

Comparison Of Microbial Load On Absorbable And Non Absorbable Suture Materials After Periodontal Flap Surgery

Research Article

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Abstract

Background: One of the most common complications after any periodontal surgery would be surgical site infection. The surgical site infection may be because of plaque accumulation and bacterial adhesion on the suture material.

Aim: The aim of the study was to compare the microbial load on absorbable and non absorbable suture materials after periodontal flap surgery.

Materials and Methods: This comparative study was conducted among 50 patients who had undergone periodontal flap surgery in the Department of Periodontics, Saveetha Dental College and Hospitals, Chennai, India. The patients were categorized based on the suturing materials used as follows: Group 1: Absorbable materials (25 patients), Group 2: Non absorbable materials (25 patients). After one week of periodontal flap surgery, all the patients were recalled, the sutures were removed and were subjected to bacterial culture using TSA medium and the colony forming units were counted and compared between both the groups. The data was analyzed using Statistical Package for Social Sciences (SPSS Software, Version 23.0). Mean, Standard deviation and Chi-square test were calculated.

Results: The mean colony forming unit in patients who had non absorbable suture materials was 59.80 ± 13.2 . Whereas, among the patients who had absorbable suture materials, the mean colony forming unit was 22.88 ± 353 . Bacterial count was comparatively less in absorbable suture material than non absorbable suture material. The association between type of suture material and bacterial count was done by Chi square test and was found to be statistically not significant with the p value of 0.87 ($p > 0.05$).

Conclusion: The present study suggests that absorbable suture materials favour less adherence of bacteria as compared to non absorbable suture materials following periodontal flap surgery.

Keywords: Absorbable Suture Material; Innovative Technique; Bacterial Adherence; Non Absorbable Suture Material; Periodontal Surgery.

Introduction

Periodontal disease is an important public health problem all over the world. Periodontal diseases are caused by an unhealthy interaction between bacteria populating tooth surfaces and the tissues that attach the teeth to the bone. Periodontitis is a chronic inflammatory disease which affects both the soft and hard tissues around the tooth. The primary etiology of the disease is bacterial plaque, however the disease is associated with various risk fac-

tors including age, gender, smoking, stress, socioeconomic status, genetic factors, systemic diseases and hormonal changes [1-9]. If the condition is left untreated, it leads to increase in pocket depth, gingival recession, clinical attachment loss, bone loss, furcation involvement, pathological migration and tooth mobility eventually leading to tooth loss [10-15].

The management of periodontitis involves scaling and root planning followed by flap surgery. In periodontal surgery, the most

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common method of wound closure is by sutures [16]. A surgical suture approximates neighbouring cut surfaces while compressing blood vessels to induce hemostasis and basic wound healing. Suture materials, although providing tensile strength for wound healing, can serve as a pathway for bacteria to enter the surgical wound, increasing the vulnerability of host tissue to infection. Sutures acting as a nidus for wound infection and contamination has been a topic of debate for more than 30 years and research has revealed that surgical sutures have a similar propensity for microbial adhesion and colonisation as other synthetic, implanted medical devices [17, 18].

Microbe adhesion to suture material is influenced by a number of variables. According to several studies, bacterial adhesion with severe inflammatory reactions is more common in non absorbable or braided or multifilament sutures than in absorbable or non-braided or monofilament sutures. Suture material is a foreign body that, once implanted, potentiates infection and the capacity of sutured tissue to resist infection varies depending on the material used [19].

The absorbable materials are usually polymers or copolymers of lactic acid and glycolic acid, which are produced into synthetic threads in various quantities and molecular shapes. The benefit of absorbable materials is that they are glycolysed or dissolved and natural metabolic processes break them down with nearly minimal residues. Polymers, silks, and Teflon (expanded polytetrafluoroethylene) materials are non-absorbable materials that are often employed in periodontal surgery [20, 22]. Silk is a non-absorbable natural suture that has been widely used for wound ligation and was the most frequent natural suture used in the biomedical sector for the past 100 years, surpassing collagen. This demonstrates silk's great biocompatibility, despite the fact that it is a foreign protein to mammals [23].

Our team has extensive knowledge and research experience that has translated into high quality publications [24-43]. Through extensive literature search, it was revealed that there is a lack of adequate studies comparing the microbial load on absorbable and non absorbable suture materials after periodontal flap surgery. Hence, the rationale of this study was to compare the microbial load on absorbable and non absorbable suture materials after periodontal flap surgery.

Materials and Methods

Population Selection:

This comparative study was conducted among 50 patients who had undergone periodontal flap surgery in the Department of Periodontics, Saveetha Dental College and Hospitals, Chennai, India. The ethical clearance was obtained from the Institutional Ethical Committee and a written informed consent was obtained from all the study participants.

The patients were categorized based on the suturing materials used as follows: Group 1: Absorbable materials (25 patients), Group 2: Non absorbable materials (25 patients). After one week of periodontal flap surgery, all the patients were recalled, the sutures were removed and were placed in sterile container containing transport medium and the bacterial culture was done using TSA medium and the colony forming units (CFU) were counted and compared between both the groups.

Statistical Analysis:

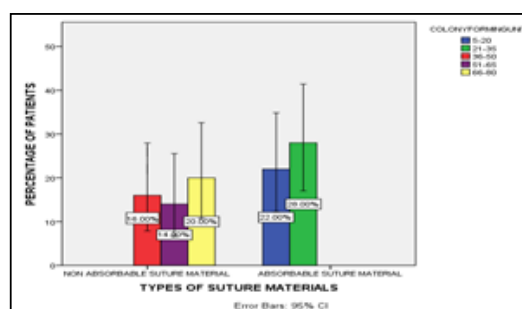
The data was analyzed using Statistical Package for Social Sciences (SPSS Software, Version 23.0). Descriptive and inferential statistics were done for data summarization and presentation. Mean, Standard deviation and Chi-square test were calculated.

Results

A total of 50 patients were enrolled. Of which 25 patients had undergone periodontal flap surgery with absorbable suture material and another 25 patients with non absorbable suture material. After 1 week, the suture materials were removed and cultured. The mean colony forming unit in patients who had non absorbable suture materials was 59.80±13.2. Whereas, among the patients who had absorbable suture materials, the mean colony forming unit was 22.88±35.3.

The colony forming units were grouped as follows: group 1: CFU of range (5-20), group 2: CFU of range (21-35), group 3: CFU of range (36-50), group 4: CFU of range (51-65), group 5: CFU of

Figure 1. The bar graph represents the association between the type of suture material and the bacterial count. X axis represents the type of suture material and Y axis represents the percentage of patients. Blue colour denotes colony forming unit of range 1-20, green colour denotes the colony forming unit of range 21-35, red colour denotes the colony forming unit of range 36-50, purple colour denotes the colony forming unit of range 51-65, yellow colour denotes the colony forming unit of range 66-80. Bacterial count was comparatively less in absorbable suture material than non absorbable suture material. The association between type of suture material and bacterial count was done by Chi square test and was found to be statistically not significant with the p value of 0.87 (p>0.05).



range (66-80). Among 25 patients with non absorbable suture materials, 8 patients had CFU of range 36-50, 7 patients had CFU of range 51-65 and 10 patients had CFU of range 66-80. Among 25 patients with absorbable suture materials, 11 patients had CFU of range 5-20, 14 patients had CFU of range 21-35. Bacterial count was comparatively less in absorbable suture material than non absorbable suture material. The association between type of suture material and bacterial count was done by Chi square test and was found to be statistically not significant with the p value of 0.87 ($p > 0.05$). (Figure 1).

Discussion

The present study was done to compare the microbial load on absorbable and non absorbable suture material after periodontal flap surgery.

The present study showed that absorbable suture materials had less microbial load than that of the non absorbable suture materials. Dragovic M *et al.*, in his randomized controlled clinical trial compared different suture materials with respect to oral wound healing, microbial colonization, tissue reaction and clinical features. And found out that poor soft tissue healing was found around non absorbable suture materials and also this suture elicited more inflammatory reaction and microbial adherence [44]. Sergi S *et al.*, in his randomized clinical study evaluated the clinical and microbiological impact of absorbable and silk suture and found out that absorbable suturing material has lesser bacterial adherence as compared to non absorbable suturing material [45].

In another study microbial colonization on various intraoral suture materials were studied and it was observed that absorbable silk and monocryl sutures exhibited the smallest number of adherent bacteria. A greater quantity of bacteria was found on non absorbable sutures than on absorbable sutures and nearly 2 times more facultative anaerobic bacteria were isolated from non absorbable suture material [46]. Otten *et al.*, conducted an *in vitro* and *in vivo* analysis to compare the microbial profile on absorbable and non absorbable suture materials and found that in comparison with absorbable suture material about 15% more aerobic and anaerobic strains were isolated on non resorbable suture material. [47].

Grigoras R *et al.*, conducted *in vitro* study about the bacterial adhesion on the surface of suture materials and found out that polydioxanone absorbable monofilament suture material had the lowest bacterial adherence level than the rest of the suture materials. [48]. Maftei *et al.*, conducted a study on biomechanical properties of suture materials and their relationship to bacterial adherence and found that the non absorbable suture materials like silk and nylon had highest bacterial adherence when compared to the polyglycolic acid suture which is an absorbable suture material [49].

The results obtained in the present study are in accordance with the previous studies as absorbable suture materials favours less adherence of bacteria as compared to non absorbable suture materials. However, future studies assessing the influence of different absorbable and non absorbable suture materials and patient related factors on microbial load need to be conducted to confirm these findings.

Conclusion

The present study suggests that absorbable suture materials favour less adherence of bacteria as compared to non absorbable suture materials following periodontal flap surgery.

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