Case Report

Pinhole Surgical Technique for treatment of marginal tissue recession: A case series

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Abstract:

The field of periodontal plastic surgery is always a subject of fascination for periodontists, and the importance of pink esthetics is gaining its pace. Preservation of what is existing is more important than its replacement. The same principle also applies to soft-tissue esthetic procedures thereby the concept of minimal surgical invasion came into existence. This article presents a series of five cases with 18 recession sites which were treated with a minimally invasive Pinhole Surgical Technique which resulted in overall root coverage of 96.7% after 6-month follow-up with minimal complications.

Key words:

Minimally invasive, pinhole surgery, root coverage, recession

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INTRODUCTION

With the introduction of new techniques in the management of periodontal diseases, there have been various techniques for treating marginal tissue recession (MTR) in recent years. Each technique has unique indications, advantages, and disadvantages and when proper principles are followed usually leads to successful results. The management of MTR has evolved over decades and currently is the era of minimally invasive surgery (MIS). Based on MIS, principle is the introduction of Pinhole Surgical Technique (PST) in the management of MTR. PST is a very promising minimally invasive technique for the management of Miller's Class I and II type of MTR with the advantages of a pinhole incision with no sutures. The following is a case series which was aimed to define the predictability multiple MTR treated by PST.

CASE REPORT

A total of five patients with complaints of sensitivity of teeth, unesthetic root exposure were taken up for the management of MTR by PST after Institutional Ethical Committee clearance and written informed consent were obtained. All the patients were aged between 25 and 40 years and were systemically healthy [Table 1]. The total number of recession units in these patients was 18 and was of Miller's Class I or II type MTR. The overall assessment showed <20% of bleeding on probing at recession sites [Figure 1]. The parameters measured at baseline and after 6 months are recession height (RH), recession width (RW), Width of keratinized tissue (WKT), mean root coverage (MRC), complete root coverage (CRC), number of days analgesics required, and incidence of postoperative complications. RH was measured as the distance between the cementoenamel junction (CEJ) to the apical most point of the gingival margin. RW was measured as the distance between the gingival margins from medial end to distal end at the level of CEJ. The MRC expressed as percentage was calculated using the formula; baseline RH – postoperative RH/baseline RH × 100. After infiltration local anesthesia, small horizontal incision of 2–3 mm was placed in the height of the mucobuccal fold [Figure 2]. A set of special instruments was used to gain access through the pinhole incision placed in the alveolar mucosa of the centermost teeth with multiple recessions to elevate the mucosal tissues in apicocoronal direction [Figures 3 and 4]. All the muscular and fibrous adhesions are freed away using the instrument through the single pinhole incision, and the supraperiosteal closed blunt dissection was done till the interdental papillae. Complete passive mobilization of the entire mucogingival tissues was made until the tissues advance

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coronally. To stabilize the advanced tissues, collagen membrane was used. The membrane was cut longitudinally having a width of 2 mm each in multiple pieces. The cut membranes were introduced into the pinhole and positioned at interdental papillae until there is sufficient fullness in the papillary tissues for self-holding the mucogingival tissue complex [Figure 5]. There was no other incision placed elsewhere, and there was no requirement of any sutures. The advantages are being minimally invasive, no flap, no other incisions, and no sutures. The entire mucogingival complex moved coronally maintained by fullness of the papillary tissues, and the patient is able to visualize the coverage immediately [Figure 6]. No periodontal dressing was placed. The patients were advised analgesics for 5 days and were informed to discontinue medications when there was the absence of pain. The patients were reevaluated after 1 and 7 days, 3 months, and 6 months [Figures 7 and 8].

RESULTS

The mean RH was 2.77 with a range of 4 mm–2 mm. Out of total 18 sites of MTR treated with PST, 88.8% (16 out of 18 sites) of the sites showed CRC at 6-month postoperative and there was near CRC in 11.1% (2/18) of the sites evaluated. Upon one-way ANOVA analysis for comparison of pre- and postoperative RH and RW parameters, there was statistically significant difference between the values ($P \leq 0.0001$). With the mean WKT preoperatively as 2.11 mm and postoperative as 2.78 mm, there was statistically significant increase in the WKT ($P \leq 0.0001$). The overall MRC was found to be 96.7% in 18 sites with only two sites which achieved partial root coverage [Table 2]. The mean number of days which was required to take postoperative analgesics was 4 days with a maximum number of days being 5 days. The only postoperative complication seen in three-fifth of cases was postoperative swelling [Table 3].

Table 1: Demographic characteristics

Gender	Age
Male	34
Male	29
Female	36
Male	24
Female	30

DISCUSSION

The PST appeared to be very promising in the management of multiple Miller's Class I and II recessions which resulted in highly esthetic root coverage outcome. The methods of assessing the outcomes of any surgical technique are of utmost importance. Without reevaluation, it may be difficult to understand the predictability, effectiveness, and efficacy of a new procedure. The predictability was found to be inversely proportional to the RH and RW.[1] It increases in case of Miller's Class I and II type of MTR. There is an overlapping variation in the results of various studies with various techniques of root coverage and this is because of the different protocols and difference in assessment of outcomes. It has been studied that one of the important parameters to be considered in assessing the outcomes of root coverage procedure is to determine the amount of coverage in relation to mean root length. A root coverage of 5 mm in a 10 mm and 12 mm root length is 50% and 41%, respectively. There is no assessment of the predictability of a technique unless the root length factor is being considered.[2] The effectiveness of a procedure is measured by MRC which is the actual amount of root coverage achieved in individual sites. It was shown that 98% root coverage was achieved with 100% coverage in 89% of sites with connective tissue graft (CTG).[3] Further there was also a cosmetic method of root coverage assessment with before-after panel scoring method,[4] and a root coverage esthetic score with score of <7 was considered as an esthetic failure.[5]

The ultimate goal of any root coverage treatment is also to assess the patient satisfaction and assessment of any technique should include postoperative problems of the patient. When it comes to the amount of postoperative pain after root coverage procedures, it was consistently seen that grafting procedures had higher amount of pain. Out of grafting methods, free gingival graft had a higher incidence of postoperative pain

Table 2: Recession parameters before and after treatment

Case number/ tooth number	RH		RW		WKT		MRC (%)	CRC
	Preoperative	Postoperative	Preoperative	Postoperative	Preoperative	Postoperative		
1/13	4	0	4	0	2	3	100	Present
1/14	3	0	3	0	2	3	100	Present
1/15	2	0	3	0	2	3	100	Present
1/16	2	0	3	0	2	3	100	Present
2/22	2	0	3	0	3	3	100	Present
2/23	3	0	3	0	2	3	100	Present
2/24	2	0	3	0	1	2	100	Present
2/25	2	0	3	0	1	2	100	Present
3/13	4	1	3	1	2	3	75	Absent
3/14	3	1	3	0	1	2	66.6	Absent
3/15	3	0	2	0	1	3	100	Present
4/12	3	0	3	0	2	3	100	Present
4/13	4	0	3	0	2	2	100	Present
4/14	2	0	3	0	3	3	100	Present
4/15	2	0	3	0	2	3	100	Present
5/22	3	0	4	0	3	3	100	Present
5/23	3	0	3	0	3	3	100	Present
5/24	2	0	3	0	2	2	100	Present

RH – Recession height; RW – Recession width; WKT – Width of keratinized tissue; MRC – Mean root coverage; CRC – Complete root coverage

Figure 1: Baseline showing multiple marginal tissue recession

Figure 2: Pinhole incision in alveolar mucosa

Figure 3: Preparation of tissue through pinhole

Figure 4: Set of instruments used

Figure 5: Insertion of collagen membrane

Figure 6: Postoperative at 24 h

Figure 7: Postoperative healing after 1 month

Figure 8: Postoperative healing after 6 months

Table 3: Analgesic needs and postoperative complications

Duration of analgesics required (days)	Postoperative complications
5	Postoperative swelling
4	Postoperative swelling
3	Nil
5	Postoperative swelling
3	Nil

in the early wound healing period than CTG and there was no difference after 3 weeks.[6] At the same time, there was no difference in postoperative pain outcomes when free CTG was compared to subepithelial CTG (SECTG).[7] A retrospective study of 18-month duration revealed that PST is a very effective surgical technique to treat Miller's Class I and II type of MTR, wherein out of 121 sites of MTR treated, there was MRC of 94%. The amount of postoperative complications reported was minimal as pain in 37% cases, mild bleeding in 29% cases, and postoperative swelling in 32% of cases for duration of first 2 days. The study also revealed a high amount of patient satisfaction on the esthetic front with 95% of the patients highly satisfied. The mean number of analgesics taken by PST patients was found to be 1.7 ± 2.6. The mean number of days that the patients in this case series were on analgesics was for 4 days. The only complication noted after PST in this case series was postoperative edema which was severe on day 2 and reduced thereafter in 3 out of five patients.

The overall MRC (96.7%) obtained in this case series was comparable and similar to the previous results.[8] It is also reported that there is an increase in the WKT with a novel modification of coronally advanced flap (CAF). The reasons of such increase were reported to be contribution from the periodontal ligament through granulation tissue and the final settlement of the mucogingival junction (MGJ) in its genetically determined position. The amount of time required by the MGJ to resettle in its original position, thereby leading to increase in WKT is not ascertained yet.[9] When analyzing the significant increase in WKT in the present case series, it was found to be similar to the previous studies with modified CAF.[10] The high amount success in PST can be attributed to being the least invasive procedure with no incisions/sutures. The results are esthetic since they are very obvious to the patients immediately after surgery. It is well understood that vertical release incisions in periodontal flaps do reduce the vascularity of the flap. A good vascular perfusion is the key point in any surgical procedure for faster healing. From an esthetic point of view, the vertical release incisions also lead to unesthetic keloid-like tissues along the incision line. Although there is no significant difference between the outcomes of surgery with or without vertical release incision in terms of root coverage, there exists a difference when esthetic demands are high. In PST, there is an additional biologic, esthetic, and time advantage wherein there is no disruption of the lateral vascular supply, no scar formation, and reduced time.[11] The procedure can even be applied to treat full mouth recessions in one sitting. Hence, the advantage of PST is very obvious which includes least invasiveness, no scar, no sutures, and self-retentive coronal positioning of the MTR. The limitation of PST is it requires specialized instruments and a long learning curve. There are no histological studies available and there is no evidence about the fate of the packed collagen membranes in the interdental papilla region. It is a known fact that absorbable collagen membranes take varied amounts of time for resorption based on various factors. It is also been stated that acellular dermal matrix (ADM) can also be used with a slight modification of the PST.[12] It was reviewed by Chambrone *et al*. that SECTG remains the gold standard in the management of root coverage with a significant increase in WKT.[13] However, other procedures such as guided tissue regeneration also lead to significant improvements.[14] However, the difficulty arises when the patients are more apprehensive for grafting procedures since it involves a second surgical site.[15] In such cases, ADM was proven to be an alternative to CTG.[16] The critical soft-tissue thickness is also considered as an important factor for the success of root coverage and leading to 100% root coverage when the thickness of the flap is >0.8 mm. In PST, there is no elevation of the flap and hence the wholesome soft-tissue thickness available at the host bed is completely utilized.[17] The periosteal reflection hypothesis states that even reflection of the periosteum significantly affects the blood supply to tissues is not widely accepted, but there are at least some transient vascular changes associated with mucoperiosteal flap reflection.[18] In PST where there is no actual separation of the underling tissues, it is proposed that there may be some transient changes in vascularity, but it may be well maintained without disruption and this may be one of the reasons for hastened early wound healing process.

CONCLUSION

The management of multiple recessions in single sitting is advantageous for the patient and becomes a challenge to the clinician to appropriately select the correct technique. Thus, in addition to other minimally invasive techniques for root coverage, PST was found to be promising for the treatment of multiple MTR with overall MRC of 96.7% with minimal patient discomfort and maximal esthetic outcomes. However, the exact nature of the fate of the collagen membranes tucked in the papillary region needs to evaluate along with histological evidence of the outcome of the surgery. It can be very well accepted as a predictive treatment methodology for the management of multiple MTR and as an alternative to various techniques such as Zucchelli's modified CAF and SECTG.

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Conflicts of interest

There are no conflicts of interest.

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