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Coronally Advanced Flap a Predictable Procedure for Gingival Recession Management- A Case Series

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Abstract
Oral health is not limited on maintaining merely good hygiene but is also dependent upon mastication efficiency and harmonious occlusion. There can be various factors which affect the mastication efficiency including mal-positioned tooth, tooth brush trauma and root denudation. Root denudation is often accomplished with hyperemia and tooth sensitivity which causes gingival recession. It is usually associated with accumulation of dental plaque and forms the basis of clinical attachment and tooth loss, ultimately leading to tooth extraction and bone deformities. The overall impact is not only loss of masticatory efficiency but also psychological depression affecting personal confidence also. Since esthetics is considered as part of individual physical development, so gingival recession is a major hurdle for maintaining individual esthetic health. Although, there are a variety of treatment options available for gingival recession ranging from the free gingival grafts to Lateral pedicle grafts, advanced flaps have an additional benefit of providing good esthetic outcomes. Coronally advanced flap is a typical example which has been used extensively to provide good colour blending and is often associated with less comorbidity and excellent esthetic results. In combination also, it is considered as a good therapeutic modality. It can be used for single/multiple recession defects. All techniques have their own merits and demerits and they are often dependent upon many factors like depth, anatomy and supportive factors in the associated gingival recession defect. Hence, a case series has been presented with single/multiple recession defects of patients with esthetic concerns and advanced bone loss. The aim of this case series is to provide an insight to gingival recession treatment using Coronally advanced technique to achieve excellent esthetic outcomes.

Key words –Coronal flap, graft, denudation, esthetics, multiple recession , root exposure

Introduction

Gingival recession refers to exposure of root surface due to apical shift in the position of gingiva.[1]It is usually associated with excess hyperemia and tooth sensitivity. The ultimate effects are root sensitivity, chances of arrested caries and finally tooth loss. Early stages are having good prognosis showing almost complete soft tissue regeneration. Later, the bone los starts and it is accompanied with tooth mobility and advancement of periodontal disease. Gingival recession is a common esthetic problem with predilection for males and even affecting children with minor frequency of 8 %.[2,3] Etiology can be related to tooth malposition, trauma and even genetic predisposition.[4] Since it is the beginning of periodontal disease so it has be managed timely to prevent further progression.

The treatment of gingival recession aims at maintaining recuperation along with original blending with surrounding tissues. [5] The treatment modalities comprise of either pedicle soft tissue graft procedures (which are either advanced or rotational) or they can be classified as free soft tissue graft procedures (further classified as epithelialized graft or sub-epithelial connective tissue graft).[6] The rotational flap procedures involve the laterally sliding flap, double papilla flap and oblique rotated flap while the advanced flap procedures are associated with the coronally advanced flap and semilunar coronally advanced flap.[7] Besides these esthetic procedures modalities, some adjuncts are also used like guided tissue regeneration (GTR), Enamel matrix derivatives (EMD), Chorian membrane , alloderm, mucograft and lastly, platelet concentrates along with like Platelet-rich fibrin and Platelet-rich plasma .[8-15]

An ideal outcome of a particular root coverage procedure is to maintain the environment with absence of plaque, adequate periodontal support (absence of either horizontal or vertical bone loss) and sufficient attached gingiva to prevent reoccurrence at the later stage. Another important clinical entity which is associated with the root coverage procedures is the amount of keratinized gingiva. [16]

Rotational flap procedures especially Coronally advanced flap have proven to be a good esthetic procedure for obtaining root coverage. [5] The procedure has been used for both single and multiple recessions defects and has atypical advantage of providing adjunct benefits also. Considering the beneficial effects of Coronally advanced flap, a case series has been presented to highlight the advantage of each indication and provide the future benefits of each surgical procedure. Prior to the procedures, written informed consents were taken from each patient

Case Series

Case-1 -A 42 years old male came to the Department of Periodontology, Maharishi Markendeshwar College of Dental sciences and research (Deemed to be university) with a chief complaint of unpleasant looks in lower front tooth region. On clinical examination, it was found that Miller's class III gingival recession was present on teeth number 31 & 41 along with short vestibule. Pre-recession width (RW), Recession Depth were recorded University of Michigan "O" Probe (with William's markings at University of Michigan "O" Probe (with William's markings at 1,2,3,5,7,8,9 & 10 mm) while width of keratinized tissue (KT) was recorded with reamer and rubber stopper as the protocol mentioned by Aroca et al. (2009).[17] Recession depth (RD) was 3 mm pre-operatively while recession width (RW) was calculated to be about 4 mm on both teeth ,31 & 41 respectively. Width of keratinized tissue came to be around 2 mm owing to shorter vestibular depth (Fig.-2). Full mouth scaling and root planing was done by hand and ultrasonic instruments, at least 1 month prior to the surgery and oral hygiene instructions were reinforced at each visit. After completion of phase I therapy, patients were scheduled for surgical phase.In this case, combination of vestibular deepening along with Bridge flap was performed (Fig-2).After preparation, later connective tissue graft was also harvested and sutures were placed (Fig-3).The procedure involved Arcuate incision with raising of full thickness flap followed by graft harvesting from the hard palate. It was followed by placement of periodontal dressing. Patient was recalled after 10 days for suture and periodontal dressing removal. Evaluation was performed after 1 and 3 months (Fig-5 & 5).

Case-1-Combination of connective tissue graft & Bridge flap

Fig.-1. Pre-operative view showing gingival recession with respect to tooth no. 31 &41

Fig.-2. Incisions given and recipient site prepared

Fig.-3. Sutures given at recipient site

Fig.-4. Post –operative view-3 months showing partial coverage of recession defect.

Fig.-5. Post –operative view-3 months at donor site

Case-2

Another patient, aged 35 years old reported with a chief complaint of unpleasant looks upper front teeth. On clinical examination, it was found that Miller's class I gingival recession was present on teeth number 21 (Fig-6). Even, a stent was placed to measure the exact recession depth.

After giving adequate local anaesthesia [2 % lignocaine hydrochloride with adrenaline 1:200000], the recipient site was prepared for coronally advanced flap (CAF). Using No. 15 Bard Parker blade, 2 apically divergent vertical releasing incisions extending from a point coronal to the CEJ (cemento-enamel junction) at the mesial and distal line axis were given towards the lining mucosa. Then, a split-thickness flap was prepared by sharp dissection at mesial and distal portions of the recession defect. These portions were interconnected by an intracrevicular incision. (Fig-6 & 7).Apical to the receded soft tissue margin on the facial aspect of the tooth, a full-thickness flap was elevated by using Molt's Periosteal elevator (No. 9) to achieve maximum thickness for root coverage . Approximately 3mm apical to the marginal bone, a horizontal incision was made which was followed by blunt dissection into the vestibular lining mucosa so that muscle tension was relieved. This blunt dissection was extended buccally and laterally to make the mucosal graft tension free while positioning it coronally at the level of CEJ. Then, the facial portion (mesial and distal portion of interdental papilla coronal to flap) was de-epithelialized using currette/ cumine scaler to allow for the final placement of the flap margin..

The central area of the flap was stabilized by suturing (sling suture) and a periodontal dressing (coepack) was given to avoid any direct trauma to the working/operative site (Fig-8). Patients were prescribed the necessary antibiotics, analgesics, anti-inflammatory drugs and chlorhexidine mouthwash. Patient was recalled after 1 week, 3 months and 6 months and complete root coverage was observed (Fig-9).

Case-2 -Coronally advanced flap alone with vertical Incisions

Fig.-6. Pre-operative view showing gingival recession with stent with respect to tooth no. 21.

Fig.-7. Incisions given and flap raised.

Fig.-8. Sutures given at the recipient site.

Fig.-9. Post –operative view-6 months showing complete coverage.

Case-3

Another patient, aged 35 years old reported with a chief complaint of unpleasant looks upper front teeth. On clinical examination, it was found that Miller's class I gingival recession was present on teeth number 22-23 (Fig-10).

After giving adequate local anaesthesia [2 % lignocaine hydrochloride with adrenaline 1:200000], the recipient site was prepared for coronally advanced flap (CAF).The procedure involved absence of vertical incisions followed by raising of full thickness flap.[22] These portions were interconnected by an intracrevicular incision. (Fig-11).After creating new papillae, the flap was stabilized by suturing (sling suture) and a periodontal dressing (coepack) was given to avoid any direct trauma to the working/operative site (Fig-12). Patients were prescribed the necessary antibiotics, analgesics, anti-inflammatory drugs and chlorhexidine mouthwash. Patient was recalled after 1 week and 3 months and complete root coverage was observed (Fig-13).

Case-3-Coronally advanced flap with multiple recessions

Fig.-10. Pre-operative view of multiple recession at tooth no.22 &23.

Fig.-11. Flap raised and new papillae created.

Fig.-12. Sutures given at recipient site.

Fig.-13. Post –operative view-3 months showing Complete coverage

Results

1st case was having interproximal bone loss with presence of Miller's class 3 recession defect. Hence , only partial coverage was achieved in that case. However for the other cases with isolated /multiple recessions, full coverage was achieved , post-operative after 3 and 6 months

Discussion

Oral health is considered completely incomplete if esthetics is not restored. Maintenance of esthetics is entirely dependent upon good plaque control and periodontal regeneration. Root coverage procedure aim to achieve the dual task of root coverage and augmentation of keratinized gingiva. Among these root coverage procedures, rotational flap procedures are quite popular. The history of rotational flap procedures dates back to the beginning of 20th century when **Younger (1902), Harlan (1906) and Rosenthal (1911)** invented the use of pedicle or free soft tissue grafts to cover the denuded root surfaces.[6] These procedures were mainly based on either presence of single layered lateral pedicle or coronally positioned muco-periosteal flap procedures**.** [17] These procedures were quite advantageous and produced minimal strain on the patients. Later, there was the advent of double layered techniques in which there was a combination of surgical procedures with grafts. It started from the combination of Connective tissue graft (CTG) with Coronally advanced flap (CAF).[18-19] These techniques not provided the recession coverage by flap but also aimed to provide additional benefits by submerging graft beneath them. Later, adjuncts like PRF and GTR provided superiority of reduction of pocket depths along with excellent wound healing.[8,9,20]

Now the trend has shifted towards the evolution of new techniques for the surgical treatment of multiple adjacent recession type defects (MARTD) also.[21,22] These techniques were chiefly associated with the coronally advanced flap along with a supra-periosteal envelope technique (SET) of utilizing sub-epithelial connective tissue graft & free gingival graft .[21-23,33] Further , there were addition of some superior adjuncts like enamel matrix derivative**,** platelet rich plasma, alloderm and platelet rich fibrin which provided additional benefits of clinical attachment gain, keratinized tissue width augmentation along with recession coverage.[24-27] Even application of orthodontic button was utilized as an additional benefit to provide more stability.[28] Enamel matrix derivative (EMD), obtained from porcine embryogenesis, is defined as an amelogenin derivative that has been developed to promote periodontal regeneration.[24] Less recession post operatively has been found with EMD was performed when compared to guided tissue regeneration technique for the treatment of intra-bony defects.[9] Platelet Rich Plasma (PRP) is defined fraction of plasma which provides a rich source of growth factors and could be effective in stabilization and revascularization of the flap or grafts. The autologous Platelet Rich Fibrin clot (PRF) was used initially in implant surgery by **Choukroun et al** in **2000** in order to improve bone healing.[5,26] In spite of any additional scientifically proven clinical benefit, the homogeneous fibrin network is still considered as an excellent healing biomaterial having immense potential for bone regeneration and soft tissue wound healing.[24]

.All these above mentioned procedures are in combination with coronally advanced flap. There are many benefits of the said procedure like original recuperation, perfect tissue blending and less comorbidity.[5] This procedure is based on the coronal shift of soft tissue apical to the denuded root surface with multiple variation like full-thickness flap and partial thickness .[29-30] As the time advanced , modifications were done by **Zucchelli & De sanctis (2000; 2007)** and **Zucchelli et al (2009)**.[21-22] Another variant of this technique is

Semilunar coronally advanced flap which was originally introduced in **1907** by **Harlan,** but the technique that is utilized in modern periodontal surgeries was devised by **Tarnow (1986)**.[31]This procedure has the advantage of being suture-less and is comparatively less traumatic than other techniques.[32]

If a comparative evaluation is performed, findings from meta-analyses demonstrates that application of sub-epithelial connective tissue grafts (SCTG) or connective tissue grafts (CTG) in combination with coronally advanced flap leads to a statistically significant gain in root coverage as compared to GTR-resorbable membrane procedures or Coronally advanced flap procedures alone .[34-35] The results of many studies depict that combination of CTG and Coronally advanced flap offer comparable results in terms of esthetics..[36-37] Even for flap thickness, it was observed by **Baldi et al (1999)** that flap thickness of 0.8 mm was the thresh hold for complete root coverage and below that only partial coverage was achieved.[38] Also, combination of CTG with Coronally advanced flap has resulted in greater root coverage as compared to Coronally advanced flap.[43] Even , when compared to membranes like PRF, the results varied from 60-98 % with CTG group being better than the membranes in terms of gain in keratinized tissue width and Clinical attachment level.[39]

It is quite obvious that the introduction of specific objectives which could be inclusion criteria or search strategies should be based on evidence and scientifically valid information that may effectively reduce the variation in clinical outcomes .It would establish the application and predictability of a specific procedure and improve the effectiveness of clinical practice. Consequently, scientific evidence-based information should be well supported by delineated systematic reviews.[39] An overall comparison of the treatment outcome of commonly employed root coverage procedures is majorly affected by the fact that practically very few studies have presented with suitable documentation in association with presence of clinical data and substantial heterogeneity between studies.[40-41] However, the variability in the treatment outcome for the various procedures, both within and between studies, is large. This indicates that the procedures are quite operator sensitive and are affected by that various factors like the type of defect, amount and quality of adjacent gingival tissue, sample size and the applied inclusion criteria (e.g. patients' selection, methodological quality, type of technique, devices used for measurements influencing the treatment outcome have not been adequately considered.[42]

This clinical review on techniques of Coronally advanced flap has tried to emphasize that treatment modalities , in terms of esthetics, should not be selected on the basis of result evaluation but also on the basis of professional approach and surgical morbidity. Although still the combination of CTG with CAF is considered as the gold standard for root coverage, studies are required to confirm the final outcomes owing to additional benefits of growth factors like PRF.[19] There can be a lot of variations on individual examination of patients and even, professionals can present with different points of view regarding the performed procedures and the achieved final results .In final decision-making, evaluation of general patient characteristics and evaluation of various aspects of the anatomy at the individual defect site are to be set at top preference.[42] New procedures should be devised to improve complete root coverage in Miller's Class I and Class II recession defects. They should be simplified to ensure a wider reproducibility and to decrease the cost– benefit ratio. Progress in the creation of gingival papillae in Miller's Class III and Class IV recession defects is always included in the final outcome. Further research is needed to evaluate the influence of soft and hard tissue attachment to the root on the stability of the results.

Conclusion-Oral health maintenance is a daunting task. It is incomplete without complete treatment of the esthetics. However, the concept lies in the fact that good plaque control along with periodontal regeneration provides excellent benefits for maintain excellent hygiene. From a surgeon point of view, presence of adequate periodontal support along with patient cooperation enhances the future prognosis of an esthetic surgery. Coronally advanced flap being a simplified and successful procedure provides maximum benefits of minimum trauma and additional benefits of simplicity & original colour blending. Hence, the need arises for the dentist to be exceptionally skilled with advanced knowledge of both present and future techniques to achieve a more predictable outcome.

SOURCE OF CONFLICT-Nil

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