



Analysis of Various Bone Grafts Used for Periodontal Flap Surgery - An Institutional Based Retrospective Study.

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ABSTRACT

The term periodontal regeneration can be understood as the condition by which the function and architecture of the periodontal health is fully restored. A medical process called bone grafting can be defined as that process which restores missing or defective bone from a patient's body. The benefits of using periodontal bone grafts are decrease in probing depth, enhanced clinical attachment level, bone regain of the osseous fault and regeneration of the alveolar bone, cementum and periodontal tissues. The goal of this study is to analyse the commonly used bone grafts in periodontal flap surgery patients. Data was collected from patients records in June 2019 to April 2020. Total sample size included 88 patients between the age range 15-75 years old who were diagnosed with periodontitis and underwent treatment for bone grafting procedures. Data was tabulated and imported to SPSS for statistical research. Descriptive statistics and chi square test was done. The inspection proved that the bone grafting was done more in male patients with generalised chronic periodontitis within the age range of 31-45 years. This association was not significant since p value=0.761. Within the limits of the study, the bone grafting was done more in male patients who were diagnosed with generalized chronic periodontitis within the age range of 31-45 years old and xenograft was the most common bone graft type used for periodontal flap surgery.

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INTRODUCTION

Regenerating the alveolar bone which is destroyed by periodontitis is one of the biggest challenges seen in dentistry today [1]. Periodontitis can be defined as a long term inflammatory disease which leads to the demolition of supporting structures of the teeth [2]. Disease development occurs as a conclusion of host-immune response to bacteria, directing to destruction of connective tissue and

alveolar bone [3]. Optimum health, aesthetics and function of many dentitions can be restored by the regeneration of alveolar bone. Various methods are employed to establish this goal using the technique of bone grafting and other regeneration procedures [4]. Periodontal therapy has been initiated at the elimination of disease and maintenance of a functional, healthy gingiva and supporting tissues [5]. Periodontal bone grafting in the earlier times

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has been disputed and unpredictable [6]. The majority of studies prove that the strong statements of bone grafting shows better success using autogenous grafting materials than open flap debridement in the management of severe osseous defects cases. Other studies argue that the amount of bone regeneration possible with current techniques is restricted and unpredictable to be useful [7].

Periodontal regeneration can be explained as the procedure which enables the architecture and function of the periodontal tissues to be completely recovered. This is considered as an aggregate process and requires a harmonious sequence of biological events. The re-establishment of continuity without full restoration of architecture and function can be defined as a repair of the periodontium. The benefits of using periodontal bone grafts are decrease in probing depth, enhanced clinical attachment level, bone regain of the osseous fault and regeneration of the alveolar bone, cementum and periodontal tissues [8]. The 3 different types of bone grafts used most frequently in today's world in periodontics are autogenous grafts, allografts and alloplasts. Early assessment of these procedures did not include controls. Further, controlled trials were indicated to be necessary as some therapists speculated that equal amounts of bone fill can be achieved without bone grafts [9].

Autogenous bone grafts can be defined as the process which involves grafts that are taken from one part of a patient's body and transferred to another, following which full-mouth periodontal flap surgery can be also done in cases of osseous defects [10]. Cortical bone chips, bone blend, osseous coagulum, extraction socket bone and extraoral cancellous bone with marrow are considered some types of autogenous periodontal bone grafts. Allografts are defined as grafts transferred between genetically dissimilar members of the same species. Among these, demineralised freeze-dried bone is used most often. But, non demineralized freeze-dried bone and frozen iliac cancellous bone are used less frequently [11], [12].

The various factors pertaining to the surgical technique of bone grafting are difficult to evaluate scientifically and, therefore, most suggestions are based on clinical evaluations [13]. In this section we shall emphasize on a variety of treatment modalities that have been proposed to enhance bone grafting which are continually being proposed. Among which, root debridement is considered an extremely important step in bone-grafting procedures [14]. Ultrasonic and hand instruments as a combination are commonly used to ensure that all hard and soft deposits plus altered cementum are completely disconnected from the root surface. Rotary instruments have recently

been shown to increase the process. [15]. Along with these, magnifying loupes have also been described as valuable adjuncts based on clinical observations. This provides for complete root debridement which helps to improve the predictability and success of grafts in the future [16].

Biological properties of collagen may provide support in periodontal rehabilitation procedures [17]. The effect of bone graft has been evaluated in previous studies which shows that the frozen dried bone allograft is most effective for regeneration of class II furcation defects [18]. There are various articles pertaining to intra bony defects, vertical bone loss and furcation involvement used for periodontal flap surgeries [19]. Some recent advances in bone grafting can be listed out as enhanced procurement and availability of bone graft material, upgraded methods for complete detoxification of diseased root surfaces, improved understanding of the cell kinetics of wound healing, request of the principles of guided tissue regeneration and the availability of growth factors to enhance healing [20]. Periodontal bone grafts have the capacity to completely rejuvenate the periodontal tissues destroyed by periodontal disease [21]. Various recent regenerative procedures were employed to bone grafting which may widely improve their predictability in the future. [22], [23]. Previously our team had conducted numerous clinical trials and lab studies and in-vitro studies [24-39] over the past 5 years. The goal of the study is to analyse the commonly used bone grafts in periodontal flap surgery patients.

MATERIALS & METHODOLOGY

The study was done under a university setting. Records of patients who visited Saveetha Dental College, Chennai between June 2019-March 2020 were evaluated. This study was accepted by the institutional ethics board (ethical approval number- SDC/ SIHEC/ 2020/ DIASDATA/ 0619-0320). Two reviewers were involved in this study. Total sample size included 88 patients between the age criteria 15-75 years old who were diagnosed with periodontitis and underwent treatment for bone grafting procedures. Patients with any developmental disorder, bone grafting procedures related to implant surgery or patients without periodontitis were considered as the exclusion criteria.

Data collection was done from patients visiting Saveetha Dental College during a particular time frame. The data was acquired from the treatment records under the category of bone grafting of periodontitis patients and the data was tabulated. If the patient did not undergo bone grafting, those samples were excluded from the study. Data was

analysed by one external reviewer. The data was then exported to SPSS and the variables were identified. Systematic analysis like the Chi square test was performed on the data using SPSS software by IBM.

RESULTS & DISCUSSION

The data collected from the patient management software was tabulated in SPSS and the descriptive analysis was obtained. Out of a total of 88 patients, 59% are males and 41% are females (Figure 2). In the study analysis, 22.7% were present in the 15-30 years old category, 42% being the highest in the 31-45 years old criteria, 29.5% in 46-60 years old criteria and 5.7% in 61-75 years old (Figure 1). The most prevalent periodontal disease seen was generalised chronic periodontitis in 77.3% patients, 16% of localised chronic periodontitis and the remaining percentage of patients in aggressive periodontitis. The most common bone graft type used for periodontal flap surgery is xenograft (94.3%) followed by alloplast (3.4%) and allograft (2.2%) (Figure 3). The association between age and gender of patients who underwent bone grafting procedures was analysed, which showed that the maximum number of bone grafting procedures was done in male patients aged 31-45 years. But, it was statistically not significant ($p=0.761$) (Figure 4).

Periodontitis can be defined as a host-mediated inflammatory disease which is caused by pathogenic microorganisms and is followed by the destruction of tooth-supporting tissues, culminating in tooth loss. Disease turnabout with regeneration of new bone, cementum and periodontal ligament. A root surface not contaminated by bacterial plaque is essential for maintaining healthy periodontal tissues [40]. Bone replacement grafts are popularly used to promote bone formation and rejuvenation of the chronic inflammatory state of periodontal destruction [41]. It is essential for repair of lost bone followed by a functional attachment apparatus to be achieved. The bone grafting materials will lead to the regeneration of a new attachment apparatus [42], [43].

The purpose of this study was to assess the age and gender related to bone grafting in periodontal flap surgery patients. The most common age group seen was in the range 31-45 years which constituents 42% of the total population recorded. But there are some studies, as Claffey [44], quoted that the most prevalent age group seen in his study was 45-70 years old, who required bone grafting for surgical therapy. This has contradictory findings to the present study which has many reasons like ethnicity or acceptance of required treatment [45]. After which, the most prevalent gender present in this study was 59% male participants. Males are more prone to periodontitis due to age, habits and

medical conditions which results in more need of bone grafting procedures to be done for flap surgeries. But studies quoted by Trombelli [46], showed that females are more prominent for bone grafting procedures due to age, menstrual history and concern for dentition. This showed contradicting results to the present study.

The most common bone graft type used is xenograft (94.3%). Various different studies like Reynold MA [47], also quoted that xenograft is the most predominantly used bone graft type in periodontal surgical procedures. Intra osseous defects, furcation loss and vertical bone loss can be treated with the xenografts type. Generalised chronic periodontitis is the most prevalent periodontal disease seen in patients undergoing bone grafting procedures. Most of the studies are in acceptance like Chen Cl [48] also described in his study. Only in this condition, bone grafting procedures are opted due to severe bone loss and pocket formation. Few limitations of this study design might be that the study is single centred with less sample size, similar ethnicity and geographical location. To improve the significance of this study, it should be done extensively with detailed parameters and find future scope for bone grafting using novel biomaterials.

CONCLUSION

Within the limitation of the study, it can be concluded that the bone grafting was done more in male patients who were diagnosed with generalized chronic periodontitis within the age groups of 31 to 45 years and xenograft was the most common bone graft type used for periodontal flap surgery.

AUTHOR CONTRIBUTIONS

Perna contributed in study design, manuscript preparation, Dr. Manish Ranjan contributed to the statistical framework and Dr. Balaji Ganesh S contributed to manuscript writing and proofreading.

CONFLICT OF INTEREST

Nil

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Ethical Clearance

It is taken from "Saveetha Institute Human Ethical Committee" (Ethical Approval Number-SDC/SIHEC/2020/DIASDATA/0619-0320)

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FIGURES

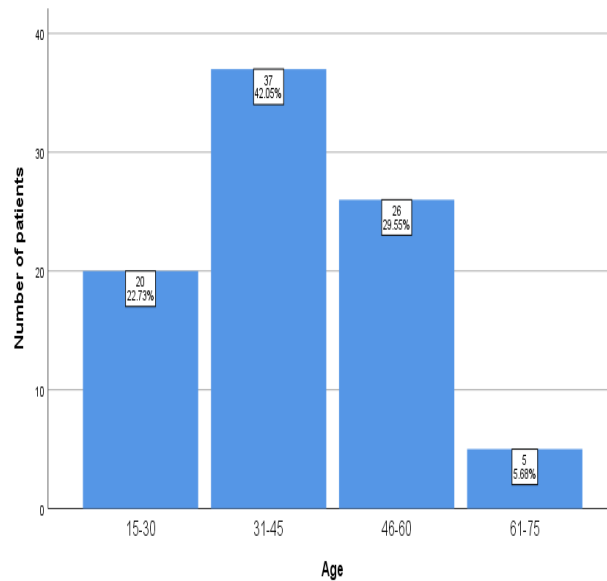


Figure 1: This graph shows the age group of patients who underwent bone grafting procedure. X axis shows age criteria and y axis shows the number of patients who underwent bone grafting. In the study population, the maximum number of patients were included in the age criteria of 31-45 years (42.05%)

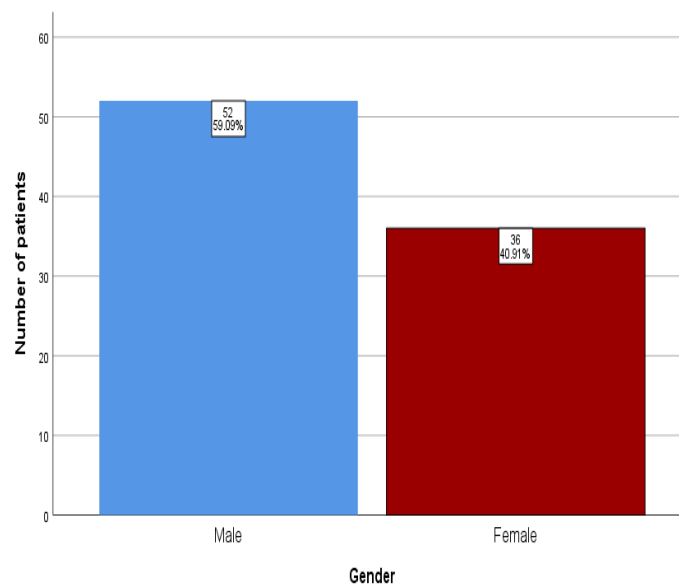


Figure 2: This graph shows the gender of patients who underwent bone grafting procedure. X axis shows gender and the y axis shows the number of patients who underwent bone grafting. In the study population, the maximum number of patients were males. (59%)

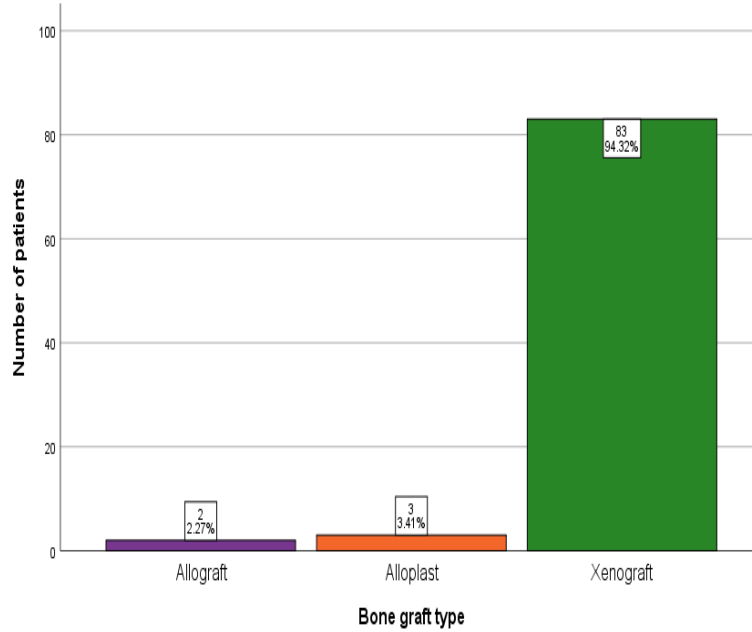


Figure 3: This graph shows the bone graft type used in patients who underwent periodontal flap surgery. X axis denotes bone graft type and y axis denotes the number of patients who underwent bone grafting. In the study population, the most commonly used bone graft for periodontal flap surgery was xenograft (94.32%)

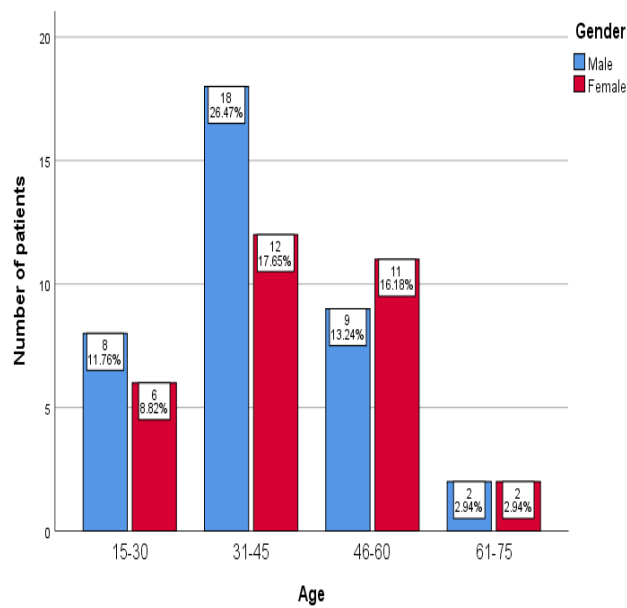


Figure 4: This graph represents the association between age and gender of patients who underwent bone grafting procedures. X axis shows the age and Y axis shows the number of male and female patients. The graph denotes that the maximum number of bone grafting procedures was done in males aged 31-45 years. The Pearson's chi square value is 1.165 and p value is 0.761, hence it is considered to be statistically not significant.