft (34.1%) as well as OFD. These results were at variance with the Siaili et al., study [1] where the use of EMD was popular compared to the more restricted use of GTR procedures.

According to Trombelli and Scabbia [16] one of the main factors affecting the regenerative outcome was the improvement in flap design, with studies showing that primary wound closure and stability are essential during the healing phase. Furthermore the use of minimally invasive surgery as described by Cortellini and Tonetti

[11] would reduce post-surgical problems that may affect the wound healing phase. Only 42% of the participants indicated that they would use any special flap techniques for regenerative procedures with the papilla preservation (35.8%) and coronally displaced flap (18.9%) procedures the most commonly used strategies although the MIST technique [11] was less frequently mentioned by the participants. One of the findings from the Siaili et al., study [1] was the relationship between the years from graduation and the use of special flap design with participants with more years of experience preferring to use a special flap design more often than their younger colleagues. In the present study no such relationship was observed between these variables.

There were several issues that arose when analyzing the responses from the present study namely the impact of smoking and the prescription of antibiotics by clinicians when undertaking periodontal regenerative procedures.

Smoking has been recognized as a main risk factor for periodontal disease and may also impact on the healing phase following periodontal treatment [16-19]. According to Chambrone et al. [20] smokers also tend to have lower frequencies of complete root coverage compared to non-smokers. In the present study the participants appeared to be unaware of the impact of smoking on periodontal therapy and as such the majority of participants did not consider smoking as a contraindication for the regeneration procedures with only 25.8% of the participants considering that smoking was a contraindication for regeneration procedures. There was also a lack of awareness of the importance of smoking on other clinical outcomes such as impaired healing of the periodontal tissues, poor prognosis (27.3%), failure of treatment (21.2%) and vasoconstriction (24.2%). These findings were, however were not in agreement with evidence from the published literature or the findings from the Siaili et al. [1] study where $\geq 70\%$ of participants considered smoking as a contraindication in regenerative procedures. The reasons why Kuwaiti dentists were less concerned about the effect of smoking on the periodontal tissues and the impact on a successful outcome of treatment was unclear. However, the prevalence of smoking in Kuwait particularly among males is 34.5%, although considerably less in women (1.9%) which may have had a bearing on the responses from the participants in present study [21]. Currently there does not appear to be a consensus regarding the exclusion criteria for periodontal regeneration of smokers.

Another difference from the Siaili et al., study [1] was the administration of systemic antibiotics for regenerative procedures where the majority of the Kuwaiti sample (90.4%) would prescribe antibiotics to their patients, whereas the British dentists would prescribe antibiotics at a lower frequency (58.8%) for their patients. This difference may be due to a greater awareness of the current problems with antibiotic resistance through over-prescribing in the United Kingdom [22-23]. The choice of the prescribed antibiotic (combination of amoxicillin and metronidazole), however was in reasonable agreement with the Siaili et al., study [1]. The use of an animal-derived regenerative material as part of the regenerative procedure was rejected by the majority of the participants (87%) which was contrary to the earlier findings of several European studies [1,24]. One of the suggestions for the rejection of an animal-derived material from the participants was based mainly on religious grounds.

Although there were some differences between the present study and the previous study by Siaili et al. [1] as a result of differences in the sample population, cultural and religious grounds, the results from the present study would appear to validate the questionnaire used by Siaili et al. [1].

Conclusion

The results from the present study would suggest that Kuwaiti dentists are aware of current innovations in periodontal regeneration, however there were conflicting responses regarding the exclusion criteria of smokers prior to the regenerative procedure and the prescription of post-operative antibiotics following regenerative procedures compared with the evidence from the published literature. The use animal-derived materials for regenerative procedures was not acceptable to most of the participants in the study.

References

- Siaili M, Chatzopoulou D, Gillam DG. Preferences of UK-Based Dentists When Undertaking Root Coverage and Regenerative Procedures: A Pilot Questionnaire Study. *Int J Dent*. 2014; 548-519.
- Needleman, I Tucker, R Giedrys-Leeper E, Worthington H. Guided tissue regeneration for periodontal intrabony defects-a Cochrane systematic review, *Periodontol* 2000. 2005; 37: 106-123.
- Esposito M, Grusovin MG, Papanikolaou N, Coulthard P, Worthington HV. Enamel matrix derivative (Emdogain) for periodontal tissue regeneration in intrabony defects, *Eur J Oral Implantol*. 2009; 2: 247-266.
- Trombelli L, Farina R. "Clinical outcomes with bioactive agents alone or in combination with grafting or guided tissue regeneration, *J Clin Periodontol*. 2008; 35: 117-135.
- Caton JG, Greenstein G. Factors related to periodontal regeneration. *Periodontol* 2000. 1993; 1: 9-15.
- Chambrone L, Chambrone D, Pustiglioni FE, Chambrone LA, Lima LA. Can subepithelial connective tissue grafts be considered the gold standard procedure in the treatment of Miller Class I and II recession-type defects? *J Dent*. 2008; 36: 659-671.
- Chambrone L, Pannuti CM, Tu YK, Chambrone LA. Evidence-based periodontal plastic surgery II. An individual data meta-analysis for evaluating factors in achieving complete root coverage. *J Periodontol*. 2012; 83: 477-490.
- Cheng YF, Chen JW, Lin SJ, Lu HK. Is coronally positioned flap procedure adjunct with enamel matrix derivative or root conditioning a relevant predictor for achieving root coverage? A systemic review. *J Periodontal Res*. 2007; 42: 474-485.
- Maynard JG JR. Coronal positioning of a previously placed autogenous gingival graft. *J Periodontol*. 1977; 48: 151-155.
- Cortellini P, Pini Prato G. Coronally advanced flap and combination therapy for root coverage. Clinical strategies based on scientific evidence and clinical experience, *Periodontol* 2000. 2012; 59: 158-184.
- Cortellini P, Tonetti MS. Improved wound stability with a modified minimally invasive surgical technique in the regenerative treatment of isolated interdental intrabony defects. *J Clin Periodontol*. 2009; 36: 157-163.
- Miller PD, JR. A classification of marginal tissue recession. *Int J Periodontics Restorative Dent*. 1985; 5: 8-13.
- Cairo F, Pagliaro U, Nieri M. Treatment of gingival recession with coronally advanced flap procedures: a systematic review. *J Clin Periodontol*. 2008; 35: 136-162.
- Reynolds MA, Aichelmann-Reidy ME, Branch-Mays GL, Gunsolley JC. The efficacy of bone replacement grafts in the treatment of periodontal osseous defects: A systematic review. *Ann Periodontol*. 2003; 8: 227-265.
- Rosen PS, Reynolds MA, Bowers GM. The treatment of intrabony defects with bone grafts. *Periodontol* 2000. 2000; 22: 88-103.
- Trombelli L, Scabbia A. Healing response of gingival recession defects following guided tissue regeneration procedures in smokers and non-smokers. *J Clin Periodontol*. 1997; 24: 529-533.
- Bergström J, Eliasson S, Dock J. Exposure to tobacco smoking and periodontal health. *J Clin Periodontol*. 2000; 27: 61-68.
- Kinane DF, Peterson M, Stathopoulou PG. Environmental and other modifying factors of the periodontal diseases. *Periodontol* 2000. 2006; 40: 107-119.
- Patel RA, Wilson RF, Palmer RM. The effect of smoking on periodontal bone regeneration: a systematic review and meta-analysis. *J Periodontol*. 2012; 83: 143-155.
- Chambrone L, Chambrone D, Pustiglioni FE, Chambrone LA, Lima LA. The influence of tobacco smoking on the outcomes achieved by root-coverage procedures: a systematic review. *J Am Dent Assoc*. 2009; 140: 294-306.
- Memon A, Moody PM, Sugathan TN, El-Gerges N, Al-Bustan M, Al-Shatti A, et al. Epidemiology of smoking among Kuwaiti adults: prevalence, characteristics, and attitudes. *Bulletin of the World Health Organization*. 2000; 78: 1306-1315.
- Limb M. GP bashing not the answer to antibiotic overprescribing, professor tells summit. *BMJ*. 2014; 349: g6718.
- NICE guideline [NG15]. Antimicrobial stewardship: systems and processes for effective antimicrobial medicine use. NICE guideline [NG15]. 2015.
- Schröen O, Sahrman P, Roos M, Attin T, Schmidlin PR. A survey on regenerative surgery performed by Swiss specialists in periodontology with special emphasis on the application of enamel matrix derivatives in intrabony defects. *Schweiz Monatsschr Zahnmed*. 2011; 121: 136-142.