Journal of Multidisciplinary Dental Research

CASE REPORT

Reviving Furcation: Hyaluronic Acid and Xenograft for Grade II Defects

A K Aysha Safoora[1,*], Krishnaraj Ganeshnarayanan[2], K B Uthappa[3], Rashmi S Pattanshetty[3]

[1] *Postgraduate, Deptartment of Periodontics, Coorg Institute of Dental Sciences, Virajpet, Karnataka, India*
[2] *Professor, Dept of periodontics, Coorg Institute of Dental Sciences, Virajpet, Karnataka, India*
[3] *Reader, Dept of periodontics, Coorg Institute of Dental Sciences, Virajpet, Karnataka, India*

ARTICLE INFO

Article history:
Received 30.09.2024
Accepted 12.12.2024
Published 30.12.2024

[*] *Corresponding author.*
A K Aysha Safoora
ayshanvar22@gmail.com

https://doi.org/10.38138/JMDR/v10i2.20

ABSTRACT

Furcation involvement in periodontal therapy, particularly in molars, is challenging, and conventional treatments often yield suboptimal results. Advances in understanding inflammation have led to exploring extracellular matrix (ECM) components like hyaluronic acid (HA) to enhance healing and regeneration. To assess the effects of HA combined with xenograft in treating a Grade II furcation defect in a patient with chronic periodontitis. A patient with grade II furcation underwent open flap debridement, receiving a xenograft combined with hyaluronic acid (HA). Radiographic and clinical parameters, including probing pocket depth (PPD), furcation involvement, and bleeding on probing (BOP), were measured at baseline, 6 months, and 9 months. Significant improvements were observed in clinical parameters at the 9-month follow-up: PPD and furcation involvement showed a marked reduction, and BOP decreased. Radiographic evidence indicated substantial bone fill within the defect. The combined use of HA and a bone graft in treating Grade II furcation defects led to improved clinical outcomes and radiographic evidence of bone regeneration. This case report supports the potential of HA as an adjunctive treatment in periodontal therapy for furcation involvement.

Keywords: Extracellular matrix; Furcation; Hyaluronic acid; Regeneration; Xenograft

1 INTRODUCTION

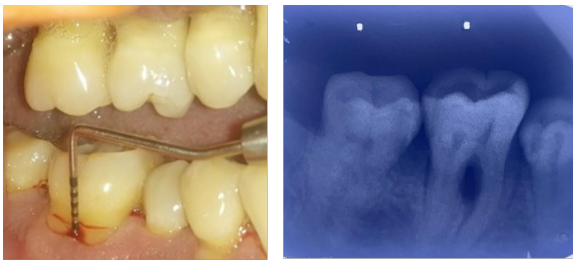
Furcation defects are often difficult to access for effective professional debridement because their narrow entrances prevent periodontal instruments from reaching them. Additionally, the ridges, convexities, and concavities within the defect make instrumentation challenging, so regenerating the periodontium in these areas is considered one of the most difficult tasks in periodontal therapy.[(1)] Despite anatomical challenges, studies have shown that Grade II furcation defects can achieve reduced probing depths and improved clinical attachment levels (CAL) through the use of coronally positioned flaps, hard tissue grafts, and guided tissue regeneration, with or without the addition of various grafting materials.[(2)] Xenograft is a type of graft derived from a different species, such as bovine, equine, or coral. It is a demineralized bone matrix derived from decalcified animal sources, such as bovine or equine, resulting in nonimmunogenic particles, typically around 250 μm in size. These particles are gradually resorbed and replaced by the host bone within approximately 24 weeks.

Recently, clinicians have begun using a combination of grafting materials and extracellular matrix (ECM) components to promote periodontal regeneration. Hyaluronan/Hyaluronic Acid (HA), a natural ECM component, plays a crucial role in the functioning of extracellular matrices, including those in the periodontium. Therefore, the objective of this case report was to assess the effect of combining HA with a xenograft in the treatment of a Grade II furcation defect.

2 CASE REPORT

A 56-year-old male patient reported to the Department of Periodontology and Implantology, Coorg institute of dental science, virajpet with the chief complaint of bleeding gums. The patient was physically healthy with no known medical conditions. An intraoral examination revealed soft,

edematous gingiva throughout the oral cavity, with bleeding on probing observed in over 60% of the sites. Probing depths of 8 mm and a Grade II furcation defect were noted for tooth #46, indicating significant periodontal involvement [Figure 1**a and b**].



a b

Fig. 1:

Phase 1 therapy began after the treatment plan was explained to the patient and informed consent was obtained. The patient was advised to use a 0.12% chlorhexidine gluconate mouthwash twice a day for 14 days. Following this period, the patient was evaluated. After the administration of local anesthesia, a crevicular incision was made with a #12 blade, and the mucoperiosteal flap was reflected to allow for thorough debridement of the furcation defect [Figure 2]. A xenograft (Osseograft) with high molecular weight HA (Gengigel) was then condensed into the furcation and intrabony defects associated with teeth #46 and #47 [Figure 3**a and b**]. The flap was repositioned and secured with 3-0 silk sutures, after which Coe-Pack was applied to the surgical site [Figure 4 **a and b**].

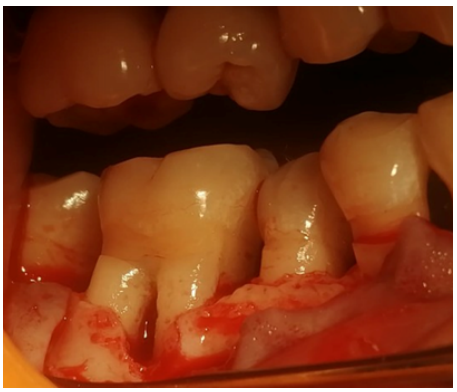
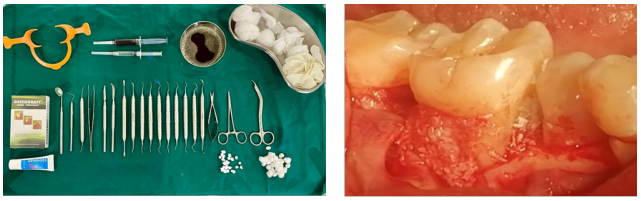


Fig. 2:

Postoperatively, the patient was prescribed Amoxicillin 500 mg, to be taken three times daily for 5 days, a nonsteroidal anti-inflammatory drug, zeradol-p (aceclofenac 100 mg & paracetamol 325mg) for 3 days and an antacid, pan 40 mg once a day on an empty stomach for 3days. The patient was advised not to brush or chew on the operated side for 14 days. They were scheduled to return after 14 days for the removal of sutures. Clinical measurements, including probing pocket depth (PPD) and bleeding on probing (BOP), were recorded at 6 and 9 months. Healing at the surgical site occurred uneventfully without any complications. At the end of 9 months, there was a decrease in all clinical parameters, accompanied by radiographic evidence of bone fill [Figures 5 and 6].



a b

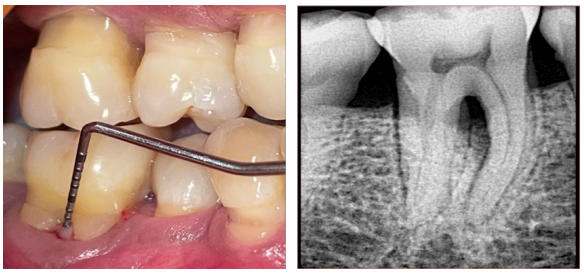
Fig. 3:

a b

Fig. 4:

a b

Fig. 5:



a b

Fig. 6:

3 DISCUSSION

The present case report evaluated the efficacy of adjunctive use of HA along with xenograft in the treatment of Grade II furcation defect. The primary function of HA is to preserve the structural and homeostatic integrity of tissues by binding to water, facilitating the transport of essential metabolites, and activating metalloproteinase inhibitors that help prevent tissue breakdown.[3] In vitro and animal studies have demonstrated that HA notably enhances tissue tensile strength, promotes angiogenesis, stimulates clot formation, and supports bone formation. Additionally, HA accelerates cell differentiation and migration during tissue repair and regeneration, preserves cell viability and increases cell proliferation and early osteogenic differentiation.[4]

The primary goal of regenerative therapy is to restore both the hard and soft periodontal tissues, including the formation of a new attachment apparatus, ultimately leading to the closure of the furcation defect[5]. Previous reports have indicated that regeneration of a new attachment apparatus, including cementum, connective tissue, and bone, occurs in intrabony defects treated with xenograft.[6]

In this study, the enhanced clinical and radiographic outcomes can be attributed to the combination of HA and xenograft.

These outcomes are consistent with those found in Mamajiwala et al.'s study[7] where 0.8% HA was utilized alongside open flap debridement for treating periodontal intrabony defects.

Arpağ et al[8] conducted a histomorphometric study using a rabbit model and found that high molecular weight HA could enhance xenograft healing by promoting new bone formation and reducing residual graft material. The present study observed significant reductions in probing pocket depth (PPD)and bleeding on probing which can be attributed to the anti-inflammatory, bacteriostatic, and osteo-inductive properties of HA when used with a bone graft[9]. These findings emphasize the clinical significance and efficacy of HA in regenerative periodontal procedures.[10]

4 CONCLUSION

In conclusion, the combination of xenograft and HA for treating Grade II furcation defects appears to be a promising and effective approach. The combined use of HA and a bone graft in treating Grade II furcation defects led to improved clinical outcomes and radiographic evidence of bone regeneration. The anti-inflammatory, bacteriostatic, and osteo-inductive properties of HA contributed significantly to the observed improvements. However, to reinforce these findings, additional studies with larger sample sizes are needed. This case report supports the potential of HA as an adjunctive treatment in periodontal therapy for furcation involvement.

REFERENCES

1) Sharma H, Tomar N, Kaushik M, Rana N. Comparative evaluation of Novabone Putty and Freeze Dried Bone Allograft (FDBA) in the treatment of grade II furcation defect: A case report. *Int J Res Anal Rev*. 2021;8:439–447.
2) Avila-Ortiz G, De Buitrago JG, Reddy MS, S M. Periodontal regeneration - Furcation defects: A systematic review from the AAP Regeneration Workshop. *Journal of Periodontology*. 2015;86(2 Suppl):S108–S130. Available from: https://doi.org/10.1902/jop.2015.130677.
3) Moseley R, Waddington RJ, Embery G. Hyaluronan and its potential role in periodontal healing. *Dent Update*. 2002;29(3):144–148. Available from: https://doi.org/10.12968/denu.2002.29.3.144.
4) Bansal J, Kedige SD, Anand S. Hyaluronic acid: A promising mediator for periodontal regeneration. *Indian Journal of Dental Research*. 2010;21(4):575–578. Available from: https://doi.org/10.4103/0970-9290.74232.
5) Bhatnagar MA, Deepa D. Management of grade II furcation defect in mandibular molar with alloplastic bone graft and bioresorbable guided tissue regeneration membrane: A case report. *IP International Journal of Periodontology and Implantology*. 2016;1(3):96–99. Available from: https://www.ijpi.in/article-details/3214.
6) Sowmya NK, Kumar ABT, Mehta DS. Clinical evaluation of regenerative potential of type I collagen membrane along with xenogenic bone graft in the treatment of periodontal intrabony defects assessed with surgical re‑entry and radiographic linear and densitometric analysis. *Journal of Indian Society of Periodontology*. 2010;14(1):23–29. Available from: https://doi.org/10.4103/0972-124X.65432.
7) Mamajiwala AS, Sethi KS, Raut CP, Karde PA, Mamajiwala BS. Clinical and radiographic evaluation of 0.8% hyaluronic acid as an adjunct to open flap debridement in the treatment of periodontal intrabony defects: Randomized controlled clinical trial. *Clinical Oral Investigations*. 2021;25(9):5257–5271. Available from: https://doi.org/10.1007/s00784-021-03834-7.
8) Arpağ OF, Damlar I, Altan A, Tatli U, Günay A. To what extent does hyaluronic acid affect healing of xenografts? A histomorphometric study in a rabbit model. *Journal of Applied Oral Science*. 2018;26:1–8. Available from: https://doi.org/10.1590/1678-7757-2017-0004.
9) Briguglio F, Briguglio E, Briguglio R, Cafiero C, Isola G. Treatment of infrabony periodontal defects using a resorbable biopolymer of hyaluronic acid: A randomized clinical trial. *Quintessence International*. 2013;44(3):231–240. Available from: https://doi.org/10.3290/j.qi.a29054.
10) Pilloni A, Rojas MA, Marini L, Russo P, Shirakata Y, Sculean A, et al. Healing of intrabony defects following regenerative surgery by means of single‑flap approach in conjunction with either hyaluronic acid or an enamel matrix derivative: A 24‑month randomized controlled clinical trial. *Clinical Oral Investigations*. 2021;25(8):5095–5107. Available from: https://doi.org/10.1007/s00784-021-03822-x.