

## Derma Fillers: Ray of Light in Black Triangles – A Pilot Study

### Abstract

**Background and Aim:** Open gingival embrasure often poses complex functional and esthetic problems. Interdental papilla reconstruction is among the most challenging periodontal treatments. Hyaluronic acid (HA) gel injection, a noninvasive technique with immediate papilla reconstruction, has been recently proposed. This minimally invasive therapeutic procedure has shown predictable esthetic outcome, thus, gaining rapid acceptance as an esthetic treatment modality in dentistry. The aim of the study is to evaluate the clinical application of derma fillers (HA gel) for the reconstruction of the interdental papilla in the esthetic zone. **Materials and Methods:** Six patients were included with interdental papilla deficiency. After the induction of local anesthesia, 0.2 ml of 0.2% HA injection was given at baseline, 3 weeks and 3 months. Measurements of the black triangle were done clinically using acrylic stent as a reference. The application of HA gel for the reconstruction of interdental papilla was found successful at a 6-month period. **Results:** The study showed a significant gain in papillary volume, and esthetics improvement was notable. A statistically significant result was obtained in context to papilla fill. **Conclusion:** Interdental papilla reconstruction with injectable HA gel is a promising minimally invasive treatment option for interdental deficiency in small areas.

**Keywords:** Black triangles, esthetics, hyaluronic acid, interdental papilla

### Introduction

Gingival esthetics is much of concern nowadays due to increased cosmetic demands. The complex anatomy of interdental area combined with the vascular supply allows for periodontal disease to progress rapidly causing loss of interdental papilla and formation of black triangles. Interdental papilla acts as a biological barrier by protecting the underlying periodontal structure from intraoral insults. Reconstruction of interdental papilla, especially at the esthetic zone, is among the most challenging and least predictable periodontal treatments. In such conditions, restoring the esthetics at the anterior region is among patients expectations from periodontal treatments.<sup>[1]</sup> This issue can become highly problematic, especially in cases with a high lip line to the extent that the patient may avoid smiling. Complex periodontal plastic procedures along with restorative intervention can enhance ultimate outcome but rarely can achieve ideal results. Various complex surgical techniques and flap designs have been proposed for the reconstruction of

interdental papilla with limited success. However, these techniques are mostly invasive and they fail to achieve long-term stability and predictability, mainly because of the minor blood supply in the limited area that the interproximal papilla occupies.<sup>[2]</sup> A noninvasive technique with the use of hyaluronic acid (HA) gel with immediate results has been recently proposed. This treatment can replace the afore-mentioned invasive surgical procedures and may be successfully used for the reconstruction of dental papilla at the esthetic zone. HA is high-molecular-weight nonsulfated most prominent and critical connective tissue glycosaminoglycan, produced during cells life cycle. It act as a barrier to Gram-negative bacteria,<sup>[3]</sup> and it plays an important role in cell growth, membrane receptor function, and adhesion. The most important function of HA is its involvement in tissue healing and repair. This material stimulates cell proliferation, migration and angiogenesis, reepithelialization, and proliferation of basal keratinocytes.<sup>[4,5]</sup> Other properties of HA are illustrated in Table 1 (Properties of HA). This technique has various advantages over conventional surgical techniques which include noninvasive, nontoxic, immediate with

**Shalini Kapoor,  
Anjali Dudeja**

*Department of Periodontology,  
SGT Dental College, Gurgaon,  
Haryana, India*

**Submitted :** 12-Sep-2018  
**Revised :** 21-Oct-2018  
**Accepted :** 27-Nov-2019  
**Published :** 13-Jul-2020

#### Address for correspondence:

*Dr. Anjali Dudeja,  
Department of Periodontology,  
SGT Dental College, Gurgaon,  
Haryana, India.  
E-mail: anjalidudeja19@gmail.  
com*

#### Access this article online

##### Website:

[www.contempclindent.org](http://www.contempclindent.org)

**DOI:** 10.4103/ccd.ccd\_693\_18

##### Quick Response Code:



**How to cite this article:** Kapoor S, Dudeja A. Derma fillers: Ray of light in black triangles – A pilot study. *Contemp Clin Dent* 2020;11:55-9.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow\_reprints@wolterskluwer.com

significant results, no periodontal wounds, color of regenerated papillary tissue is similar to adjacent tissue, require very little time, ready to use, and have a low risk of complications. Due to the lack of adequate information regarding the efficacy of this material, the present study sought to assess the effect of HA gel on interdental papilla reconstruction in the esthetic zone with immediate effect in patients presenting to the Department of Periodontics, SGT University, Gurgaon, Delhi-NCR, India.

**Aim**

The aim of this pilot study was to evaluate a new method for possibly reducing or eliminating small deficient papillae adjacent to teeth and also the clinical application of derma fillers (HA gel) for the reconstruction of interdental papilla in the esthetic zone.

**Materials and Methods**

Six patients, four females and two males, with an average age of 37.5 ± 14.4 years (range 20–61 years) with seven treated sites were included in this pilot project. Patients presenting to the Department of Periodontics, SGT University, Gurgaon, Delhi-NCR, with interdental papilla loss or defects at one or several areas in the anterior maxillary region who met the inclusion criteria were selected for this study. The inclusion criteria were as follows: age range of 20–61 years, possession of the maxillary anterior teeth, participants had to be nonsmoker, noncontributory medical history, and no consumption of drugs causing gingival hyperplasia. Patients were thoroughly informed about the method of conduction of study, and written informed consent was obtained from them. Interdental papilla was evaluated according to Nordland and Tarnow classification [Figure 1].<sup>[5]</sup> In seven treated sites, 4 had Class II and 3 had Class I. Before treatment, photographs were taken perpendicular to teeth of interest [Figures 2 and 3]. These were used to take subsequent photos as close to the original photos as possible. Measurements of the black triangle were done clinically from the tip of the papilla to the contact point of the associated teeth using the periodontal probe and stent

as a reference [Figure 4]. Before treatment, a short-acting local anesthetic was administered. A commercially available, hyaluronic-based gel (<0.2 mL) 0.2% was injected 2–3 mm apical to the tip of the papilla [Figure 5]. The patients were discharged and requested not to brush their teeth at the day of injection and resume oral hygiene the day after using a soft toothbrush at the anterior teeth and place it coronal to the gingival margin. The patients were asked not to use dental floss at the treatment sites. Patients were recalled at 3 weeks and 3 months for subsequent booster doses and follow-up [Figures 6-10]. Follow-up at 6<sup>th</sup> month [Figures 11 and 12] was done to assess the sustainability of the esthetic results. The obtained data were statistically analyzed using the paired *t*-test.

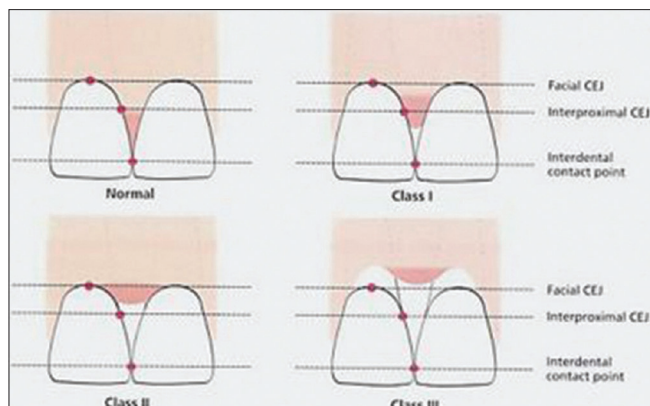
**Results**

A total of seven interdental papillae in six patients, including two males and four females, with a mean age of 37.5 ± 14.4 years (range 22–61 years) were evaluated. None of the cases had diastema or space in between their understudy teeth. All participants were followed up until the completion of treatment, and no complication, hypersensitivity, or allergy was noted. In terms of periodontal status, three papillae (86%) were Class I and the remaining were Class II.<sup>[5]</sup> The percentage change of interdental papilla reconstruction at different follow-up times is presented in Tables 2 and 4.

As *P* < 0.05, the results were statistically significant. There was a statistically significant difference observed

**Table 1: Properties of hyaluronic acid**

Biocompatible <sup>[6]</sup>
Regulation of immune response <sup>[7]</sup>
Osteoinductive and antioxidant <sup>[7,8]</sup>
Promotes healing <sup>[9]</sup>
As a diagnostic marker <sup>[6]</sup>
Principle ligand for CD4+ <sup>[10]</sup>
Provides elasticity and stability to tissue <sup>[11]</sup>



**Figure 1: Nordland and Tarnow classification**



**Figure 2: Pre treatment photographs**



Figure 3: Pre treatment photographs

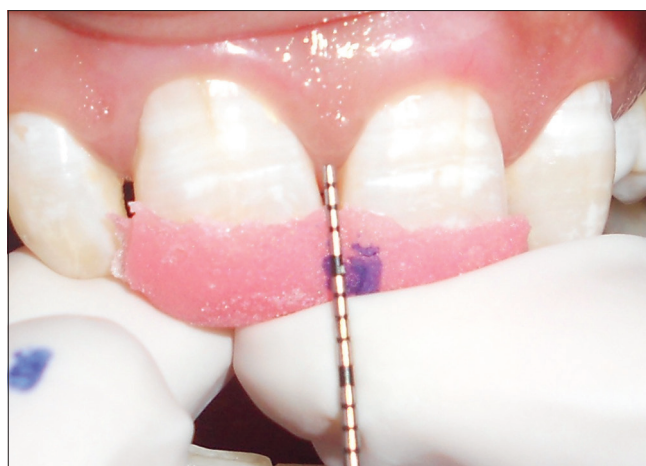


Figure 4: Using stent for measurements



Figure 5: Gel injected 2–3 mm apical to tip of the papilla



Figure 6: AT 3 Weeks

**Table 2: Percentage change in interdental papilla fill after 3 weeks and 3 months**

Case number	Embrasure space at baseline, mm	After 3 weeks, mm	After 3 months, mm	Amount of gain, mm (%)
1	2 (Class I)	1	0.1	1.9 (95)
2	5 (Class II)	3.8	0	5 (100)
3	4 (Class II)	2.8	0	4 (100)
4	5.5 (Class II)	4.6	1.2	4.3 (78.1)
5	3 (Class I)	2.5	1.3	1.7 (57)
6	4 (Class II)	3	0.5	3.5 (87.5)
7	3 (Class I)	1	0	3 (100)

**Table 3: Level of significance of papilla fill after 3 months**

Mean	SD	SEM	P
3.4	1.33	0.54	0.002

SD: Standard deviation; SEM: Standard error of the mean

at 3 months in all the seven cases [Table 3]. A very less amount of shrinkage was seen after 6 months.

### Discussion

Reduction or total loss of the interdental papilla may create esthetic impairments, create phonetic problems, and allow unwarranted food impaction. One of the most difficult and

elusive goals for the periodontist in the esthetic aspect of periodontal therapy is the reconstruction of the interdental papilla. Esthetic problems after the loss of interdental papilla, especially following periodontal surgeries, have been extensively reported in the literature.<sup>[12-16]</sup> In order to resolve this issue, several methods have been proposed to fill up this space, including periodic curettage,<sup>[13]</sup> Beagle's technique,<sup>[14]</sup> a combination of Roll technique and papilla preservation,<sup>[15]</sup> and pedicle flap (comprising a semilunar incision and a coronally advanced flap).<sup>[16]</sup>

Takei *et al.*<sup>[17]</sup> propose a new surgical approach called the papilla preservation technique, which allows the interdental tissue to be dissected from the lingual/palatal aspect so that it can be elevated intact with the facial flap. After the treatment of the bony defect, the buccal flap, including the palatal/lingual aspect of the papilla, is repositioned. To optimize the clinical results in terms of attachment/bone gains and soft-tissue preservation, Cortellini *et al.*<sup>[18]</sup> published a modification of Takei *et al.*'s technique as a new approach for interproximal regenerative procedures (the modified papilla preservation technique). This technique is applicable in wide interdental spaces (2 mm), especially in the anterior dentition. This technique allows for achieving primary



Figure 7: AT 3 Weeks



Figure 8: AT 3 Months



Figure 9: Followup AT 3 Months



Figure 10: Followup AT 3 Months



Figure 11: AT 6 Month



Figure 12: AT 6 Month

closure of the tissue and preserving the papilla in 75% of cases. These results may be improved using a microsurgical approach.<sup>[19]</sup> However, these techniques are all invasive and mostly unpredictable.

Most previous studies are case presentations containing little or no data regarding short- and long-term results with specific techniques. The application of noninvasive techniques such as the use of commercially available HA gel can replace the conventional invasive methods. The attempt to use HA gel for papillary augmentation is scarcely reported in the existing literature.<sup>[20]</sup> Only one long-term

study has evaluated the effect of HA filler on interdental papilla reconstruction and noted that the injection of HA gel is safe and significantly decreased the interdental black triangle in the esthetic zone. Becker *et al.*<sup>[21]</sup> concluded that the injection of HA gel as a safe material significantly decreased the interdental black triangle in the esthetic zone. This finding was similar to our obtained result. The present study results demonstrated that the application of HA gel was successful for interdental papilla reconstruction at 6 months follow-up [Table 5]. The rate of interdental papilla reconstruction at the maxillary anterior region was significant compared to baseline ( $P < 0.05$ ). In 3 cases 100%

**Table 4: Percentage change in interdental papilla fill after 3 weeks, 3 months, and 6 months**

Case number	Embrasure space at baseline, mm	After 3 weeks, mm	After 3 months, mm	After 6 months, mm	Amount of gain, mm (%)
1	2 (Class I)	1	0.1	0	2 (100)
2	5 (Class II)	3.8	0	0.5	4.5 (90)
3	4 (Class II)	2.8	0	0	4 (100)
4	5.5 (Class II)	4.6	1.2	1.2	4.3 (78.1)
5	3 (Class I)	2.5	1.3	0	3 (57)
6	4 (Class II)	3	0.5	0.5	3.5 (87.5)
7	3 (Class I)	1	0	0	3 (100)

**Table 5: Level of significance of papilla fill after 6 months**

Mean	SD	SEM	P
3.4	0.87	0.33	0.000

SD: Standard deviation; SEM: Standard error of the mean

and in remaining 4 cases 57%–90% papilla fill were seen at 6 months. No postoperative complications were seen.

## Conclusion

This study indicates possible improvements in regenerating lost interdental papilla and removal of black triangle by injecting HA into the lost papilla using a nonsurgical approach. HA is useful in regenerating periodontal tissues. This nonsurgical approach limits the use of surgical procedures for regenerating lost papilla, and hence, it is a noninvasive method and also reduces patient discomfort. Therefore, this study demonstrates HA to be a nonsurgical approach for regenerating lost papilla and gave significant and satisfactory results. To overcome the limitations of using of HA for regenerating lost papilla, this study need to be elaborated with more number of patients depending on the size of the black triangle.

## Acknowledgment

I express my profound sense of gratitude and sincere regards to Dr. Harpreet Singh Grover and Dr. Shalini Kapoor for her meticulous supervision, valuable guidance, encouragement, and critical appreciation.

I would also like to thank my beloved parents Dr. Atam Prakash Dudeja and Mrs. Santosh Kumari Dudeja.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## References

- Mansouri SS, Ghasemi M, Salmani Z. Clinical application of hyaluronic acid gel for reconstruction of interdental papilla at the esthetic zone. *J Islamic Dent Assoc Iran* 2013;25:208-13.
- Blatz MB, Hürzeler MB, Strub JR. Reconstruction of the lost interproximal papilla – Presentation of surgical and nonsurgical approaches. *Int J Periodontics Restorative Dent* 1999;19:395-406.
- Vangelisti R, Pagnaco A, Era C. Hyaluronic acid in the topical treatment of inflammatory gingivitis. *Prevenz Asist Dent* 1993;1:16-20.
- Becker W. Esthetic soft-tissue augmentation adjacent to dental implants. *Compend Contin Educ Dent* 2001;22:250-2, 254, 256.
- Cardaropoli G, Lekholm U, Wennström JL. Tissue alterations at implant-supported single-tooth replacements: A 1-year prospective clinical study. *Clin Oral Implants Res* 2006;17:165-71.
- Tanwar J, Hungund SA. Hyaluronic acid: Hope of light to black triangles. *J Int Soc Prev Community Dent* 2016;6:497-500.
- Dahiya P, Kamal R. Hyaluronic Acid: A boon in periodontal therapy. *N Am J Med Sci* 2013;5:309-15.
- Abdulhameed BS, Ibraheem LM. Periodontal effect of 8% hyaluronan as an adjunct to scaling and root planing in the treatment of chronic periodontitis a comparative study. *J Dent Med Sci* 2014;13:76-81.
- Mendes RM, Silva GA, Lima MF, Calliari MV, Almeida AP, Alves JB, *et al.* Sodium hyaluronate accelerates the healing process in tooth sockets of rats. *Arch Oral Biol* 2008;53:1155-62.
- Chen KL, Yeh YY, Lung J, Yang YC, Yuan K. Mineralization effect of hyaluronan on dental pulp cells via CD44. *J Endod* 2016;42:711-6.
- Sahayata VN, Bhavsar NV, Brahmabhatt NA. An evaluation of 0.2% hyaluronic acid gel (Gengigel®) in the treatment of gingivitis: A clinical & microbiological study. *Oral Health Dent Manag* 2014;13:779-85.
- Azzi R, Etienne D, Carranza F. Surgical reconstruction of the interdental papilla. *Int J Periodo Rest Dent* 1998;18:466-73.
- Shapiro A. Regeneration of interdental papillae using periodic curettage. *Int J Periodontics Restorative Dent* 1985;5:26-33.
- Beagle JR. Surgical reconstruction of the interdental papilla: Case report. *Int J Periodontics Restorative Dent* 1992;12:145-51.
- Evian CI, Corn H, Rosenberg ES. Retained interdental papilla procedure for maintaining anterior esthetics. *Compend Contin Educ Dent* 1985;6:58-64.
- Han TJ, Takei HH. Progress in gingival papilla reconstruction. *Periodontol* 2000 1996;11:65-8.
- Takei HH, Han TJ, Carranza FA Jr., Kenney EB, Lekovic V. Flap technique for periodontal bone implants. Papilla preservation technique. *J Periodontol* 1985;56:204-10.
- Cortellini P, Prato GP, Tonetti MS. The modified papilla preservation technique. A new surgical approach for interproximal regenerative procedures. *J Periodontol* 1995;66:261-6.
- Cortellini P, Tonetti MS. Microsurgical approach to periodontal regeneration. Initial evaluation in a case cohort. *J Periodontol* 2001;72:559-69.
- Azzi R, Etienne D, Sauvan JL, Miller PD. Root coverage and papilla reconstruction in Class IV recession: A case report. *Int J Periodontics Restorative Dent* 1999;19:449-55.
- Becker W, Gabitov I, Stepanov M, Kojs J, Smidt A, Becker BE. Minimally invasive treatment for papillae deficiencies in the esthetic zone: A pilot study. *Clin Implant Dent Relat Res* 2010;12:1-8.