



## Research article

# Management of Class-I and -II Miller Recession Using Modified Technique: A Case Report

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**Abstract.**

**Background:** Gingival recession is characterized by the gingival margin move apically to the mucogingival junction and cause root surface exposure. It causes a high incidence of caries, hypersensitivity and interferes with the appearance of the patient. A variety of materials and periodontal plastic surgery procedures are available to correct mucogingival problems and cover the root surface. Some treatment modifications have been developed to obtain optimal root coverage and better esthetics so that the selection of suitable treatments can affect the treatment results.

**Objective:** To describe the treatment result of gingival recession using several modifications of gingival recession treatment.

**Case Report:** A 42-year-old woman presented to the Dental and Oral Hospital of Hasanuddin University with a chief complaint of sensitive teeth when eating sweets or rinsing. Intraoral examination revealed the malposition of teeth 43 and 33, causing traumatic occlusion. Moreover, there were gingival recessions in the maxilla and mandibular regions. Recession in the maxillary right (12, 13, 14, 15, 16) was treated with tunneling technique combined with platelet-rich fibrin (PRF); recession in the maxillary left (22, 24, 26) was treated with coronally advanced flap (CAF) technique combined with PRF; and recession on mandibular (33, 43) was treated with CAF technique combined with subepithelial connective tissue graft (SCTG).

**Conclusion:** All combination treatments gave satisfactory results for patients but different times of healing.

**Keywords:** coronally advanced flap, gingival recession, platelet-rich fibrin, subepithelial connective tissue graft, tunnel technique

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## 1. Introduction

The recession of gingiva is common in the population and can be present in healthy periodontal tissue on the buccal surface of teeth because of hard toothbrush use. Meanwhile, it can be present on any tooth surface in an individual with poor oral hygiene. Gingival recession is related to the aesthetic gingival problem, higher occurrence of root caries, teeth abrasion, and tooth sensitivity. [1,2]

The common etiologic of gingival recession are local factors, periodontal disease, mechanical force, iatrogenic factors, anatomical factors. Local factors that induced gingival recession are plaque and calculus. Plaque and calculus lead to periodontal inflammation. Besides, it makes the prophylaxis dental care cannot be performed well. Periodontal disease is affected by an immune response to bacteria that present in the plaque, it can cause periodontal defect or both combinations. A mechanical force like aggressive brushing technique and traumatic occlusion can lead to gingival recession. Iatrogenic factors such as orthodontic, restorative, and prosthodontic procedures can cause gingival recession. Orthodontic treatment can change the form of margin gingiva and gingiva papilla. Restorative and prosthodontic procedures associated with crown preparations spread subgingival involving restorations and crowns placed subgingivally, overhanging restorations, and gingival retraction. Anatomical factors such as dehiscence of alveolar bone, aberrant frenal attachment, gingival morphology, and tooth position can play role in the presence of gingival recession. [3,4]

Gingival recession classification which most widely used was Miller's classification : Class I: Type of recession narrow or wide, the tooth position in the arch usually well aligned, marginal tissue recession does not spread to the mucogingival junction, no bone or soft tissue loss interdentally and root closure can be expected one hundred percent. Class II: Type of recession narrow or wide, the tooth position in the arch usually well aligned, marginal tissue recession spread to the mucogingival junction, no bone or soft tissue loss interdentally and root closure can be expected one hundred percent. Class III: Marginal tissue recession spread to or beyond the mucogingival junction, there is tooth malposition bone or soft tissue loss interdentally, partial root closure can be anticipated. Class IV: Marginal tissue recession spread to or beyond the mucogingival junction, severe tooth malposition, severe bone and soft tissue loss in the interdental area, difficult to accomplished root coverage. [2,3]

A variety of materials and periodontal plastic surgery procedures are used for treating mucogingival problems and root surface coverage of gingival recession, including Coronally Advanced Flap or CAF, Connective Tissue Graft or CTG, and Laterally Positioned

Flaps or LPF. Also, Allen [5] introduced a tunnel or suprapariosteal envelope technique for root surface coverage in cases of multiple adjacent recessions. Tunneling was defined as an envelope flap without making a vertical release incision to maintain the integrity of the interdental papilla attachment. Tunneling also included coronal advancement of the flap in an attempt to completely cover gingival recession defects. The choice of procedure depends on the extent of the recession defect, the location of the aesthetic repair needed, and the need for additional gingival tissue graft. However, every dental procedure and material used in periodontal plastic surgery has limitations, with varying degrees of success. [1,6,7]

CAF can coverage the root surface without graft or the addition of regenerative material, but when its use as a single procedure to cover the recession areas is unstable for a long time because it can cause recurrence. The potential of CAF to coverage root recessions

depends on keratinization tissue in an apicocoronally side which is an important parameter in preventing the recurrences of recession.[7]

SCTG is the procedure that effective to get root coverage with a high degree of aesthetic achievement. Indications and procedures that must be carried out to achieve success with SCTG were first introduced by Langer and Langer [8] with a success rate of 80.0-98.4%. SCTG technique is the gold standard of root coverage of gingival recession in periodontal surgery, based on rapid keratinization and adherence. [7,9,10]

Combination treatment procedures for CAF and SCTG or tunneling and SCTG, provide excellent post-surgical treatment results. However, SCTG techniques also have limitations, these limitations cause, platelet-rich fibrin or PRF, acellular dermal matrix either from human or ADM, xenogeneic collagen matrix or XCM, enamel matrix derivatives or EMD, and xenogeneic origin or XADM is used as an alternative treatment. [9,11]

PRF releases fibrin-rich membranes, platelets, and growth factors, it was the second generation of platelet membrane. Developed in France for the first time by Choukroun et al

1. and used specifically in oral surgery. Recent research shows that PRF has release growth factors significantly, which means that PRF can accelerate the healing process. PRF do not require anticoagulation, easy to manipulate and prepare so they can be cut, adapted, and easily sewn. Its use is in improving recession deformity, improving the functional properties of the gingival vestibular region of the tooth, and returning the integrity of gingival keratinization. [1,7,9,12]

Based on this, the objectives of this case report were to illustrate the clinical comparison of class I and class II Miller's gingival recession treatments using tunneling combination PRF, CAF combination PRF, and CAF combination SCTG techniques.

## 2. Case Report

### 2.1. Clinical Consideration

A Female patient aged 42 came to the Dental and Oral Hospital of Hasanuddin University with the main complaint of sensitive teeth when eating sweets or rinsing. Gingival bled easily because of the aggressive technique of toothbrushing in a horizontal direction. The patient had no history of high blood pressure or other systemic diseases, she had no history of allergy and consumption of any drugs in such a long time. On extraoral examination, there are no abnormalities. On intraoral examination, the patient has much calculus on her teeth, no deep caries or filling on the labial or buccal side of the tooth to be treated, malposition of teeth 33, and 43 which causes traumatic occlusion. Bilateral gingival recession of the maxilla (12,13,14,15,16, 22,24,26) and mandibula (33,43). Based on Miller's classification, gingival recession on maxilla region classified as Miller's class I and on mandibula region classified as Miller's class II.

## 3. Clinical Measurement

Parameters were used to evaluate at baseline and one month after the surgical procedure are Recession Depth (RD) defines as the distance between CEJ to the very apical point of the gingival margin, clinical attachment level (CAL) defines as the distance between CEJ to the base of the gingival sulcus and Probing Depth (PD) defines as the distance that record from margin gingiva to the gingival sulcus.

## 4. Pre-surgical preparation

Initial treatment includes professional plaque control by scaling and root planing, then followed by occlusal adjustments of teeth that have traumatic contact because the patient rejected to receive orthodontic treatment. Instructions to the patient in the proper brushing technique which is modified Stillman's technique to prevent abrasive tissue destruction for an appropriate home care maintenance program. The patient controls after four weeks and is re-



examined for the oral cavity condition. Although the gingival inflammation has disappeared, the chief complaint of gingival recession persisted, so periodontal plastic surgery was planned to treat the adjacent gingival defect. Gingival recession measurement using a UNC 15 probe and obtained a gingival recession about 2mm, 2mm, 4mm, 2mm, and 2mm for lateral incisor, canine, first premolar, second premolar, and first molar of maxillary right, respectively. The gingival recession about 2mm, 2mm, and 2mm in the maxillary left lateral incisors, first premolar, and first molar, respectively. The gingival recession about 6mm, 6mm, 5mm, and 3 mm of mandible left of the canine, mandibular right of the canine, first premolar, and second premolar, respectively. CAL about 4mm, 4mm, 6mm, 4mm, and 4mm in maxillary right lateral incisors, canines, first premolars, second premolars, and first molars, respectively. CAL about 4mm, 4mm, and 4mm in the maxillary left lateral incisors, first premolar, and first molar, respectively. CAL about 8mm for mandible left canine and 8mm for mandibular right canine. Probing depth either on the maxilla or mandibular teeth were 2 mm.

The surgical procedures are done in three stages for three months of treatment. The first procedure was treated gingival recession in the maxillary right (12,13,14,15,16) with tunneling technique combined with the PRF, the second procedure was treated gingival recession in the maxillary left (22,24,26) with CAF technique combined with the PRF, the third procedure was treated gingival recession in the mandibular (33 and 43) with CAF technique combined with the SCTG.

Blood pressure, pulse, respiration, and temperature were measured again before the preparation of the surgical procedure. The patient has had received an explanation about the treatment protocol and not refused to sign an informed consent before the surgical procedure is performed.

## 5. Surgical Procedure

### 5.1. Case Report 1: Tunneling + PRF Recipient site preparation

The surgery was initiated after administration of local infiltration anesthesia using pehacaine with 2% lidocaine and 1: 80.000 adrenaline and performed under aseptic conditions throughout the procedure. Sulcular incision was made at the recession and performed using blade no.15 and be careful not to extend the incision to the end of the interdental papilla. Full- thickness mucoperiosteum flap was done using a tunneling knife, to release the tissue extending beyond the mucogingival junction so that there will be enough flap relaxation to facilitate coronal placement after PRF placement. Each



**Figure 1:** Preoperative intraoral condition.



**Figure 2:** Intraoral condition after scaling and root planing.

papilla adjacent to the recession was gently damaged without releasing it completely so that a tunnel formed. The tissue released to create the tunnel is created by expanding in the lateral direction by about 3-5 mm. (Fig.4-6)

## 6. PRF Preparation

PRF was prepared based on the protocols conducted by Choukroun et al [13] Immediately during surgery, 10ml patient's blood by intravenous was taken and put in a sterile tube without any anticoagulant. It was then centrifuged for 12 minutes and 2700 rpm at room temperature. Using a sterilized tweezer, the PRF clot was taken and the red blood



**Figure 3:** A pre-surgical x-ray before surgical procedure.

cell layer attached to the PRF clot was removed using a sterilized scissor. The clot was then compressed with PRF preparation kit to form a PRF membrane (Fig.7)

## 7. PRF membrane Placement

PRF membrane was placed into the tunnel from the sulcus. The PRF membrane was positioned over recession coronal to the cementoenamel junction. Gingiva was immobilized as coronally as possible without tension, gingiva which in the new position was sutured with a simple interrupted suture used 5-0 nylon for stabilization. Modification sutures were added on teeth 14 and 15, in which the suture temporarily fixated convergently using composite resin at the one-third coronal of the facial aspect of teeth. The periodontal dressing was given in the labial and buccal aspects. (Fig.8-11)

## 8. Treatment Result

There is mild inflammation on the margin gingiva and healed uneventful on the treated site observed 14 days after surgery. One month after surgery, showed good healing without gingival inflammation. There were no postoperative complications and reduction of recession depth and clinical attachment significantly. Postoperative recession after one-month follow-up was about 1mm, 1mm, 2mm, 1mm, and 1mm for right lateral incisor, canine, first premolar, second premolar, and first molar of maxillary respectively. Vice with the clinical attachment level measurement about 3mm,3mm,4 mm, 3mm, and 3mm. The pocket depth 2mm each teeth.



**Figure 4:** Disinfection surgical area with povidone iodine.



**Figure 5:** Infiltration anesthetic in buccal.

## 9. Case Report 2: CAF + PRF Recipient site preparation

The surgery was initiated after administration of local infiltration anesthesia using pehacaine with 2% lidocaine and 1: 80.000 adrenaline and performed under aseptic conditions throughout the procedure. Sulcular incision was made at the recession and performed using blade no.15 and a full-thickness flap elevation using rasparatorium respectively on labial/buccal



**Figure 6:** Tunnel prepared.



**Figure 7:** PRF Membrane prepared.

aspects. Interdental papilla was maintained as much as possible. Root planing was performed with Gracey curette to removes the calculus and to obtain a smooth surface, then to remove smear layers EDTA 24% for two min was applied [15]. After that, the root surface irrigates using 0.9% NaCl solution. A horizontal partial-thickness incision was done at the bottom of the flap to release pressure when the flap return toward coronally. (Fig.12-14,16)



**Figure 8:** PRF membrane placement into prepared tunnel.



**Figure 9:** interrupted suture taken with coronal placement of flap.

## 10. PRF Preparation

PRF was prepared based on the protocols conducted by Choukroun et al [13]. Immediately during surgery, 10ml patient's blood by intravenous was taken and put in a sterile tube without any anticoagulant. It then centrifuged for 12 minutes at 2700 rpm at room temperature. Using a sterilized tweezer, the PRF clot was taken and the red blood cell layer attached to the PRF clot was removed using a sterilized scissor. The clot was then compressed with PRF preparation kit to form PRF membrane (Fig.17-18)





**Figure 10:** Periodontal dressing was given.



**Figure 11:** 14 days after surgery.

## 11. PRF membrane Placement

De-epithelization papilla was performed then the PRF was placed into the root surface that was prepared before. The flap was positioned as coronally as possible without any tension. Sling sutures were performed using 5.0 nylon and periodontal dressing on labial and buccal aspects (Fig.19-23)

## 12. Treatment Result

There is mild inflammation on the margin gingiva and healed uneventful on the treated site observed 14 days after surgery. One month after surgery, showed good healing without gingival inflammation. The postoperative recession was about 0mm, 0mm, 0mm, in the maxillary left lateral incisors, first premolar, and first molar, respectively. Same with clinical attachment measurement which are 2mm, 2mm, and 2mm respectively. The pocket depth was normal for each tooth around 2 mm. Patient-reported satisfaction with the aesthetic result.



**Figure 12:** Disinfection and Infiltration anesthetic in buccal.

## 13. Case Report 3: CAF + SCTG Recipient bed preparation

The surgery was initiated after administration of local infiltration anesthesia using pehacaine with 2% lidocaine and 1: 80.000 adrenaline and performed under aseptic conditions throughout the procedure. Measurement of recession depth and width were carried out. Horizontal incision at both interproximal sides of the recession teeth, until the *cementoenamel junction* of the two adjacent teeth and performed using blade no.15. Next, two vertical incisions were made perpendicular to the horizontal incisions, to the *mucogingival junction* of the alveolar mucosa. Sulcular incision is performed to connect the horizontal incision. A partial thickness, the trapezoidal flap is released from the mucogingival junction leaving the underlying alveolar bone cover with the periosteum and connective tissue. Blunt dissection into the vestibular is performed





**Figure 13:** Sulcular and papilla preservation.



**Figure 14:** full thickness flap with raspatorium.

to release the tension from the gingiva muscle. Interdental papillae were maintained wherever possible the flap was checked for any tension by all possible movement of the lips. Root planing was performed with Gracey curette to removes the calculus and to obtain a smooth surface, then to remove smear layers EDTA 24% for two min was applied [15], after that, the root surface irrigates using 0.9% NaCl solution (Fig.24-27)



**Figure 15:** Root planing.



**Figure 16:** Horizontal partial thickness incision to releasing the flap.

## 14. Donor site preparation

After preparation of the recipient bed, the donor area in the palate was anesthetized by block anesthesia for the greater palatine nerve using pehacaine with 2% lidocaine and 1: 80.000 adrenaline and performed under aseptic conditions throughout the procedure. The same measurement of the recipient bed was used as a guideline while procuring the graft from the palate. A partial-thickness horizontal incision was placed on the palatal, begin approximately 2-3 mm from the free gingival margin with scalpel blade no.15.



**Figure 17:** PRF membrane prepared.



**Figure 18:** De-epithelized papilla.

The incision is begun in the distal aspect of the canine and mesial aspect of the first molar. Initially, the epithelium with a thin layer of connective tissue was dissected and reflected. Tissue forceps are used to prepare

palatal flaps. The perpendicular incision is performed on the bone with two vertical incisions and one medial incision. A connective tissue graft was taken, to control bleeding and achieve hemostasis, the pressure was given to the donor area with gauze that has been soaked in saline. The interrupted suture was given to the palatal flap. (Fig.28-33)



**Figure 19:** PRF membrane positioning on recipient site.



**Figure 20:** Repositioned of flap as coronally as possible.

## 15. Graft Placement

De-epithelization papilla was performed then the connective tissue was placed into the apical approach of the cemento-enamel junction, then stabilization suture was done in the apical area. Following graft stabilization, gentle pressure with moist gauze was applied to prevent dead space formation and the overlying flap was pulled to cover the donor tissue. The partial-thickness flap was sutured with interdental using 5.0 nylon and periodontal dressing was given. (Fig 34-37).





**Figure 21:** Sling suture.



**Figure 22:** Periodontal Dressing.

## 16. Treatment Result

There is mild inflammation on the margin gingiva, healed uneventful on the recipient site, and the patient reported a little bit of discomfort at the donor site on palatum observed 14 days after surgery. One month after surgery, root coverage was complete up to the cemento-enamel junction, tissue healing and adhesion of margin gingiva was good, absence bleeding on probing, present an adequate keratinized tissue, color, and contour of the gingiva match with the surrounding tissue. Reduction of recession and clinical



**Figure 23:** one month after surgery.

attachment level was significant. The postoperative recession was about 0mm and 1mm of mandible left of the canine and mandibular right of the canine, respectively. Same measurement with clinical attachment level 3 mm and 2 mm of the canine mandibular. The pocket depth was normal for each tooth around 2 mm. The patient feels no sensitive teeth anymore and reported satisfactory aesthetic results one month after surgery.

## 17. Post-surgical preparation

All Surgical procedures have the same post-surgical preparation. The patient was prescribed amoxicillin 500 mg three times a day for five days, diclofenac 50 mg two times a day, and chlorhexidine digluconate 0.12% three times a day for four weeks. The patient was asked not to chew on the surgical area and use a soft toothbrush as mechanical plaque control in the surgical area. 14 days after surgery, a patient came to remove the periodontal dressing and the suture. The next appointment was scheduled 30 days after surgery

## 18. Discussion

Some gingival recession cases need treatment for the prevention of further complications. Periodontal aesthetic surgical techniques have been introduced to treat gingival recession. The choice of technique and long-term success of procedures depends on the careful evaluation of the defect types, etiology, operator's ability, presence of



**Figure 24:** Disinfection surgical area with povidone iodine.



**Figure 25:** Infiltration anesthetic in buccal.

keratinized tissue, blood supply, tissue width, predictability, single or multiple recession, healing, aesthetic result, risk factors, interdental papilla, alveolar bone, and level adjacent periodontal tissue. [5,14]

The tunneling technique is a modification of the supraperiosteal envelope technique, which is indicated to treat multiple adjacent gingival recessions. This technique is simple and minimizes the damage of the gingival margin due to mechanical instrumentation. The procedure does not remove the interdental papilla so that it can reduce bleed



**Figure 26:** Measurement of recession depth and width.



**Figure 27:** Prepared recipient bed.

and give a better interproximal aesthetic result. PRF is an adjunctive agent that can accelerate the healing

process after surgery. PRF stimulates fibroblast proliferation and tissue vascularization. PRF besides economical in cost, simple preparation, and easy application. The combination of Tunneling and PRF was effective and safe to treat Class I and class II Miller's gingival recession. [4,5]

The combination technique of tunneling and PRF performed on the right maxillary of the patient showed a reduction of gingival recession depth and gave satisfactory results,





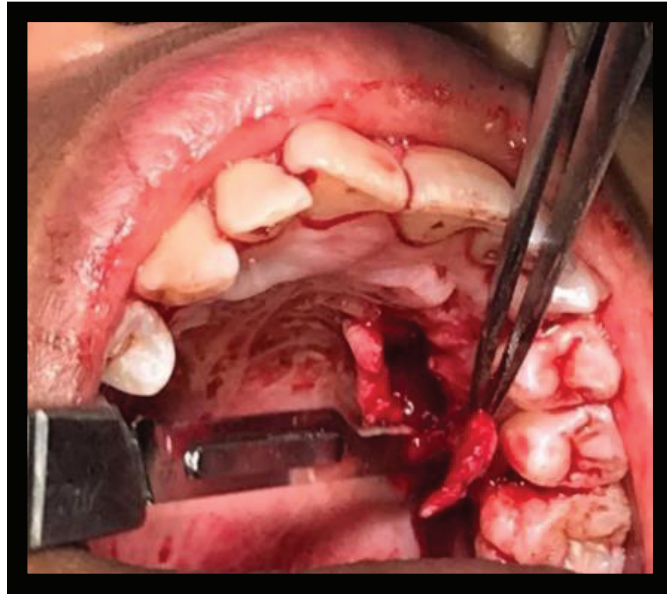
**Figure 28:** Disinfeksi donor site with *povidone iodine* dan infiltrate anestesi.



**Figure 29:** Horizontal incision was placed on palatal.

which observe thirty days after surgery. Parikh H et al. [6] treated multiple adjacent gingival recession with tunneling and PRF technique, the treatment results of this study obtained a significant reduction in recession depth and root coverage after six months post-surgical control. Krismariono A [4] performed gingival recession treatment in seven women with tunneling and PRF techniques and obtained satisfactory results after 2 weeks.

CAF is the therapy of class I and class II Miller's gingival recession with a high rate of success. CAF was recommended for recession defects surrounded by keratinized



**Figure 30:** The connective tissue graft harvested.



**Figure 31:** Palatal Flap was sutured with interrupted suture.

tissue. Optimum root coverage, similar color with surrounding tissue, and gingival margin adhesion to teeth as the original shape can be obtained with this technique. To get better treatment results CAF techniques can be combined with PRF and SCTG. [2,15]

Subepithelial Connective Tissue Graft (SCTG) is a technique that utilizes the placement of connective tissue de-epithalization into recession defects. SCTG procedures are usually taken from the palatal or retromolar area because of the thickness of the tissue. This procedure can be indicated in the treatment of single or multiple recessions, correction of papilla volume, deformity of edentulous gingival edges, increase in the



**Figure 32:** Periodontal dressing.



**Figure 33:** two weeks after surgery.

number of keratinized mucosa, improvement of root coverage associated with restoration, abrasion, and dental caries procedures. The main advantage of this procedure is that the graft obtains two sources of blood supply which from the recipient bed and the overlying flap. This results in perfect integration and optimal post-treatment aesthetic results.[15]

The combination technique of CAF and PRF was performed on the left maxillary of the patient which showed a reduction of gingival recession depth and uneventful tissue healing, which observe thirty days after surgery. Meanwhile, the combination technique



**Figure 34:** Placement of stabilization sutures.



**Figure 35:** Graft Coronally positioned and suture.

of CAF and SCTG performed on canine mandibula showed a progressive healing, good coverage of root surface up to the cemento-enamel junction, a decrease of gingival recession depth, no bleeding on probing, and the color similar to the adjacent tissue which observes thirty days after surgery. This indicates adequate tissue regeneration on the root surface. Increase keratinization and gingival tissue thickness are important clinical outcomes in the use of SCTG. Mazocco [10] treat gingival recession with CAF and SCTG with full and partial thickness flap on 20 patients and obtain 96% root coverage at six months of in the entire population. SCTG was taken from the palatal side because of





**Figure 36:** Periodontal dressing.



**Figure 37:** one month after surgery.

its adequate thickness, it's a keratinized mucosa, and high vascularization so that it can survive on the avascular root surface and stimulate the overlying keratinized epithelium. Teng kawan [7] research on nine patients who have gingival recession miller's class I and II and obtains that CAF and SCTG give faster tissue healing based on decreased recession height and optimal coverage of tooth surface.

The limitation of this clinical case was the short length of time of control; therefore, the healing process of techniques could not observe optimally.

## 19. Conclusion

Gingival recession is a condition that is disturbing the appearance of the patient's smile, can cause root caries, and hypersensitivity of teeth. Periodontal plastic surgery was performed to restore a healthy periodontal condition and improve the patient's gingival aesthetics. The selection of appropriate surgical procedures will provide satisfactorily for the patient and predictable results. The combinations of treatment were performed using tunneling and PRF, CAF and PRF, CAF and SCTG to cover the root surface. All the combination treatment gives satisfactory results for patients but different time of healing.

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