

Coronal Flap Advancement for Treatment of Non-Carious Cervical Lesion Followed by Ceramic Restoration: Case Report

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Abstract

Non Carious Cervical Lesion (NCCL) are located at cervical region of the tooth and can affect crown, root or both areas simultaneously, leading to the vanishing of cement-enamel junction (CEJ), also called root crown lesion. An up-to-date gingival recession classification, proposed by Cairo, *et al.* in 2011 [1] and accepted in scientific community in 2018, present the lesions by the following: Recession type 1 (RT1): no inter proximal insertion loss. CEJ is not detectable on both sides - mesial and distal. Recession type 2 (RT2): loss of inter proximal insertion is associated with the gingival recession. A 56 years old patient presenting several abfraction lesions on the anterior region of maxillae - from tooth 26 to 15, and misadapted prosthetic restoration on tooth 21, reporting pain caused by hypersensibilization of cervical area of teeth 11, 12, 13, 14, 22, 23. The sub connective tissue graft, most predictive surgical treatment for gingival recession in rate of root covering percentage was proposed in association with ceramic fragments, individualized restoration with cervical finish localized in dental surface. This treatment is indicated when dental position permits the increase of restorative material with minimal preparation of tooth, only on enamel surface, for example in diastema closure, anatomical alteration of tooth morphology, increase of buccal volume, mispositioned tooth and incisal edge fracture [2].

The possibility of association of the soft tissue graft with amelogenin offer better result in recession treatment with good rates of root covering creating a good scenario for aesthetic restorations.

Keywords: Non-Carious Cervical Lesion; Ceramic Restoration; Coronal Flap

Introduction

The non-carious cervical lesion (NCCL) are found in the cervical portion of the tooth and can affect crown, root or both areas simultaneously leading to vanishing of the cement-enamel junction (CEJ). The absence of protective gingiva on this area lead to a detrition of those structures creating NCCL [3]. Those lesions are frequently found at the buccal surface of teeth and rarely at lingual/palatal and inter proximal. NCCL are more pronounced in incisors, cuspids and bicuspid and more prevalent in maxilla in comparison to mandible [4].

The dentinal hypersensitivity (DH) is widely found in dentistry practice being demonstrated that are caused in NCCL by the expo-

sition of the dentinal tubules [5]. The hydrodynamic theory demonstrate that physical stimulus promote fluid movement inside the dentinal tubule contracting or distending odontoblastic processes stimulating nervous fibers located at enamel-dentin interface [6]. That exposition in cervical area can be caused by three main factors: abrasion, erosion and abfraction [5].

NCCL was first describe by Lee and Eakle in 1984 [6] and defined the cervical detrition. Other authors believed that NCCL was result of the malocclusion or masticatory tension though the cervical region. As characteristic of the cervical lesions the abrasion and erosion shows smooth and round borders while abfractions is more wedge-shape and angulated. The erosion is defined as the

loss of hard tissue by chemical action not involving bacteria. By the origin of acid can be classified as intrinsic and extrinsic [4].

Intrinsic source of acid are originated in the stomach and are associated with alimentary diseases as anorexia and bulimia nervosa or acid reflux and regurgitation. The extrinsic sources are dietary acid found in soft drinks and fruits or fruit juices [4].

Abrasion is characterized by the loss of dental tissue by factors others than just dental contact as inadequate brushing and hard toothbrush that cause enamel fracture and abrasive dental toothpaste [4-10].

Abfraction is characterized by the loss of dental hard tissue microstructure in areas with high stress concentration. This hard tissue loss is related with a thin layer of enamel structure found in cervical area also called week region of the tooth. The tension created in that area can be an ethnological factor for the hard tissue loss in the CEJ area [10].

Soares and Grippo in 2017 [8] describe NCCL with or without gingival recession as the century disease.

The main target of treatment is esthetic result [7]. The seek for esthetic treatment can be because of lesion pigmentation or gingival retraction compromising the patient smile. Another treatment indication is the discomfort or pain caused by DH compromising the cleaning and biofilm control. Another reason can be the presence of cavities with or without DH or the plaque accumulated due to the lesion shape or depth making difficult the area hygiene [7].

Gingival recession is described as the apical displacement of the gingival margin 1mm coronal or in the level of CEJ with the exposition of root surface to the oral cavity. The clinically measure of gingival recession is the maximum extension of the apical portion to the gingival margin [7].

Through many years the prognostic based gingival recession miller classification was used: class I and II, when no inter proximal periodontal insertion or bone was lost, the full cover of exposed root could be achieved. Class III when was a light or moderate lost of inter proximal soft tissue and bone and just partial root cover could be predict. And Class IV where a severe lost of inter proximal tissue occurred that there is no viable root cover [9].

An up-to-date gingival recession classification proposed by Cairo, *et al.* 2011 [1] and adopted in scientific literature in 2018 presents that: type 1 Recession (RT1): no inter proximal loss recession. The inter proximal CEJ is not clinically detectable on both sides - mesial or distal. Type 2 Recession (RT2): gingival recession associated with loss of inter proximal insertion. The amount of inter proximal tissue loss (measured from inter proximal CEJ to the bottom of the inter proximal sulcus) is less or equal to the buccal insertion loss; Type 3 Recession (RT3): gingival recession associated with inter proximal insertion loss. The amount of inter proximal tissue loss (measured from inter proximal CEJ to the bottom of the inter proximal sulcus) is greater then buccal insertion loss (measured from the CEJ to the bottom of the buccal sulcus).

In dental practice a common association is the NCCL and gingival recession. Most of these cases are treated with conventional restorative dentistry only although the association with periodontal can lead to best results. Since those lesion have a multifactorial ethnology the treatment must be multidisciplinary in order to achieve better functional and aesthetic results [11].

To Zucchelli, *et al.* 2011 [7], the restorative treatment must be made only on anatomical crown, while the NCCL limited to the root surface treated with mucogingival surgery. The restorative dentistry must be done before the gingival surgery in order to lead to some clinical advantages for both areas (restorative dentistry and gingival surgery): the restorative dentistry can be made without the interference of soft tissue and the root cover facilitated by the recover of the emergency clinical profile of the tooth crown giving a stable subtract to the surgical flap, smooth and convex.

Case Report

TMG, 56 years old, caucasian, showed in anterior maxilla several abfraction lesions involving teeth n.o 11, 12, 13, 14, 15, 22, 23, 24 and 26, also present a disadapted prosthetic crown on 21 (Figure 1). Painful symptomatology in the cervical area of the above cited teeth caused by the DH.

No additional alterations was found in complementary exams investigation.

After treatment planing based on Cone Beam Computerized Tomography (CBCT), Full mouth periapical Rx and periogram the

Figure 1: Clinical Aspect.

necessity of ceramic restorations and covering of abfraction lesions was passed to the patient and approved.

Waxed mockup was prepared planning oral rehabilitation in order to predict the amount of recession need to be covered. Anibaldi, *et al.* 2009 [12] describes that the waxed mockup is considered an important step to plan when associated with image exams, anticipating informations and facilitating communication with patient about the treatment and modifications that could occur during execution and healing time, and still can be used to create the surgical guide. Gross in 2008 [13] complement that mockup predict stability, aesthetics, masticatory and phonetic function. According to Lima, *et al.* 2010 [14], the mockup permits final treatment result visualization and after approval by both professional and patient, be used in each step of treatment.

Pre operative medication prophylaxis was prescribe associating 2g of amoxicillin and 4mg of dexamethasone 1h before procedure. Extra oral antiseptis with clorhexidine 2% an intra oral with 0,12% immediately before surgery was done, same procedure used by Mizutani, *et al.* in 2016 [15], in a clinical report of a 72 years old patient suffering due to a installed prosthetic crown on tooth 24.

Infiltrative anesthetic technique using arthicaïne 4% with adrenaline 1:100.000 following research realized by Etoz, Er and Demirbas in 2011 [16] that conclude success rate of this anesthetic salt was higher then 90% and brings safety for oral procedures.

Surgical procedure begun with intrasulcular incisions (Figure 2), and linear incisions made 5mm far from the papillae apex (Figure 3) associated with vertical incision distal to tooth 15 and 26 (Figure 4). Full flap thickness was elevated until reach mucogingival junction, where was performed divided flap. "Scraping" of papillae was made to facilitate repositioning of soft tissue.

Figure 2: Intrasulcular incision.

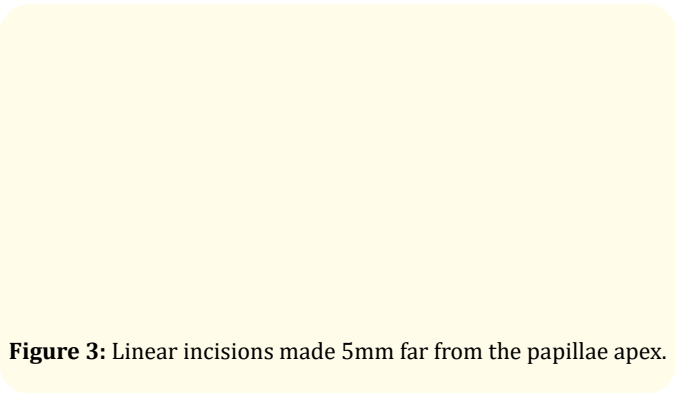


Figure 3: Linear incisions made 5mm far from the papillae apex.

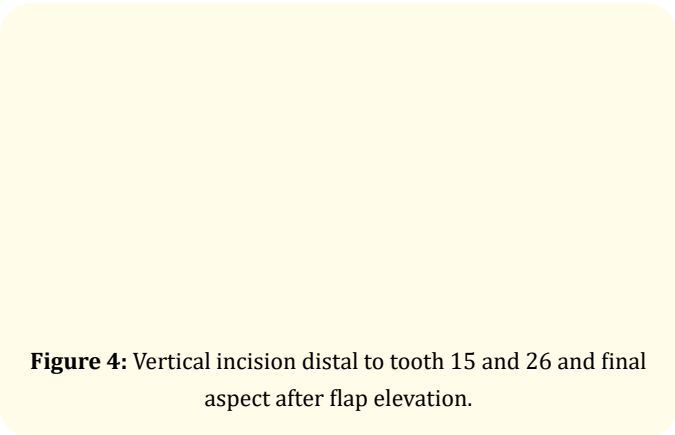


Figure 4: Vertical incision distal to tooth 15 and 26 and final aspect after flap elevation.

Preparation of tooth surface with scaling (Figure 6) and application of PrefGel® (Straumann, Basel - Switzerland) for 2 minutes to remove smear layer and expose dentin surface creating a contact area was made. Removal of EDTA excess was realized with saline solution and the area was dried with gauze, removing the most of blood and saline to application of Emdogain® (Straumann, Basel - Switzerland), to boost new periodontal tissue formation.

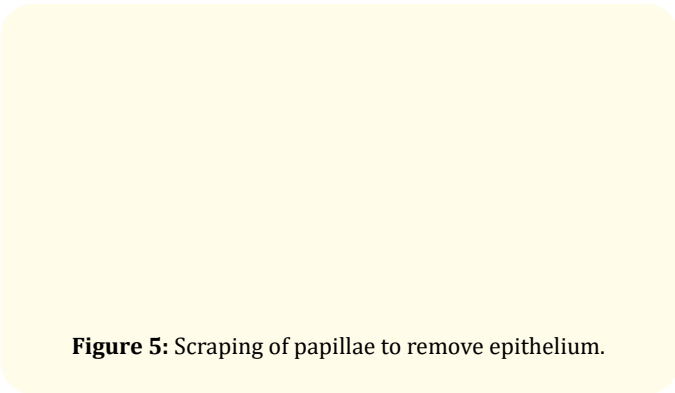


Figure 5: Scraping of papillae to remove epithelium.

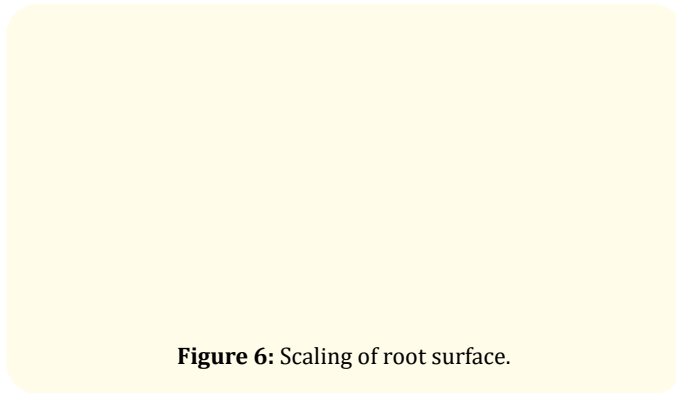


Figure 6: Scaling of root surface.

The donor connective tissue site was palate bilaterally removed by Zucchelli [7] technique due to the receptive site size (Figure 7).

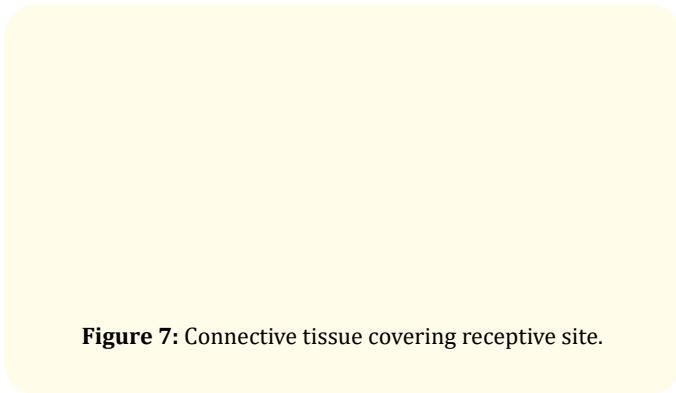


Figure 7: Connective tissue covering receptive site.

The abfraction affected area was covered with the connective tissue fragments removed from palate and covered with Emdogain® (Figure 8). The adaptation of tissue graft was made with 6-0 polyglycapone acid and 6-0 polyglycolic acid sutures (Microsuture, São Paulo - Brazil). The graft dimensions were 30-40mm length and 1-2mm thick after de-epithelization.

After closure and suture all over the flap with single suture 5-0 Polytetrafluorethilene (PTFE) in each inter proximal zone and in the vertical incision distally teeth 15 and 26 (Figure 9). Inside the empty space created in palate after tissue removal membrane created from platelet rich plasma/fibrin (PRF) was inserted to benefit healing process (Figure 10).

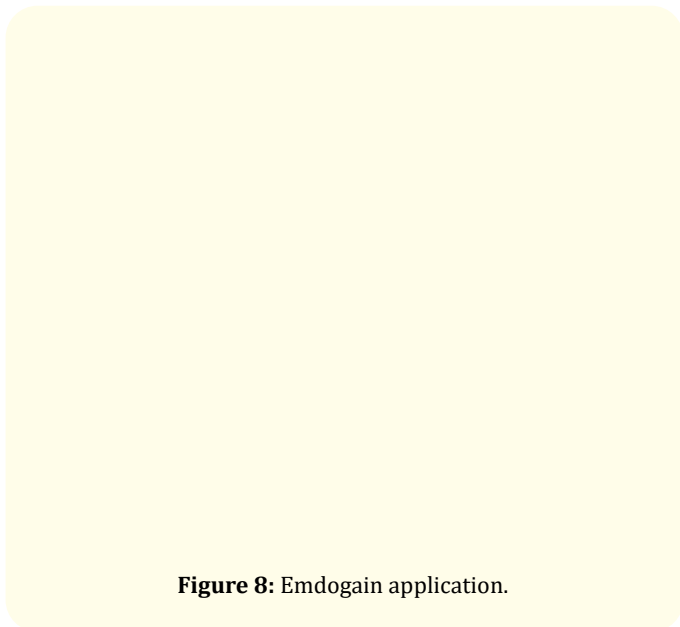


Figure 8: Emdogain application.

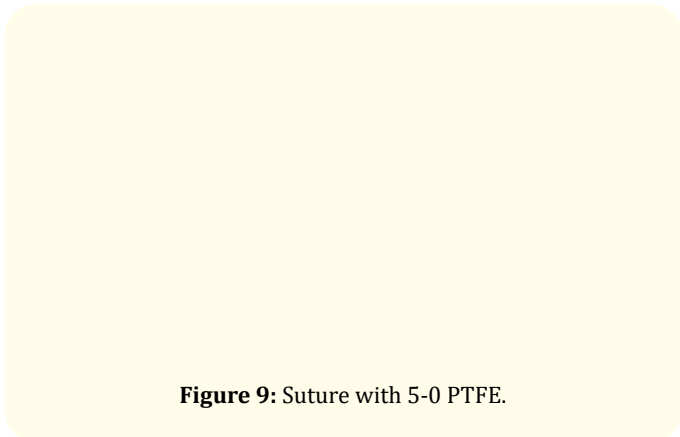


Figure 9: Suture with 5-0 PTFE.

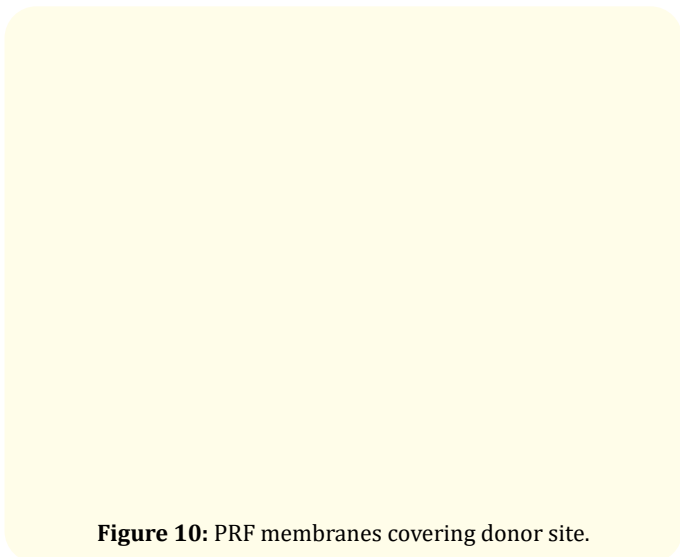


Figure 10: PRF membranes covering donor site.

Immediately after surgical procedure polished temporary bizacrilic restoration was performed using the previous mockup (Figure 11).

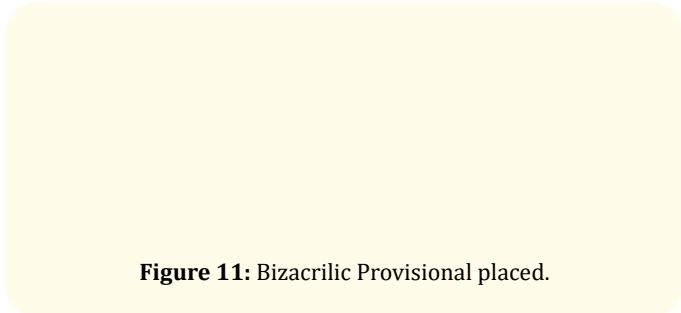


Figure 11: Bizacrilic Provisional placed.

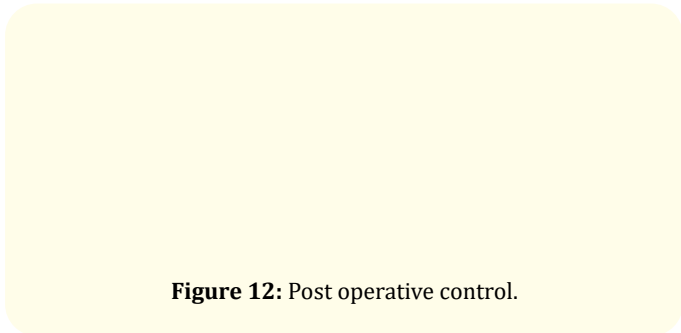


Figure 12: Post operative control.

Due the morbidity of procedure post operative return was realized at days 3, 7, 15, 30, 60 and 90. After 90 days return reevaluation of clinical aspect (Figure 12) and restoration with ceramic fragment began (Figure 13) to be performed. Two steps register with retraction of gingival margin using retraction cord n. 0 was made.

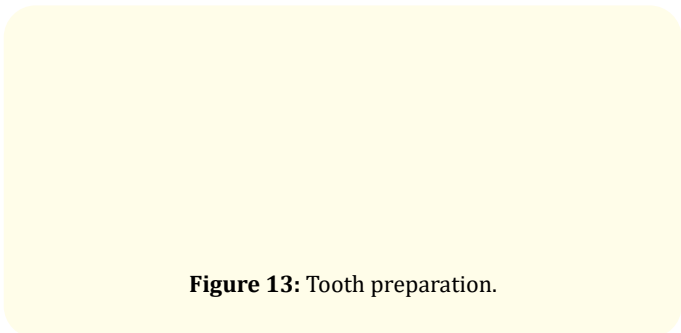


Figure 13: Tooth preparation.

Cadcam composite fragments was proven to check occlusion, tissue adaptation and previous tooth preparation following laminate and prosthetic crown preparation technique (Figure 14). After proven all interferences was removed and fragments was cemented. The cementation was proceed under relative isolation of

teeth with cotton roulettes and lip retractor after local anesthetic infiltration of lidocaine 2% with adrenaline 1:100.000. Teeth tissue conditioning with 37% phosphoric acid for 15 seconds, followed by intense water spray and surface dry. A thin layer of universal bond adhesive (single bond 3M - Brazil) was applied over enamel and dentine, rubbing for 20 seconds. The lithium disilicate fragments (IPS E-Max Ivoclar Vivadent - Liechtenstein) was cleaned with phosphoric acid for 15 seconds and rinsed with water for the same time. The internal surface was covered then with 10% fluor-hidric acid (FGM - Brazil) during 15 seconds and then washed with water for the same time. After washed and dried the fragments was rubbed silane (prosil - FGM, Brazil). Dual cement TPP (SDI - Australia) has used to fixate the fragments and the excess was removed. Light curing of cement was done and interproximal adjust made with steel strips. The incisal edges was removed with diamond burs and then polished with Diamond excel paste (FGM - Brazil) and rubber cup. Patient return after 1 week, and 1, 3 and 6 month was done after finishing treatment (Figure 15).

Figure 14: Final result after fragments cementation.

Figure 15: Clinical aspect after treatment.

Discussion

NCCL are common clinical findings that impact negatively the tooth structural integrity, vitality and aesthetics [10]. Those lesions are defined as the dental substance loss at CEJ [17] in other words the loss of dental surface or dental detrition. NCCL is the pathological loss of dental tissue promoted by different disease than dental cavity. Are the process when tension on enamel and dentin are created by occlusal forces trough the cervical area bias to erosion and abrasion [4]. Historically those lesions was classified according to appearance: wedge shape, disc shape, flatten, irregular and figurative. Generally range from shallow grooves to wide openings and great wedge lesions with clear internal angles [4].

Although no definitive evidence is available nowadays associating mechanical factors as traumatic brushing in patient with good pattern of oral hygiene or orthodontic movements gingival recession are common lesion find on buccal surface of those population [1]. NCCL are rarely find on inter proximal or palatal/lingual and maxillary incisors, cuspid and bicuspid are more affected [4].

According to Bhundia, Bartlett and O'Toole (2019) [10] the inherent weakness of tooth cervical area coinciding to it fulcrum role under occlusal forces promote NCCL. The traumatic brushing and bruxism can also be ethnological factor of the angular lesion in CEJ region. The occlusal forces and enamel flexure are primary ethnological agent on lesion apparition.

Recent researches found that the increase of tissue loss are related with the abrasion of tooth paste and hardness of toothbrush. It is also established in periodontology that toothbrushing can reach sub gingival regions to remove plaque expecting the formation of sub gingival lesions specially if an acid ethnological component is also involved [18].

Cairo, Plagiario e Nieri (2008) [1] indicate some treatment to NCCL: pediculated flap, free gingival graft, combination between pediculated flap and soft tissue graft or collagen barriers. Those procedures can be used to increase the gingival margin level. The coronary advanced flap (CAF) is a common procedure to root recover and uses the dislocation of apical tissue over the exposed root associated or not with connective graft, acellular dermic matrix, amelogenin, PRF and others. The authors still mention some previous systematic reviews demonstrating the dislocated flap without graft, combination of dislocated flap and graft or collagen barriers can be indicated to improve coronal level of marginal gingiva over the root surface.

Rocuzzo, *et al.* (2002) [19], described in a systematic review that connective graft had statistically better result when compared to guided tissue regeneration improving recession treatment results while there was no difference in clinical fixation.

In the role of periodontite treatment therapy the most frequent used are scaling and root enlisting (SRE), supra gingival plaque control en periodontal surgery. Many studies confirmed the red complex bacterial species reduction by SRE, and showed that apical repositioned flap can lead to a additional sub gingival microbiota benefit diminishing red and orange complex species. Besides, the plaque control maintained by the patient is considered determining to prevention of destructive periodontal disease recurrence [20].

Subepithelial connective tissue graft (SCTG) is one of the most predictive surgical procedure for the treatment of isolated recession defect in terms of percentage of total root coverage but can result in excessive soft tissue thickness and different color comparatively with adjacent gingiva as result of graft exposition. The coronal advanced flap (CAF) is a surgical technique for root covering that does not need a palatal donor site and was proven to be safe and predictive. For the patient with high expectation and when there is keratinized apical tissue, CAF is the first choice technique for root covering. This approach the soft tissue used to cover the root exposition is similar in color and texture of that previously found over buccal surface of the teeth. The esthetic result, consequently is more favorable [7].

The technique described by zucchelli, *et al.* 2009 [7], also used in this case report, consist in an extended horizontal incision to

include one more tooth each side of the recession in order to facilitate the coronal reposition of the tissue over the exposed root surface. Those horizontal incision consist in a variable number of interdental submarginal incisions associated with intrasulcular medial/distal incision in order to create the surgical papilla of the envelope.

Another technique used in this case report was the use of mock-up, one intramural restorative trial that permits tridimensional visualization and final prospection [21]. It consists in a revertible technique and can be done using bizacrilic composite over the natural teeth. This procedure can create more confidence for both professional and patient about the therapy decision.

Ceramic fragments are partial restorative porcelain that the terminal area is located at dental surface. Those fragments are indicated when dental position permit the addition of restorative material and even when is necessary the tooth preparation it will be minimally invasive involving only enamel for example: incisal edge increase, buccal volume increase, diastema closure, anatomical variations, dispositioned tooth and incisal fractures [2].

Conclusion

NCCL create a great challenge to whom search for resolution to those lesion treatment, nevertheless as observed on the protocols used on the related case is possible to achieve satisfactory results when the soft tissue graft in association with amelogenin are used to root covering creating a viable scenario for the restorative treatment. More studies should be done on the behalf of more comprehensive of the proposed protocol.

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