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A Comparitive Evaluation of Single Flap Approach Versus Double Flap Approach for Periodontal Pocket Reduction in Suprabony Defects: A Split Mouth Study.

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KEYWORDS

Flap Approach, Periodontal Pocket Reduction

ABSTRACT:

Aim: The aim of the study is to compare the single flap approach (SFA) versus double flap approach (DFA) for periodontal pocket reduction in supra-bony defects.

Materials and methods: A total of 100 sites in 25 patients will be selected with chronic periodontitis having two or more supra-bony defect. Sites will be equally divided in split mouth design.

The selected sites will be divided equally into two groups, by convenient sampling method in split mouth design

GROUP A: In Group A, sites will be treated with single flap approach in supra-bony defects, a test site. GROUP B: In Group B, sites will be treated with double flap approach in supra-bony defect, a control site.

All the clinical parameters will be assessed at baseline and postoperatively at 3 and 6 months.

Result: Overall improvements in the parameters were observed. statistically significant results were observed in PPD, CAL, SBI in the test group from baseline to 3 months and highly statistically significant results were seen from 3 to 6 months. Highly significant results were observed in EHI. But no statistically significant results were observed with respect to PI.

Conclusion: The SFA resulted in better improvement in reduction in pocket depth with gain in CAL, early wound healing, less postoperative discomfort, and better patient-centered outcomes.

Introduction:

Chronic periodontitis has been defined as "an infectious disease resulting in inflammation within the supporting tissues of the teeth, progressive attachment loss, and bone loss." This definition outlines the major clinical and etiological characteristics of the disease:
(1) microbial plaque formation, (2) periodontal inflammation, and (3) loss of attachment and loss of alveolar bone.[1] It is inflammatory disease of supporting tissues of teeth caused by specific microorganism or group of specific microorganisms resulting in progressive destruction of periodontal ligament and alveolar bone with pocket formation, recession or both. The clinical sign of chronic periodontitis, namely inflammation, pocket formation, attachment loss, and bone loss are considered to be due to the direct site-specific effect of subgingival plaque accumulation.[1]

Periodontal therapy is directed at slowing or arresting the disease progression and regeneration of lost periodontal tissues. From this perspective, various treatment modalities have been proposed with modifications to minimize the surgical trauma involved during periodontal treatment and to improve patient compliance.[2]
Minimally invasive surgery (MIS) is an innovative

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approach that aims to produce minimal flap reflection with gentle handling of the soft and hard tissues, thereby resulting in less tissue injury. MIS has been reported not only to reduce postoperative pain and improve healing, but also to yield significant improvements in clinical outcomes. Initially, minimally invasive surgical procedures were proposed for the treatment of intraosseous defects through the single-flap approach (SFA) in 2007.[2]

The Single Flap Approach (SFA) is a simplified, minimally invasive surgical approach to access intraosseous periodontal defects given by Trombelli et al. The basic underlying principle of the SFA consists of the elevation of a limited mucoperiosteal flap to allow access to the defect from either the buccal or oral aspect only, depending on the main buccal/oral extension of the lesion, allowing the interproximal supra-crestal gingival tissues to remain intact.[3]

The primary advantage of the SFA compared to the double-flap approach (DFA) is flap repositioning and suturing to the undetached papilla, thereby preventing contamination by blood clots and reduction in the post-surgical recession. The SFA, when used alone or in combination with guided tissue regeneration or any other bone substitutes to treat deep intra-bony defects, has shown significant clinical outcomes. The SFA helps optimize primary closure of the flap, thus enabling functional and esthetic outcomes to be achieved.[2]

Therefore, this study will be designed to gain insights into the impact of the SFA over the DFA on periodontal flap treatment outcomes, especially periodontal pocket reduction and patient compliance in terms of discomfort and time taken for surgical procedures.

Materials and methods:

Ethical approval: The institutional ethics committee of Bharati Vidyapeeth (Deemed to be University) medical college and hospital, Sangli (BV(DU)MC & H/Sangli/ IEC/ D-65) has approved the present study.

Source of data: A total of 100 sites in patients with chronic periodontitis aged 18-60 years having two or more supra-bony defect and probing pocket depth ≥5mm with radiographs revealing the defect in different quadrants had been selected from the Outpatient Department of Periodontology, Bharati Vidyapeeth (Deemed to be university) dental college and hospital, Sangli. The selected sites were divided equally into two groups, by a convenient sampling method.

GROUP A: In Group A, sites were treated with a single flap approach in supra-bony defects, a test site. GROUP B: In Group B, sites were treated with double flap approach in supra-bony defect, a control site. Before surgery, every patient had undergone thorough mechanical debridement manually along with ultrasonic scaling. All patients were educated on the importance of the maintenance of oral hygiene and were advised with oral hygiene instructions. Periodontal re-evaluation was performed after 4–6 weeks. Surgery would have been postponed until the plaque and bleeding scores were decreased and patients exhibited minimal inflammation with good soft tissue conditions.

Dental laboratory procedure:

1. The plaster model was prepared from the alginate impression material of both maxillary and mandibular teeth for all the patients in Group A and Group B.
2. Custom made stents were fabricated for the selected groups. These stents were of the same thickness with groove placed in the line of supra-bony defect adjacent to the study teeth. This groove was used as a fixed reference point for all the preoperative and postoperative measurements. Then to assess the elongation or foreshortening of the radiographs a steel ball of 3 mm in diameter was included in the stent.
3. Patient undergone all necessary blood investigations

Incisions were made using surgical instruments to minimize the trauma to the tissues, which can help to promote early wound healing. A site with only probing depths on either the buccal or palatal/lingual side was scheduled for the SFA (test site). A site with pocket depths on both buccal and palatal/lingual sides was scheduled for the DFA (control site) considering the fact that the presence of pockets on both sides is an ideal indication for DFA.

All surgical procedures were performed by 1 investigator using 2% lignocaine with adrenaline (1:200,000) under aseptic conditions.

At the test site, where the SFA was performed (either buccal or palatal/lingual), sulcular incisions were made along the gingival sulcus using a surgical blade. A full-thickness mucoperiosteal flap without vertical incisions was reflected on only 1 side (i.e., the buccal or palatal/lingual side). Incisions were restricted to the extension of the defect to minimize the surgical site involvement. After gaining access to the base of the pocket complete root planing was performed manually

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to ensure that any subgingival calculus and altered cementum present were removed. After complete debridement, the mucoperiosteal flap was repositioned and secured with 3-0 silk suture using the continuous sling method of suturing.

At the control site, the DFA (both buccal and palatal/lingual) will be performed using crevicular and interdental incisions. A full-thickness mucoperiosteal flap on both sides was reflected and thorough debridement and root planing was done. Then the mucoperiosteal flap was repositioned and secured with 3-0 non-absorbable silk suture using the simple interrupted method of suturing,

All the clinical parameters (Plaque index (Silness and Loe,) Probing pocket depth Clinical attachment level Sulcular bleeding index Wound healing index (EHI) and the radiographic parameters were assessed at baseline and 3- and 6-months post operatively.

INCLUSION CRITERIA:

1. Patients aged 18-60 years
2. Patients who have not undergone periodontal procedure in the last 6 months.
3. At least 3 teeth should be involved with a probing pocket depth of >5 mm and horizontal bone loss.

EXCLUSION CRITERIA:

1. Patients with systemic diseases.
2. Patients on medications affecting periodontal status.
3. Patients with history of smoking
4. Patients with a history of chewing tobacco.
5. Pregnant or lactating women
6. Patients with grade III mobility
7. Teeth with furcation involvement.
8. Teeth with active caries.

Results:

Intergroup comparison of plaque index score between Group A (SFA) and Group B (DFA). **Changes from baseline to 3 months and 6 months:** Overall efficacious results were seen in Group A. But no statistical difference was observed using the unpaired t test (Table 1 and Graph 1A)

Intergroup comparison of PPD, CAL, SBI level score between Group A and Group B. **Changes from baseline to 3 months and 6 months**: Overall efficacious results were seen in Group A. Statistically significant results were seen from baseline to 3 months whereas highly significant results were seen from 3 months to 6 months was observed using unpaired t test (Table 1 and Table 2) (Graph 1B, 1C, 2A)

Intergroup comparison of wound healing index score between Group A and B. Changes from baseline to 3 months and 6 months: Overall efficacious healing was seen in both groups with improved healing in Group A showing highly statistically significant difference using unpaired t test.(Table 2, Graph 2B).

Intragroup comparison of PPD in Group A and B from baseline to 3 months, baseline to 6 months and 3 months to 6 months showed statistically significant results from baseline to 3 months and height significant results from baseline to 6 months and 3 months to 6 months. (Table 3 and Graph 3)

Table 1: Intergroup comparison between Group A (Test Site) and Group B (Control Group) in relation to plaque index, Probing Pocket Depth and Clinical attachment loss

Plaque Index	**Group A (Test Site) Mean (SD)**	**Group B (Control Group) Mean (SD)**	**Unpaired t test**	**P value, Significance**
Baseline	**2.58 (0.49)**	**2.6 (0.49)**	**t = -0.201**	**p =0.841**
3 months	**1.86 (0.21)**	**1.92 (0.27)**	**t = - 0.521**	**p = 0.754**
6 months	**1.23 (0.32)**	**1.4 (0.42)**	**t = - 0.921**	**p =0.267**
PPD	**Group A (Test Site) Mean (SD)**	**Group B (Control Group) Mean (SD)**	**Unpaired t test**	**P value, Significance**
Baseline	**5.2 (0.69)**	**5.08 (0.85)**	**t =0.769**	**p =0.444**

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3 months	3.13 (0.57)	4.0 (0.69)	t = - 3.452	p = 0.005*
6 months	2.06 (0.63)	3.52 (0.5)	t = -6.81	p < 0.001**
CAL	Group A (Test Site) Mean (SD)	Group B (Control Group) Mean (SD)	Unpaired t test	P value, Significance
Baseline	5.42 (0.49)	5.26 (0.72)	t = 1.288	p =0.201
3 months	3.16 (0.51)	4.0 (0.56)	t = - 4.09	p =0.012*
6 months	2.34 (0.75)	3.62 (0.86)	t = - 7.284	p < 0.001**

Table 2: Intergroup comparison between Group A (Test Site) and Group B (Control Group) in relation to sulcular bleeding index and wound healing index

Sulcular bleeding index	Group A (Test Site) Mean (SD)	Group B (Control Group) Mean (SD)	Unpaired t test	P value, Significance
Baseline	3.64 (0.48)	3.6 (0.49)	t = 0.408	p =0.684
3 months	2.0 (0.0)	2.16 (0.37)	t = -3.055	p =0.003*
6 months	1.0 (0.0)	1.16 (0.37)	t = -3.089	p< 0.001**
Wound healing index	Group A (Test Site) Mean (SD)	Group B (Control Group) Mean (SD)	Unpaired t test	P value, Significance
Baseline	1.6 (0.49)	1.76 (0.43)	t = -1.723	p =0.088
3 months	3.0 (0.0)	2.76 (0.43)	t =3.934	p< 0.001**
6 months	3.92 (0.27)	3.28 (0.45)	t = =8.540	p< 0.001**

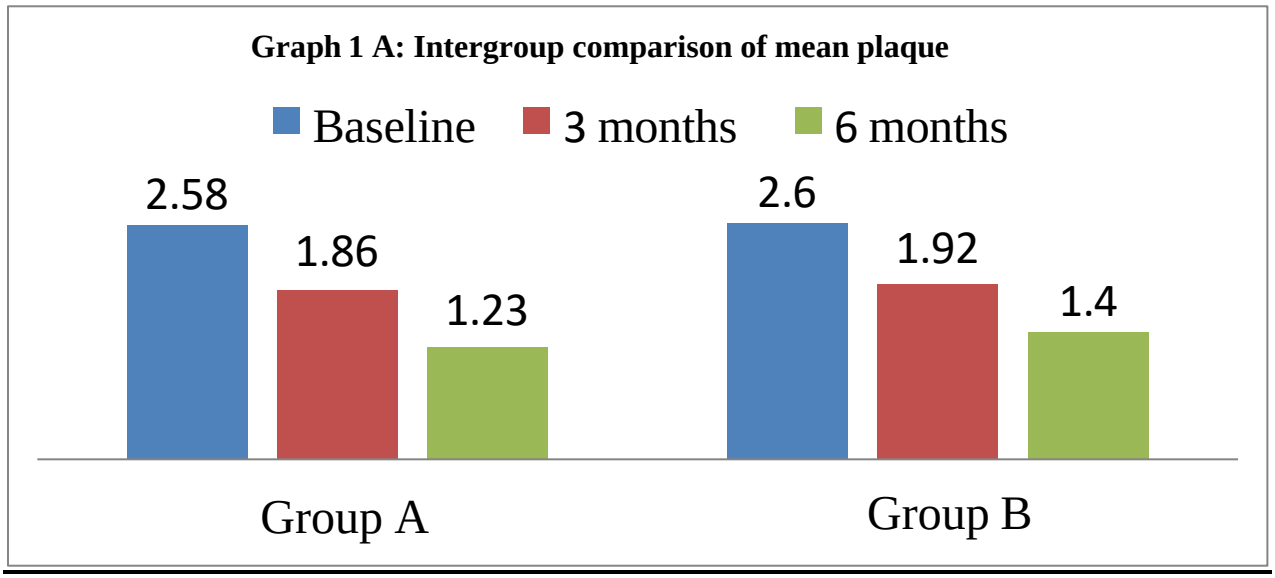

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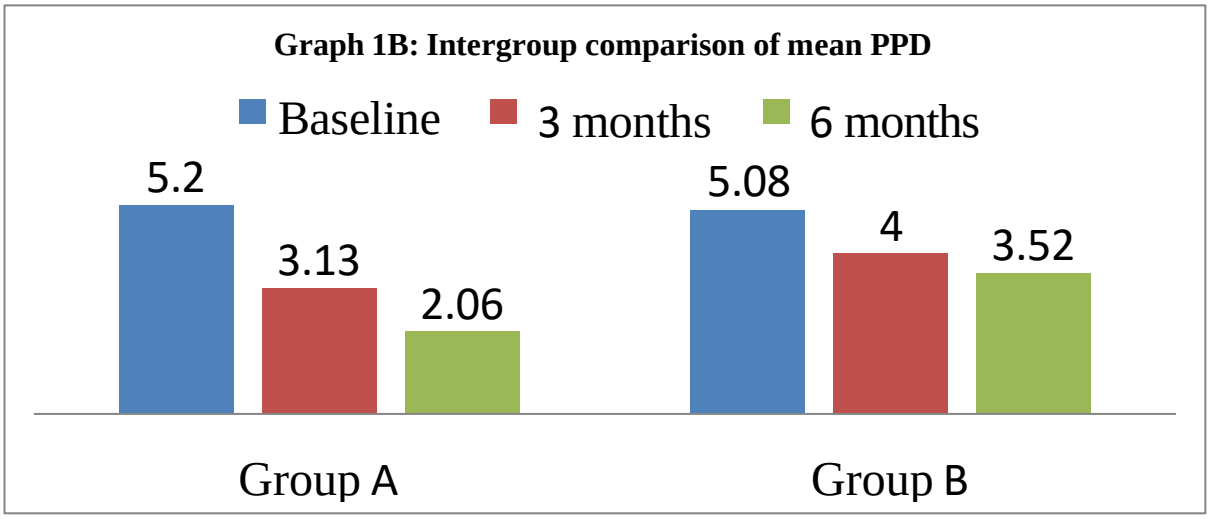
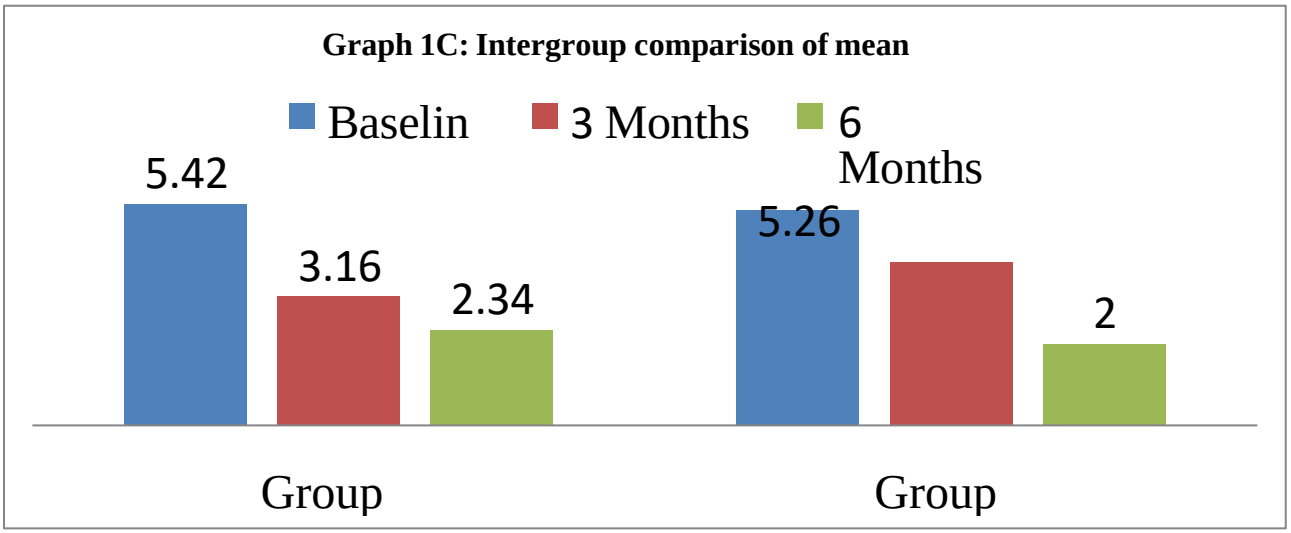
Table 3: Intragroup comparison of periodontal pocket depth

PPD	Group A (Test Site) Mean (SD)	Group B (Control Group) Mean (SD)
Baseline	5.2 (0.69)	5.08 (0.85)
3 month	3.13 (0.57)	4.0 (0.69)
6 month	2.06 (0.63)	3.52 (0.5)
Repeated Anova F test	F = 23.87	F = 19.82
P value, Significance	p< 0.001**	p< 0.001**
Baseline vs 3 month	p =0.002*	p =0.121
Baseline vs 6 month	p< 0.001**	P =0.045*
3 month vs 6 month	p< 0.001**	p =0.098

p>0.05 – not significant *p< 0.05 – significant **p< 0.001 – highly significant





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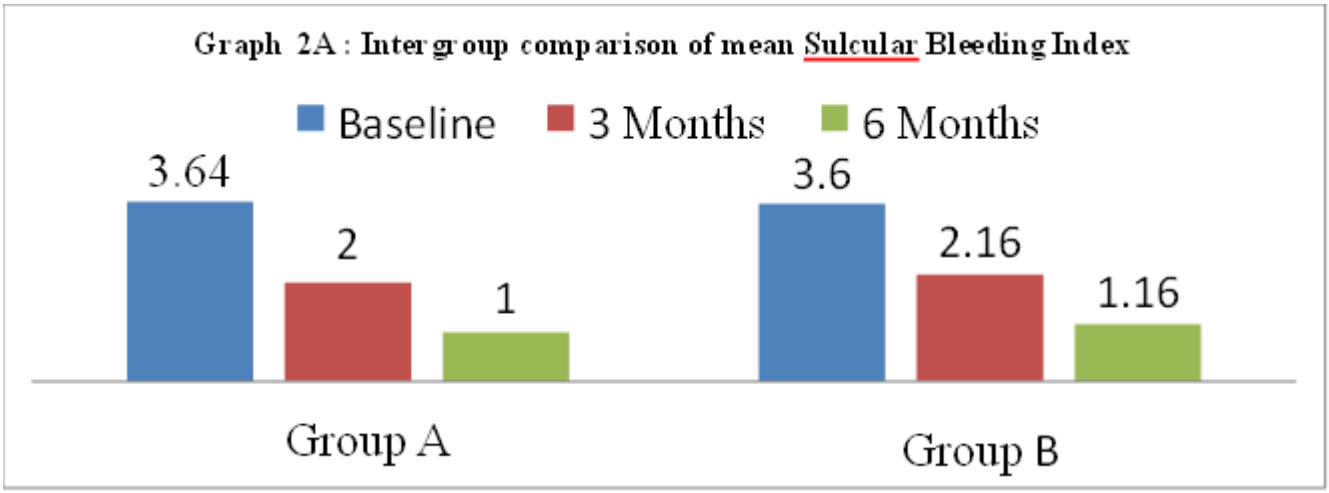

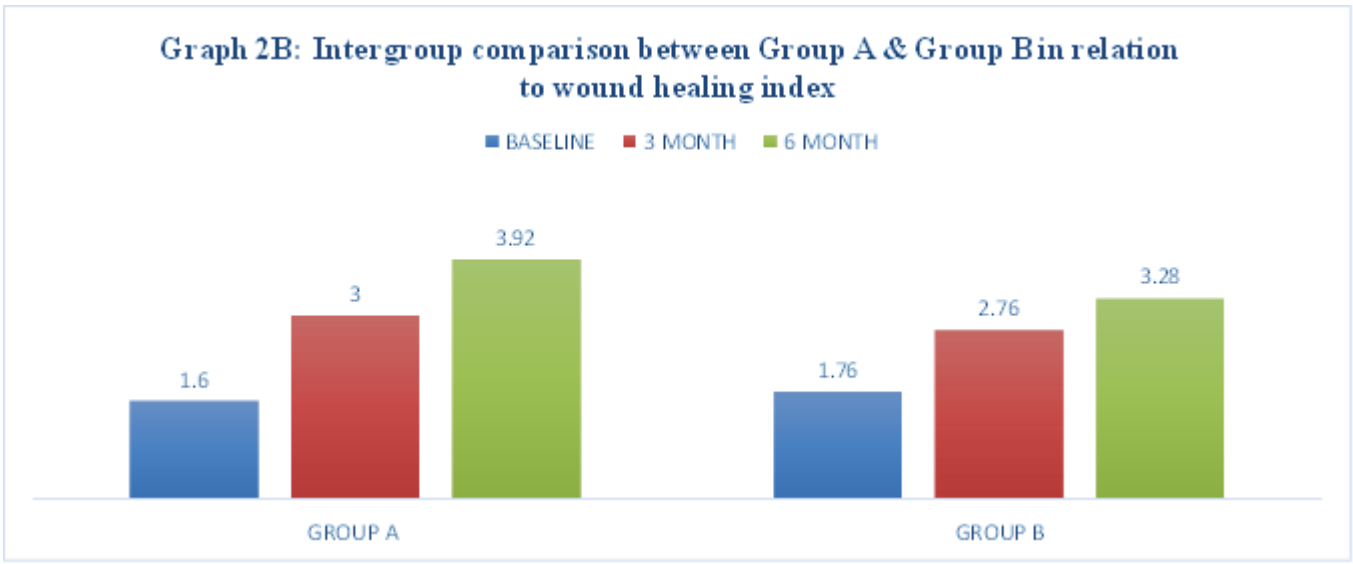

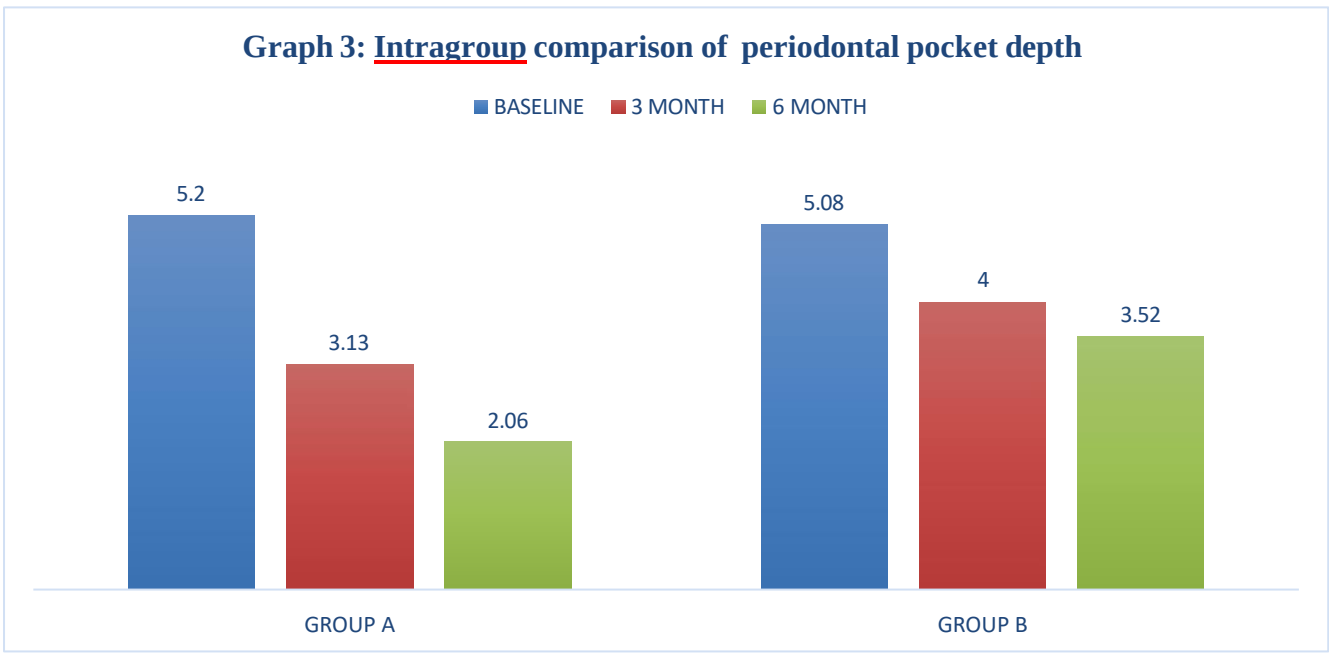

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Discussion:

The goal of periodontal flap surgery is to improve the accessibility and visibility of the root surfaces and underlying bone, thereby allowing clinicians to alleviate the disease activity and to perform regenerative procedures.[4] Double flap approach (DFA) which is also the conventional approach is used to provide access to root surfaces for pocket elimination. However, shortcomings of the DFA are the post-surgical complications like bleeding, swelling, postoperative pain, gingival recession, root hypersensitivity, lack of primary closure of the interdental space, flap dehiscence, and membrane exposure.[5] Therefore, contemporary treatment approaches are useful to overcome these potential postsurgical complications.

The development of minimally invasive techniques (MIS) with the use of magnification greatly influencing the clinical outcomes in delicate tissues such as the gingiva. Papilla preservation technique to modified MIS procedures are the few modifications to these techniques, the SFA was proposed as a way to limit the flap elevation in relation to the periodontal defect and to handle the soft and hard tissues gently.[6,7,8,9]

The SFA has many clinical benefits. Firstly, provision for easy flap repositioning and suturing, along with easy stabilization to the undetached papilla, hence promoting wound healing by primary intention. Secondly, it limits the surgical trauma to the vascular supply of the interproximal supracrestal soft tissues due to limited flap elevation promoting faster wound healing, especially at the incision line[8,3,5].The aesthetic impairment of the patient is limited due to intact interdental papilla, reduced post- surgical gingival tissue shrinkage and excellent wound stabilization.[5,10]

In the present study, the improvement in the PI, PPD, CAL and SBI scores are suggestive of good oral hygiene maintenance and favorable clinical outcomes in both groups.

The mean PPD reduction in both groups from baseline to 3 and 6 months is in accordance with several studies by Trombelli et al[8,5,11]. However, the PPD scores showed statistically significant changes from baseline to 3 months and 3 months to 6 months at either site, suggestive of stable periodontal support and good oral health maintenance after surgery. These results indicate that the SFA and DFA are equally effective for reducing PPD as long as patients maintain good oral hygiene.

Pocket depth was measured at baseline, 3 months, and 6 months in our study. Pocket depth was measured at 3 months because healing during the third week features the first histological evidence of new connective tissue attachment of the flap. From the fourth week until the end of the third month, the healing features less proliferative activity, and connective tissue maturation and osseous remodeling become more dominant elements. Within 4–5 weeks, the flap is completely reattached to the bone and teeth, with no differences from the neighboring tissue[12,13].

The SFA group showed a significantly greater CAL gain from baseline to 3 months, and a slight improvement in CAL from 3 to 6 months. In the DFA, there was CAL gain but better results were observed with SFA. These results are in accordance with previous studies in which a significant mean CAL gain was reported for the SFA when compared with the DFA[8,5,11]. However, the amount of CAL gain was minimal as compared to previous studies that included deep intraosseous defects (e.g., 4.5 mm)[8].

Clinical studies have reported that the SFA for periodontal intra-bony defects resulted in a significant added benefit when compared to the DFA in terms of various clinical parameters such as PPD, CAL, and GR. However, it should be noted that the present results were obtained in the treatment of periodontal supra-osseous defects/horizontal bone loss. Even though horizontal bone loss accounts for 92% of the total bone loss, most previous studies were done in intraosseous defects, whereas prevalence of intra-bony defects has been shown to be significantly lower, ranging from 8% to 30.2%. Although the SFA and DFA are surgical techniques designed for the treatment of intraosseous defects, in the current study an attempt was made to compare the SFA to the DFA for supra-osseous defects.[2]

In the present study, although the results obtained by the EHI showed any statistically significant improvement after surgery, clinically, the SFA showed noticeably faster healing than the DFA. Earlier studies reported by Trombelli et al. showed that the SFA minimized trauma and improved wound healing.[6,5]

However, the SFA with vertical releasing incisions is not well established and has not often been used to treat intraosseous defects, The SFA with vertical releasing incisions might be helpful in decreasing the exposure of the surgical field. Overall, these observations are suggestive that the SFA as a stand- alone procedure provides ample surgical access for adequate subgingival

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instrumentation. The SFA initiates the primary intention of healing by stabilizing the wound, thereby allowing uneventful tissue formation and maturation[2].

Randomized controlled clinical trials with a larger sample size are required to prove the efficacy of SFA for periodontal pocket reduction. These 2-flap approaches were originally designed for periodontal regeneration, but bone grafts and biomaterials were not used in the present study.

Conclusion:

To summarize with both the flap approaches showed improved clinical parameters and healing from baseline to 3 and 6 months but the results were statistically significant in Group A and better healing after surgical procedure was observed with better patient outcomes and less post operative pain due to the minimal invasive approach in Group A.

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