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The Entire Papilla Preservation Technique Versus Modified Minimally Invasive Surgical Technique in Regenerative Periodontal Therapy For Endo-Perio Lesions

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Abstract

The primary goal of "minimally invasive dentistry" is to achieve satisfactory therapeutic results with minimal trauma during the process. Minimal invasive periodontal therapy involves treatment options that cure the disease with reduced postoperative pain, improved healing, and better patient acceptance. In this case, the report aims to compare two types of MIST techniques used in regenerative periodontal therapy. In the first case, a 30-year-old female complained of pain in the anterior upper area. A ± 2 cm diameter radicular cyst was seen on the radiograph. We performed root canal treatment and periodontal regeneration surgery, utilizing the entire papilla preservation technique (EPPT). In the second case, a 22-year-old female came with a complaint of a white spot on the gingiva area. A true combined endo-perio lesion was found. Root canal treatment and periodontal regeneration surgery using a modified minimal invasive technique (M- MIST) were done. After 6 months, clinical and X-rays show a good and stable outcome where apparent bone remodeling has occurred in two cases. PPT and M-MIST are effective in regenerative periodontal therapy and show good healing of the hard and soft tissue. Both techniques show promising results as they preserve the soft tissues, increase wound stability, and reduce surgical trauma, chair time, and patient discomfort postoperatively.

Keywords: Minimal invasive surgery technique; papilla preservation technique; periodontal regeneration; Root canal treatment

1. Introduction

Regeneration therapies have emerged as a favored approach for addressing the damage resulting from periodontal disease. Traditional methods such as guided tissue regeneration (GTR) have been employed to promote the restoration of alveolar bone, cementum, and periodontal ligament in the periodontal attachment apparatus. This technique involves a series of steps, including the reflection of a flap covering multiple teeth, the removal of damaged tissue, meticulous cleaning of the tooth roots, and the placement of a barrier membrane to prevent the growth of epithelial cells. These measures collectively contribute to the regeneration process [1]. The concept of minimally invasive surgery (MIS) was initially introduced by Harrel and Rees in the periodontal literature [2]. This surgical approach aims to minimize the need for flap reflection and tissue trauma, thereby preserving the crucial blood supply, promoting stability of the blood clot within the wound site, and reducing postoperative recession over an extended period. The achievement of this objective is facilitated by employing small incisions, employing precise dissection techniques on the soft tissue to reach the anomaly, and utilizing minimal suturing methods to minimize damage to the papillary tissues [3].

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Although all of these methods are founded on the same principles of minimal flap reflection and soft-tissue manipulation, MIS includes access from the palatal or lingual surface more frequently, whereas MIST and M-MIST generally aim to gain access through the buccal or facial surfaces of the mouth [4]. The minimal flap reflection lowers the amount of visible access to the site, regardless of where the entry point is located. Surgeons have historically made use of surgical loupes, a fiberoptic endoscope, a surgical microscope, and more recently, a video scope in order to improve visualization during the course of therapy. This is done in order to solve a constraint that is shared by MIS, MIST, M-MIST, and periodontal microsurgery [5-7].

The concept of space supply for regeneration was established by Cortellin through the utilization of the modified minimum invasive surgical technique (M-MIST). The surgical technique involves utilizing a buccal horizontal incision positioned at the base of the papilla, which is then connected to a small interdental access through minor mesial and distal intra-sulcular incisions [8,9]. The entire papilla preservation (EPPT) technique, which was introduced in 2017, aims to maintain the complete integrity of the defect- associated papilla through the use of a tunnel-like undermining incision. The fully intact papilla facilitated the stabilization of the blood clot within the gingival chamber, hence enhancing the process of wound healing [10,11]. The EPPT procedure necessitated a brief buccal vertical releasing incision of the adjacent tooth, reaching a little beyond the mucogingival line. After the creation of a buccal full-thickness flap that extended from the vertical incision to the papilla associated with the defect, an angled tunneling device was employed to construct the undermining tunnel of the papilla. The papilla was lifted completely, encompassing all layers. The study demonstrated successful wound healing along the vertical incision line, with no observed problems. Additionally, the papilla received ample nourishment from its inherent and continuous vascular supply, hence minimizing the risk of wound exposure [12].

The etiological factors in the occurrence of endo-perio lesions are mostly bacterial infections through the apical foramen, lateral canals, accessory canals, and dentin tubules, as well as various non-physiological factors such as trauma, root resorption, perforation, and dental malformations that play an important role in the development of the lesions [13,14]. However, according to the 2017 classification, the classification is generally divided into two categories: endo-perio lesions with root lesions and endo-perio lesions without root lesions [15]. There are several treatment options for endo-perio cases, such as open flap debridement (OFD), root resection, and retrograde filling. Sometimes, however, the expected results are not as good, such as scars on the gums and imperfect bone regeneration [16]. Therefore, regenerative approaches such as guided tissue regeneration (GTR) became an option with the aim of regenerating and preserving periodontal tissue. Hurley et al. introduced the GTR idea for the first time in 1950. In the 1980s, this idea was first applied to periodontal tissue with the goal of repairing periodontal bonding by preventing the proliferation of epithelial cells, so making space for the regeneration of periodontal ligaments and alveolar bone [17].

This article discusses a comparison of two kinds of MIS techniques in regenerative periodontal therapy in relation to different approaches to minimally invasive surgical techniques. The purpose of this case report is to investigate the efficacy of MIS in achieving enhanced periodontal regeneration outcomes.

2. Case Report

2.1. Case 1

A 31-year-old female patient came to the dental clinic with a complaint that her teeth were worn with gloves that were frequently pulsing and swelling on the ceiling area that had been missing since ± 6 months ago. Intraoral examination found a Maryland bridge on tooth 21 with poor wing adaptation. The radiograph showed non-hermetic root canal filling on tooth 21 and lesions of a size of ± 2 cm on tooth apex 21 extending to the distal apex of tooth 22. Advanced CBCT X-ray results showed cyst lesions of ±1.5 cm with massive bone destruction (Figure 1).

During the first visit, the Maryland crown was dismantled, and the root canal was retreated and treated on teeth 21 and 22. After the cleaning and shaping are done, the teeth are covered with an intracanal dressing of calcium

hydroxide. The X-rays showed good cleaning, and the dressing reached the area of the lesion. One month after the patient's medication is scheduled for a return visit, At the X-ray examination, there appeared to be no significant changes. At the time the clinical findings appeared, there was still a fluid cyst mixed with an abscess. The operator performed a biopsy aspiration using a fine needle aspiration system technique to determine the type of lesion, as well as irrigation of the root canal, and closed back with the medication CaOH. The patient was then referred to the CBCT examination (Figure 2).

Figure 1. Clinical and radiographic view of 21 teeth.

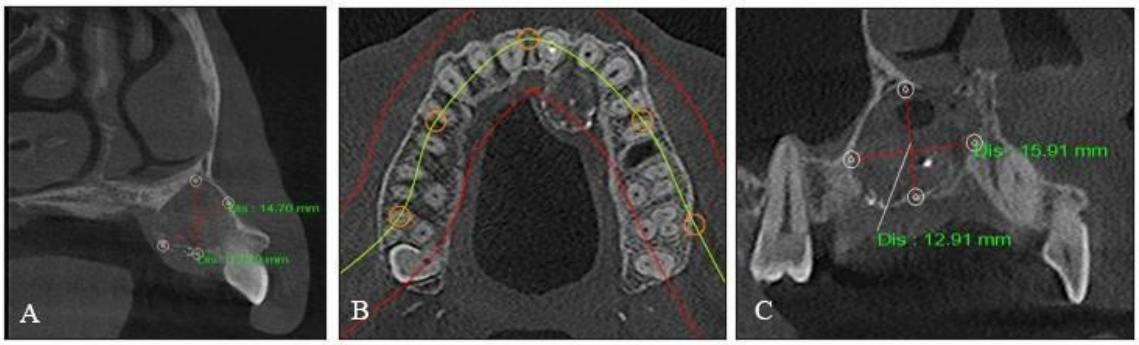

Figure 2. CBCT X-ray of cyst lesions from aspects (A) Sagittal, (B) Axial, (C) Coronal.

The results of the biopsy showed a non-malignant inflammation of the abscess of the fluid and the results every 1.5 months after the second medication showed no changes the root canal was still in a wet condition so it was decided to perform surgery on the cyst enucleation and regeneration using a xenograft (TiOss). In this case, the sampling is carried out from the palatal area considering that there will be a recession and a large bone loss if done from the buccal area due to a very large form of the lesion (Figure 3A). The surgery is performed using entire papilla preservation techniques where inserts are performed 2 mm below the margin and 3 mm below the interdental papilla with the aim of preventing recession anBd assisted with the use of a microscCope (Figure 3B). Then a reflection of the flap of full thickness and appearance of such a large cyst was performed. Then the cyst bags were enucleated and cleansed using curetase and a cyst depth > 1.5cm with a diameter ± 1.4cm was obtained (Figure 3C).

After debridement, a Xenograft-based (TiOss)±3cc bone layer is applied and coated with a collagen membrane (Figure 3D). Subsequently, sewing with an interrupted suture technique using 5-0 nylon thread is achieved with good primary stability (Figure 3E). 3-day post-operative controls showed the swelling and recovery continued well. 7- day controls indicated that swelling had begun to decrease and healing continued optimally so that seam opening was performed (Figure 3F). X-rays also showed the stability of bone marrow material.

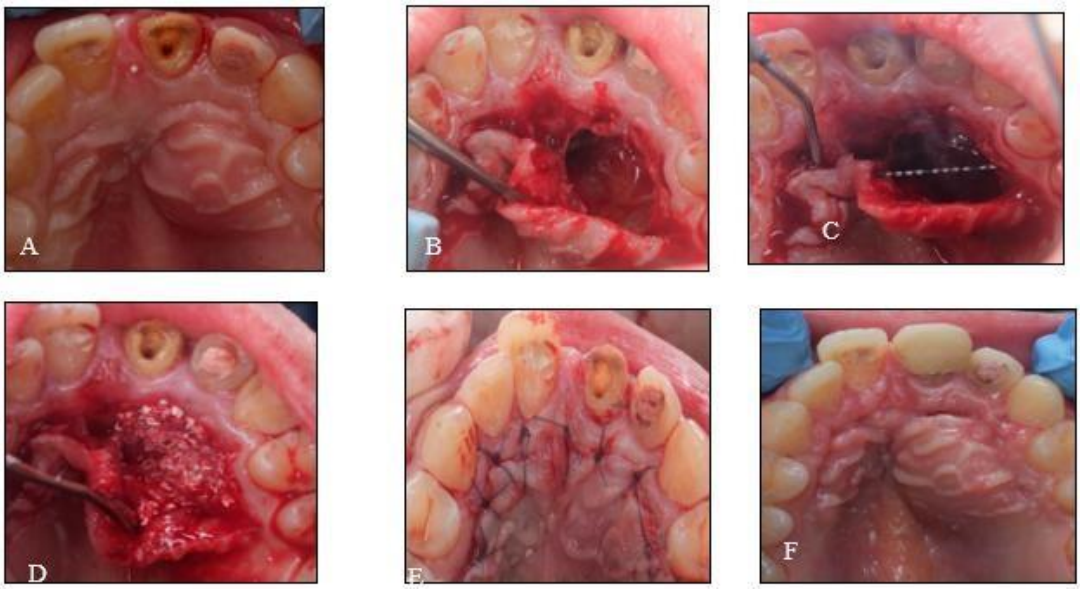

Figure 3. (A) Clinical View the Maryland crown was dismantled and the root canal retreated (B) Elevation of the flap and apparent cyst chambers (C) Post enucleate of the cyst with defect >1,5cm (D) Apply bonegraft to the defective area (E) Suturing (F) 7 days post-surgery.

The clinical and X-ray results after one month demonstrate a good and stable outcome, with reduced inflammation and stable bone marrow material. The 3-month clinical and radiographic picture showed good and stable results, and the root canal appeared to be dry, so it was filled with a bioceramic-based sealer. The six-month clinical and X-ray results show a good and stable outcome where apparent bone modeling has occurred on the X-ray (Figure 4).

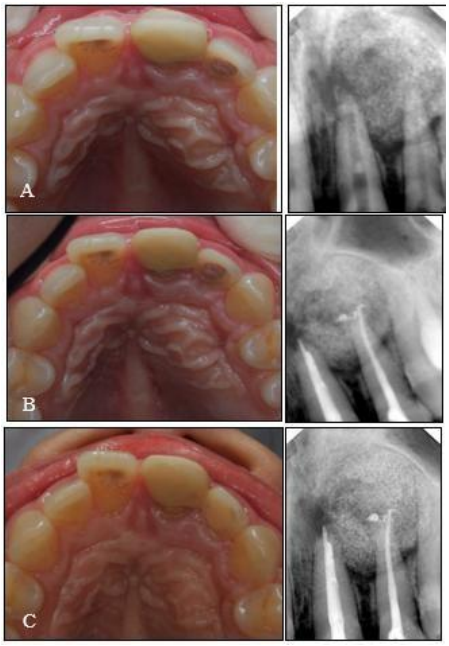

Figure 4. Clinical and Radiographic view after post-surgery (A) 1 month, (B) 3 months, (C) 6 months

2.2. Case 2

A 23-year-old patient came to the clinic complaining that there were white spots on the gums that hadn't disappeared for a year. Intraoral examination found a fistula in the interdental area of tooth 12 and no caries were found in the tooth (Figure 5).

During the first visit, the root canal was treated and closed with CaOH medication for 2 weeks. The second visit involved re-cleaning the root channel and finding the massive canal in a wet state so that the closure could be done with the medication CaOH for a duration of 4 weeks. At the third visit, there was improvement in the area of the lesion, and the canal had dried so that it was filled with a sealer-based bioceramic. The patient is scheduled to come back 3 months after the obturation, and there appeared to be no bone remodeling of the area in the lesions (Figure 6).

Figure 5. Clinical and Radiographic view.

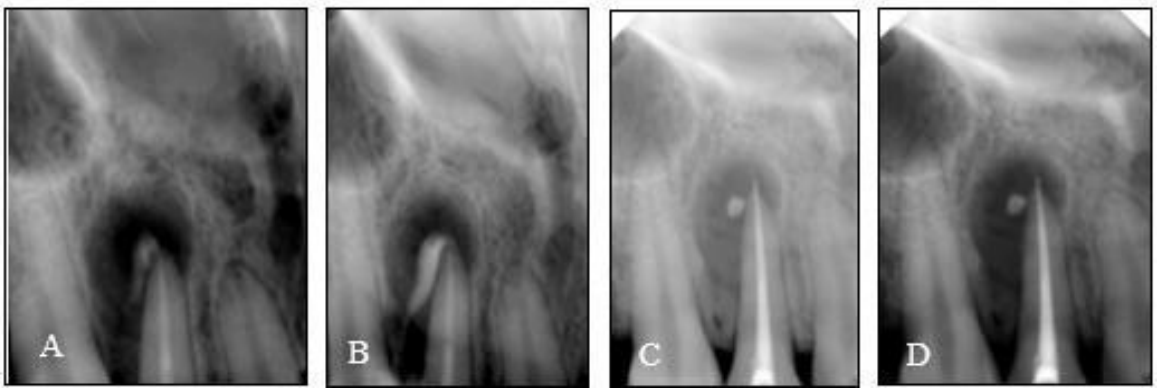

Figure 6. Radiographic View (A). CaOH Medicament, (B) Second CaOH Medicament (C) Post obturation root canal, (D) 3 months after post obturation

In this case, surgery is performed using a modified minimally invasive surgical technique where a 3 mm diagonal incision under the interdental papilla is carried out and then continued with a vertical incision (Figure 7A). Then a full-thickness flap reflection is performed, accompanied by a partially thick flap. There appears to be a pocket with a depth of 11 mm, followed by granulated tissue debridement and root planing with a curet, and there appears to be damage to the bottom of the bone (Figure 7B-C). It was then applied to a 0.5-cc Xenograft-based (TiOss) bone marrow material, coated with pericardium membrane, and sewn with an interrupted suture technique combined with a Gordian knot and sling suture (Figure 7D-E). Three-day post-surgical controls showed good and stable recovery,

and the X-rays also showed a good picture. Seven days of post- surgical controls showed excellent healing, and X-rays showed stable bone marrow material as well as seam opening.

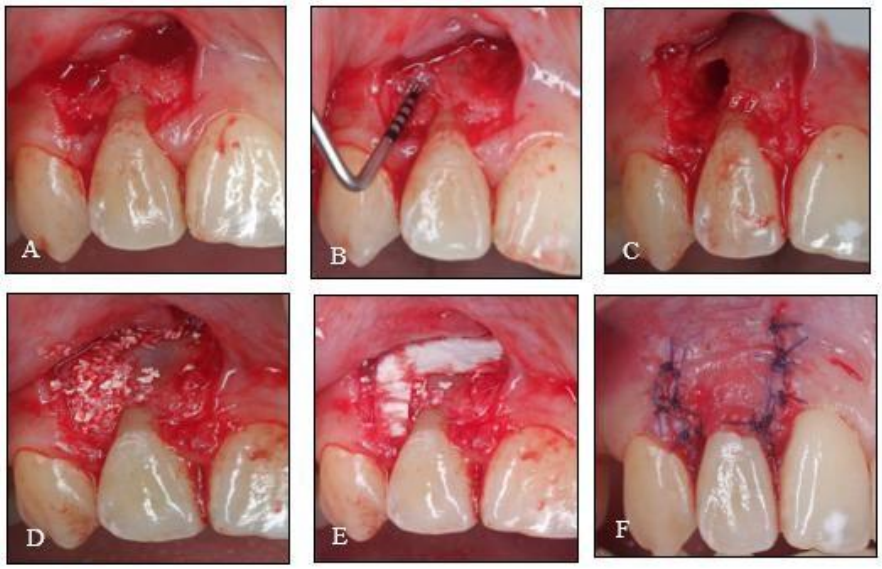

Figure 7. (A). Elevation of the flap (B) pocket deep 11mm in defect, (C) granulated tissue removal, (D) Apply bone graft to the defective area, (F) Apply membrane pericardium (E) Suturing.

The 1-month post-action control shows a stable injury area, and X-rays show stable neck material. 3 and 6 months post-operation control shows a stable wound area, and radiographs indicate that bone remodeling is starting to appear (Figure 8).

Figure 8. Clinical and Radiographic View (A) 1 month (B) 3 months (C) 6 months.

3. Discussion

In the past, conventional flap procedures were utilized to treat advanced periodontitis, using broad flaps to access the diseased tissues. These operations cause interdental papillary gingiva loss, gingival height and contour loss, root sensitivity, and crestal bone resorption [18]. The main objective of periodontal surgery is the complete preservation of the interdental soft tissue to achieve primary closure over the defective sites during the early phases of wound healing [19]. Minimally invasive treatment techniques have been developed with incisions that seek to maintain the integrity of the papilla by elevating more conservative flaps for access [20].

A surgical approach with minimally invasive techniques yields better results due to the minimal trauma produced and helps in faster and better tissue regeneration, as stated by Chacko et al. where a clinical comparison of three-month clinical parameters between minimal invasive techniques and conventional techniques suggests that minimal gingival recession, better pocket reduction and better clinical adhesion compared to conventional technologies [21].

In case 1 surgery with EPPT, the clinical and radiographic views at 3 and 6 months showed good and stable results, and the root canal appeared to be dry, so it was filled with a bioceramic-based sealer. After 3 and 6months post-surgery, the control shows a stable wound area, and radiographs indicate that bone remodeling is starting to appear in case 2 surgical with M-MIST. Compared to conventional therapy, minimally invasive techniques have reduced morbidity, a shorter postoperative time, less recession, and greater patient-reported acceptability. This promotes adaptation, the reconstruction of the supracrestal attachment, and the formation of the long junctional epithelium, so gingival recession can be considered part of the healing response [22, 23].

Research by Karthikeyan shows that minimal invasion techniques combined with the selection of the right type of regenerative material will yield far better and optimal results compared with conventional surgery techniques [24]. Aslan proposed the new EPPT technique in 2017 to treat deep IBD. Its design includes a single vertical incision contralateral to the bone defect, ensuring adequate access to fully preserve the interdental papilla and thus ensuring optimal healing conditions [11, 12]. The M-MIST greatly enhances the potential to provide space and stability for regeneration by leaving the interdental papillary soft tissue attached to the root surface. This method preserves the soft tissue roof over the defect. Retaining the vascular supply of the papillary tissue enhances postoperative healing and maintains its aesthetic appeal. This technique also evades the necessity of using any supporting biomaterial for regeneration [18].

When a clinician cannot make a definitive diagnosis in the case of endo-perio lesions, then the clinic will try to initiate one of the preliminary treatments between periodic or endo treatments first to see the effectiveness of the treatment. However, a proper history and sequential treatment planning can effectively overcome this. Calcium hydroxide (CaOH), a medicinal compound with bactericidal, anti-inflammatory, and proteolytic properties, can serve as an intracanal medication in cases with purely endodontic etiology. This medication will inhibit resorption and support improvement [25]. It is particularly effective in endodontic lesions with extensive periapical and pseudopocket pathologies, as CaOH acts as a temporary obstruction, thereby inhibiting the periodontal infection process [26].

It is essential to have a precise diagnosis in order to determine the prognosis and develop a treatment plan. EPL is frequently challenging to diagnose due to its dual origins, which are endodontic and periodontal. Communication evidences a close anatomical relationship between endodontics and periodontics, despite their frequent investigation as distinct disciplines [27]. In this case report, it appears that the tooth is already non-vital, which is a feature that indicates primary endodontic involvement in general. When there are combined endodontic and periodontal lesions, the lesion will usually heal well with good endodontic treatment. The success of the treatment depends on how well the periodontal tissue responds to the endodontic treatment. In this case report, as in both cases above, after endodontic treatment, the periodontal lesion showed no improvement in the X-ray evaluation after 3 and 6 months, confirming the involvement of secondary perio infection accompanied by primary endo.

4. Conclusion

Minimally invasive surgical techniques play an important role in periodontal regeneration. The main goal of this technique is to improve wound and primary closure stability while reducing surgical trauma, patient visits, and patient discomfort. When compared to each other, treatment of periodontal surgery in an endo-perio lesion using the Entire Papilla Preservation Technique (EPPT) or Modified Minimally Invasive Surgical Technique (M-MIST) produced significant improvement in clinical and radiographic parameters presented, as well as radiographic bone fill.

Conclusion

Minimally invasive surgical techniques play an important role in periodontal regeneration. The main goal of this technique is to improve wound and primary closure stability while reducing surgical trauma, patient visits, and patient discomfort. When compared to each other, treatment of periodontal surgery in an endo-perio lesion using the Entire Papilla Preservation Technique (EPPT) or Modified Minimally Invasive Surgical Technique (M-MIST) produced significant improvement in clinical and radiographic parameters presented, as well as radiographic bone fill.

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Conflict of Interest

The authors declare no conflicts of interest related to this case report.

References

[1] Garrett S. Periodontal regeneration around natural teeth. *Ann Periodontol*. 1996;1(1):621-666.

[2] Harrel SK, Rees TD. Granulation tissue removal in routine and minimally invasive

[3] procedures. Compend Contin Educ Dent. 1995;16(9):960-964.

[4] Harrel SK, Nunn ME, Belling CM. Long-term results of a minimally invasive surgical approach for bone grafting. J Periodontol. 1999;70(12):1558-1563.

[5] Cortellini P, Tonetti MS. A minimally invasive surgical technique with an enamel matrix derivative in the regenerative treatment of intra-bony defects: a novel approach to limit morbidity. J Clin Periodontol. 2007;34(1):87-93.

[6] Harrel SK, Wilson TG, Nunn ME. Prospective assessment of the use of enamel matrix proteins with minimally invasive surgery. J Periodontol. 2005;76(3):380-384.

[7] Harrel SK, Wilson TG Jr, Nunn ME. Prospective assessment of the use of enamel matrix derivative with minimally invasive surgery: 6-year results. J Periodontol. 2010;81(3):435-441.

[8] Harrel SK, Wilson TG Jr, Rivera-Hidalgo F. A videoscope for use in minimally invasive periodontal surgery. J Clin Periodontol. 2013;40(9):868-874.

[9] Cortellini, Pierpaolo, & Tonetti, M. S. (2009a). Improved wound stability with a modified minimally invasive surgical technique in the regenerative treatment of isolated interdental intrabony defects. J. Clin. Periodontol. https://doi.org/10.1111/j.1600-051X.2008.01352.x

[10] Cortellini, Pierpaolo, & Tonetti, M. S. (2009b). Improved wound stability with a modified minimally invasive surgical technique in the regenerative treatment of isolated interdental intrabony defects. J. Clin. Periodontol., 36(2), 157–163.

[11] Aslan, S., Buduneli, N., & Cortellini, P. (2017a). Entire papilla preservation technique in the regenerative treatment of deep intrabony defects: 1-Year results. Journal of Clinical Periodontology, 44(9), 926–932. https://doi.org/10.1111/jcpe.12780.

[12] Aslan, S., Buduneli, N., & Cortellini, P. (2017b). Entire papilla preservation technique: A novel surgical approach for regenerative treatment of deep and wide intrabony defects. The International Journal of Periodontics & Restorative Dentistry, 37(2), 227–233. https://doi.org/10.11607/prd.2584.

[13] Aslan, S., Buduneli, N., & Cortellini, P. (2020). Clinical outcomes of the entire papilla preservation technique with and without biomaterials in the treatment of isolated intrabony defects: A randomized controlled clinical trial. Journal of Clinical Periodontology, 47(4), 470–478. https://doi.org/10.1111/jcpe.13255

[14] Bhaumik Nanavati, Neeta V. Bhavsar, & Jaydeepchandra Mali. (2013). Endo Periodontal Lesion a Case Report. Journal of Advanced Oral Research, 4(1): 17-21

[15] Al-Fouzan, K. S. (2014). A new classification of endodontic-periodontal lesions. In

[16] International Journal of Dentistry 1-4.

[17] Papapanou, P. N., Sanz, M., Buduneli, N., Dietrich, T., Feres, M., Fine, D. H., Flemmig, T. F., Garcia, R., Giannobile, W. v., Graziani, F., Greenwell, H., Herrera, D., Kao, R. T., Kebschull, M., Kinane, D. F., Kirkwood, K. L., Kocher, T., Kornman, K. S., Kumar, P. S., Tonetti, M. S. (2018). Periodontitis: Consensus report of workgroup 2 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. J Periodontology, 89(173–82).

[18] Karamifar, K., Tondari, A., & Saghiri, M. A. (2020). Endodontic Periapical Lesion: An Overview on the Etiology, Diagnosis and Current Treatment Modalities. Eur End

[19] J, 5(2): 54-67.

[20] Mirzaeei, S., Ezzati, A., Mehrandish, S., Asare-Addo, K., & Nokhodchi, A. (2022). An Overview of Guided Tissue Regeneration (GTR) Systems Designed and Developed As Drug Carriers for Management of Periodontitis. Journal of Drug Delivery Science and Technology, 71:1-12.

[21] Sultan N, Jafri Z, Sawai M, Bhardwaj A. Minimally invasive periodontal therapy. J Oral Biol Craniofac Res. 2020 Apr-Jun;10(2):161-165. doi: 10.1016/j.jobcr.2020.04.014.

[22] Cortellini, Pierpaolo. (2012). Minimally invasive surgical techniques in periodontal regeneration. J. Evid. Based. Dent. Pract. https://doi.org/10.1016/S1532- 3382(12)70021-0

[23] Clinical performance of minimally invasive periodontal surgery in the treatment of infrabony defects: Systematic review and meta-analysis. J. Clin.Periodontol., 46(12), 1236–1253. https://doi.org/10.1111/jcpe.13201.

[24] Chacko, N. L., Bhamare, R., Rakhewar, P. S., & Raje, M. (2021). Microsurgical and Conventional Open Flap Debridement Procedure in the Management of Periodontitis: A Comparative Clinical Study. IIOSR-JDMS. (20):24–32.

[25] Tugnait A, Clerehugh V. Gingival recession its significance and management. J Dent 2001;29 (6):381-394

[26] Trombelli L, Simonelli A, Minenna L, Vecchiatini R, Farina R. Simplified procedures to treat periodontal intraosseous defects in esthetic areas. Periodontol 2000. 2018 Jun 1;77(16):93–110.

[27] Karthikeyan, J., R, V., & Mahendra, J. (2017). Minimally invasive techniques for periodontal regenerative therapy- an overview. International Journal of Recent Scientific Research. 08(04): 16503–9.

[28] Bhaumik Nanavati, Neeta V. Bhavsar, & Jaydeepchandra Mali. (2013). Endo Periodontal Lesion a Case Report. Journal of Advanced Oral Research, 4(1): 17-21

[29] Sonde, N., & Edwards, M. (2020). Perio-Endo Lesions: A Guide to Diagnosis and Clinical Management. Primary Dental Journal, 9(4), 45–51.

[30] Hock Siang Chua, Zhi Kuan Saw, Najahhuddin Shahbuddin, Shahida Mohd-Said. (2024). Implementing The 2017 Efp/Aap Periodontal Disease Classification in the Diagnosis and Management Of Endo-Periodontal Lesions (Case Report). Cakradonya Dent J,16(1): 17-23. https://doi.org/10.24815/cdj.v16i1.36416.