

Association Between Periodontal Flap Design And Site Of Surgery - A Retrospective Study

Research Article

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Abstract

Background: While non - surgical periodontal therapy remains the first line of treatment for periodontitis, there are limitations to what can be achieved by procedures like subgingival scaling and root planing. Flap surgery is done to access the tooth and the surrounding periodontium for better visualisation and instrumentation purpose. There are various techniques by which flap surgery is performed. Flap surgeries also provide access for osseous surgery and regenerative techniques.

AIM:The aim of the study was to assess the Site wise distribution of flap surgery techniques and the possible association between flap design and affected site.

Materials And Methods: The study is a Hospital based retrospective study, and included patients visiting a Dental hospital. A total of 731 patients who had undergone flap surgery were selected for the study. The Site wise distribution of flap technique was evaluated and tabulated in MS Excel. The data collected was imported to IBM SPSS Version 20.0 for analysis and results were obtained.

Results: The most frequently used or preferred Flap technique was found to be Kirkland Flap technique (72%). The association between Site and Flap technique was found to be statistically significant (Chi Square test, $P < 0.001$). No significant association was found between gender and choice of flap technique (Chi Square test, $P > 0.001$).

Conclusion: From the study it can be concluded that the most frequently used flap technique was Kirkland Flap. The Site of periodontal disease was found to have association with the choice of flap technique.

Clinical Significance: The clinical significance of this study was to report the influence of the site of surgery on the choice of Flap design.

Keywords: Flap Surgery; Flap Design; Kirkland Flap; Modified Widman Flap; Periodontitis.

Introduction

A periodontal flap is a section of gingiva and/or mucosa which has been surgically separated from the underlying tissues [1, 2]. Non surgical periodontal therapy remains the cornerstone of treatment of periodontitis, procedures like subgingival scaling and root planing however face certain limitations which are not encountered in flap surgery [3, 4]. Surgical periodontal treatment in its own right is also an important component of Periodontal therapy [5-7].

There are a number of periodontal surgical techniques and the choice of technique is influenced by the individual clinical situation [8]. Flap surgery not only allows for greater visualisation and instrumentation but also allows access for osseous and regenerative surgical techniques [9-11]. The various flap techniques include Modified Widman Flap, Kirkland Flap, Apically repositioned Flap, Coronally repositioned Flap, Papilla preservation flap, etc.

The choice of flap design not only affects the healing and functional outcome of the treatment but also plays a role in determining the aesthetic outcome of the treatment [12-14]. In regards to

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periodontal surgical therapy postoperative sensitivity and recession are also concerns along with post-operative appearance [15-18]. Other elements which are evident in the design and execution of flap surgeries is the thickness of the gingival tissue to be positioned over denuded roots [19-21]. Smoking status, operator skills and patient compliance [22-24] also have an impact on the both the technique used as well as the outcome of the therapy.

While literature regarding the influence of tooth location on root coverage outcomes has been discussed [25], the association between site of periodontal disease and preference of flap design has not been much explored. The aim of the study was to assess the Site wise distribution of periodontal flap techniques and its association with the affected site.

Materials and Methods

In this retrospective study, patients who underwent periodontal flap surgery in a Dental Hospital from June 2019 to March 2020 were included. Consecutive sampling method was used for the study. The study was approved by the scientific review board, and the ethical clearance was obtained from the ethical committee of the University with the following ethical approval number- SDC/SIHEC/2020/DIASDATA/0619-0320.

Patients of all age groups, both males and females were included in the study. All types of Flap surgery were taken into consideration and their digital case records including preoperative and Intra operative with digital photographs were retrieved. Only those case records which were approved by the specialists were included. Patients with systemic disease, with incomplete/censored, were excluded from the study. 731 samples which satisfied the criteria were included in the study. Variables such as age, gender, site of surgery(either quadrants or sextants mentioned in the case records) were extracted.

Statistical Analysis

The results obtained were tabulated and exported to IBM SPSS 20.0 for Statistical analysis. Descriptive Data analysis was done using percentage for Nominal and Qualitative data. The Gender and the site of surgery were considered as the independent variables while the Flap technique was considered as the dependent variables. Chi Square Test was used to evaluate the association between the Site of surgery and the type of Flap technique used and gender and the flap technique used. The p value less than 0.05

was considered as statistically significant.

Results

The present study included a total of 731 patients, of which 430 were males (58.7%) and 301 were females (41.3%) with an age range of 20-70 years.

On analysis the most commonly used flap technique was Kirkland flap(72%), followed by Modified Widman flap(18%), Papilla preservation flap (3.4%), Undisplaced flap (2.7%)(Figure 1). Overall the upper arch had more flap surgeries than the lower arch. Quadrant wise surgeries were more than the sextant wise surgeries. Irrespective of quadrant wise or sextant wise the most preferred technique was Kirkland technique except that Modified Widman flap was found to be most preferred in the second sextant (Figure 1). Papilla preservation flap was also found to be used mainly in the anterior region (Figure 1). On statistical analysis using chi square test there was significant association observed between Site of the surgery and Choice of flap technique ($p < 0.001$). The two common techniques (Kirkland flap and Modified Widman flap) were analysed to see whether these have any association with the site of surgery (both quadrant wise and sextant wise) the results revealed a significant association ($p < 0.001$) with the technique and the site (Table 2 and Table 3).

A greater frequency of periodontal flap surgeries was seen in males (58.7%) than in females (41.3%) from (Figure 5). But analysing statistically no significant association was found between Gender and the choice of flap technique, $p > 0.05$, Chi square test (Figure 4).

Discussion

In our study, the most commonly used flap technique was Kirkland flap followed by Modified Widman flap. Modified Widman flap was further found to be the most preferred flap technique in the second sextant. Results revealed Papilla preservation flap was also found to be used mainly in the anterior region. On analysis the association between Gender and choice of flap technique was not found to be statistically significant. Interestingly, a greater frequency of periodontal flap surgeries was seen in males than in females. A statistically significant association between Site distribution and Choice of flap seen both Quadrant wise and Sextant wise.

Figure 1. Bar graph depicting Flap Distribution by Site where blue colour denotes apically displaced flap, red denotes distal wedge procedure, green colour denotes Kirkland flap, orange colour denotes Modified Widman flap, yellow denotes papilla preservation flap and teal colour denotes undisplaced flap. X axis denotes the site of surgery (quadrants(Q) and sextants(S)) and Y axis denotes the number of flap surgeries by flap technique. Most common flap is the Kirkland flap followed by the Modified Widman flap. In the Sextant 2 and Quadrant 1 papilla preservation flap is also noticeable. On statistical analysis there was a significant difference in the choice of techniques between different sites (p value < 0.001).

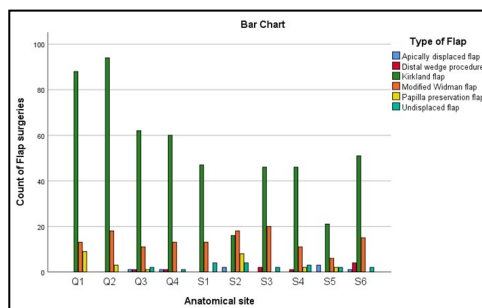


Figure 2. Bar graph depicting Quadrant wise distribution of two major Flap techniques where red denotes Kirkland flap and green denotes Modified Widman Flap. X axis denotes the site of surgery (quadrants) and Y axis denotes the number of surgeries for each technique. Irrespective of the quadrant Kirkland flap was the most preferred one. Quadrant 1 and 2 have more use of the Kirkland flap than Quadrant 3 and 4. On statistical analysis, P value < 0.001, which is showing statistically significant difference in the choice of these techniques in different sites.

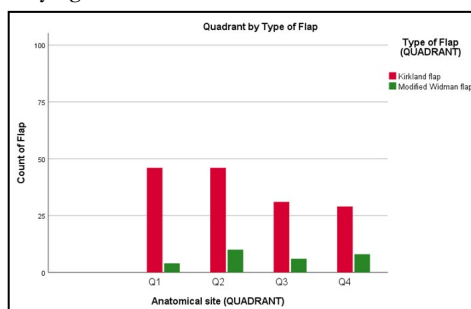


Figure 3. Bar graph depicting Sextant wise distribution of the two major Flap techniques where red denotes Kirkland flap and green denotes Modified Widman Flap. X axis denotes the site of surgery (sextants) and Y axis denotes the number of surgeries for each technique. In almost all sextants Kirkland flap outnumbered Modified Widman flap except in Sextant 2 where both are almost equally preferred. On statistical analysis the difference was significant with P value < 0.001.

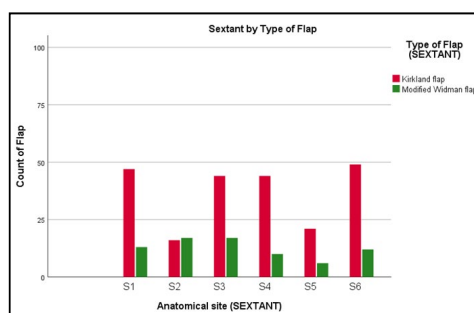


Figure 4. Bar graph depicting Gender wise distribution of flap surgery by techniques, where red denotes male and blue denotes female; X axis denotes the type of flap technique and Y axis denotes the number of patients with respective flap techniques in both Genders (Male and Female). Kirkland flap is the predominant flap in both genders. On statistical analysis, Pearson Chi-Square value = 9.023, df = 5, P value = .108, which is statistically not significant.

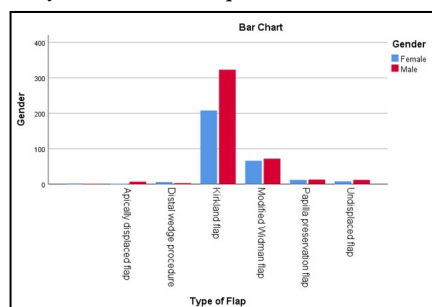
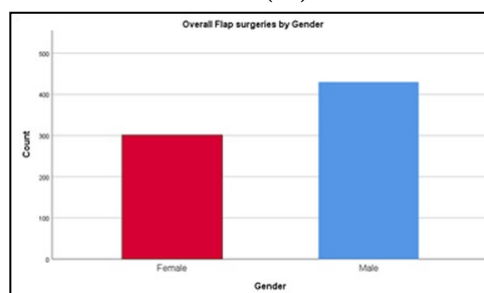


Figure 5. Bar graph depicting gender wise prevalence of flap surgery, red denotes female and blue denotes male. X axis denotes Gender and Y axis denotes the number of patients with flap surgery done in both Genders (Male and Female). The number of flap surgeries done is more in males (430) than in females (301).



The Kirkland flap was found to be the most preferred Flap technique accounting for the majority (72%) of the cases with apically displaced flap and distal wedge procedure being the least frequently used. These findings are in line with previous literature by Kumar, which states that there is a significant trend towards the use of Kirkland flap technique. This can be attributed to the better aesthetics achieved in the Kirkland Flap technique [26]. The indications as well as the advantages of Surgical therapy in the treatment of periodontitis, where non Surgical therapy is limited

has been stated in many previous studies [27, 28].

It is surprising to see that in the current study Modified Widman flap surgery was done more than the Kirkland flap in the second sextant (upper anterior) where esthetics is an important concern. In a study by Palmer et al, it was found that despite the effectiveness of Modified Widman flap at reducing probing depth, recession was observed in the long term which can however be minimised on maintenance of good plaque control [29]. This can be an explanation of the findings in the current study which show

Table 1. Table depicting the site wise distribution (Q for quadrant, S for sextant) of Flap technique with statistical analysis. Kirkland Flap (531) is observed to be the most commonly used Flap technique followed by Modified Widman flap. Statistical analysis of association of Flap Technique with Site of surgery, P value <0.001, statistically significant by Chi Square Test shows that the site of surgery significantly influences the choice of flap technique.

| | | Type of Flap Technique | | | | | | |
|--------------------|----|------------------------|----------------------|---------------------------|------------------|-----------------------------------|-------------------------|-----|
| | | Kirkland Flap | Modified Widman Flap | Papilla Preservation Flap | Undisplaced Flap | Distal wedge Procedure | Apically Displaced flap | |
| Site of Surgery | Q1 | 88 | 13 | 9 | 0 | 0 | 0 | 110 |
| | Q2 | 94 | 18 | 3 | 0 | 0 | 0 | 115 |
| | Q3 | 62 | 11 | 1 | 2 | 1 | 1 | 78 |
| | Q4 | 60 | 13 | 0 | 1 | 1 | 1 | 76 |
| | S1 | 47 | 13 | 0 | 4 | 0 | 0 | 64 |
| | S2 | 16 | 18 | 8 | 4 | 0 | 2 | 48 |
| | S3 | 46 | 20 | 0 | 2 | 2 | 0 | 70 |
| | S4 | 46 | 11 | 2 | 3 | 1 | 0 | 63 |
| | S5 | 21 | 6 | 2 | 2 | 0 | 3 | 34 |
| | S6 | 51 | 15 | 0 | 2 | 4 | 1 | 73 |
| Total | | 531 | 138 | 25 | 20 | 9 | 8 | 731 |
| Chi Square Test | | | | | | | | |
| | | Value | | df | | Asymptotic Significance (2-sided) | | |
| Pearson Chi-Square | | 136.577 ^a | | 45 | | .000 | | |

Table 2. Table depicting the Quadrant wise distribution of Kirkland Flap and Modified Widman Flap with the statistical comparison. Kirkland Flap is the most preferred flap in all Quadrants. Statistical analysis of association of Quadrant wise surgeries with the two major Flap Technique, P value <0.0001, statistically significant by Chi Square Test shows that Kirkland flap is significantly more preferred than Modified Widman flap.

| | | Type of Flap | | Total |
|----------------------------|----|----------------------|----------------------|-----------------------------------|
| | | Kirkland Flap | Modified Widman Flap | |
| Site of Surgery(Quadrants) | Q1 | 46 | 4 | 50 |
| | Q2 | 46 | 10 | 56 |
| | Q3 | 31 | 6 | 37 |
| | Q4 | 29 | 8 | 37 |
| Total | | 152 | 28 | 180 |
| Chi Square Test | | | | |
| | | Value | df | Asymptotic Significance (2-sided) |
| Pearson Chi-Square | | 748.058 ^a | 8 | 0 |

Modified widman flap being most preferred in the second sextant region. At the same time, in the current study Papilla preservation flap was found to have the most application in the upper anterior region. These findings are explained by the results of a study by Cohen, Takei et al which states that the papilla preservation technique enables better preservation of the papilla as well as enhanced esthetics and access to the roots for placement of graft material [30, 31]. The kirkland flap was found to be more preferred in the maxillary anterior region. The Kirkland Flap was also the most preferred flap in both males and females. The reason for this finding can be explained by the results of a study by Kolte et al, which found a predominantly thinner gingival phenotype in the anterior region, with the phenotype being thinner in females

than in males [32].

Significant association between the Site and the Flap technique was found in the present study. This is in consensus with previous studies Huang et al., and Zucchelli et al who found that the tooth location or affected site influences the choice of treatment technique as well as the outcome [33, 34].

In the present study the association between gender and Flap technique was found to be statistically not significant. This was consistent with the findings of a previous study by Shiao et al, where no significant association was found between the need for treatment as well as technique employed and gender for patients

Table 3. Table depicting the Sextant wise distribution of Flap Technique with statistical comparison .Kirkland Flap is the preferred technique for all sextants than Modified Widman Flap except for the Second sextant where Modified Widman flap is slightly higher than Kirkland Flap. Statistical analysis of association of Sextant with Flap Technique. P value <0.001, statistically significant by Chi Square Test shows that Kirkland flap is done significantly more than Modified Widman flap in all sextants.

| | | Type of Flap | | Total |
|--------------------------|----|----------------------|----------------------|-----------------------------------|
| | | Kirkland Flap | Modified Widman Flap | |
| Site of Surgery(Sextant) | S1 | 47 | 13 | 60 |
| | S2 | 16 | 17 | 33 |
| | S3 | 44 | 17 | 61 |
| | S4 | 44 | 10 | 54 |
| | S5 | 21 | 6 | 27 |
| | S6 | 49 | 12 | 61 |
| Total | | 221 | 75 | 296 |
| Chi Square Test | | | | |
| | | Value | df | Asymptotic Significance (2-sided) |
| Pearson Chi-Square | | 771.415 ^a | 12 | 0 |

Table 4. Table depicting Gender wise distribution of Flap Technique with statistical comparison.Higher predominance of flap surgeries in males (430). In both the genders the Kirkland flap was the most preferred followed by Modified Widman flap.Statistical analysis of association of Gender with Flap Technique showing there is no significant difference in the choice of flap techniques for males and females. P value = 0.108, not statistically significant by chi square test.

| | | Gender | | Total |
|------------------------|---------------------------|--------------------|------|-----------------------------------|
| | | Female | Male | |
| Type of Flap Technique | Apically displaced Flap | 1 | 7 | 8 |
| | Distal Wedge Procedure | 6 | 3 | 9 |
| | Kirkland Flap | 208 | 323 | 531 |
| | Modified Widman Flap | 66 | 72 | 138 |
| | Papilla Preservation Flap | 12 | 13 | 25 |
| | Undisplaced Flap | 8 | 12 | 20 |
| Total | | 301 | 430 | 731 |
| Chi Square Test | | | | |
| | | Value | df | Asymptotic Significance (2-sided) |
| Pearson Chi-Square | | 9.023 ^a | 5 | 0.108 |

with periodontitis [35].

The limitations of the study is that it is limited to the patients from one centre as well as certain factors like periodontal parameters, patient compliance, operator skill, etc.were not taken into consideration. It also has the inherent limitations of any retrospective study. But to a certain extent the larger sample size used in the study could overcome the shortcomings.The future scope of the study would involve assessment by taking consideration of patient and operator factors in the choice of flap technique and Randomized control trials among different flap techniques to evaluate its outcome on periodontal healing.

Conclusion

Within the limits of the present study it can be concluded that the most preferred Flap surgery technique was Kirkland flap. There

was a significant association between the choice of flap technique and the Site of surgery.

Clinical Significance

The clinical significance of this study was to report the influence of the site of surgery on the choice of Flap design.

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Authors Contribution

Kadambari Sriram contributed to the acquisition of data, analysis,literature collection, and in drafting the article and revis-

ing it critically for important intellectual content.

Dr. Sheeja Varghese contributed in conception, study design, interpretation of data, formatting, manuscript preparation, supervision and guidance.

Dr. Santhosh Kumar contributed to the editing, supervision and final approval of the submitted version of the manuscript.

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