Received: 25 May 2024 | Revised: 4 June 2024 | Accepted: 6 June 2024

DOI: https://doi.org/10.56501/intjorofacres.v8i1.1074

CASE SERIES

Journal Section

Conservative Aesthetic Approach in Management of Anterior Spacing Using Bioclear Concept – A Case Series

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Funding information
Nil

Abstract

The hassle to reproduce proximal anatomic contour in a restoration is one of the most common challenges faced by the clinicians while managing anterior spacing. The presence of open gingival area or black triangle involving social six would further complicate the situation to be managed with a direct restoration, provided the clinician has a guide to precisely reproduce the anatomic surfaces. The use of Bioclear matrix system prevails as an ideal choice for the dentists to accomplish long lasting, stronger and aesthetically superior composite restorations. This case report aims to exhibit the benefits of using Bioclear matrix in the restorative management of anterior spacing and its role in achieving clinically and functionally superior restoration with suitable biological properties.

KEYWORDS

Diastema, Bioclear matrix; Spacing; Black triangles; Aesthetics

1 | INTRODUCTION

Space closure in the anterior region is a frequently demanding, technique sensitive aesthetic procedure in day to day practice. Accurate planning and execution would improve dento-facial aesthetics, thereby enhancing patient's self-esteem.[1] Poorly restored tooth with overhanging margins or irregular surfaces can hamper routine oral hygiene measures including dental flossing. This in turn results in increased plaque retention leading to gingival irritation, gingival inflammation affecting patients periodontal health. Furthermore, restorative margins are more prone for micro leakage which accelerates the chance of developing secondary caries.[2]. A modern approach to composite dentistry is made possible by the introduction of Bioclear matrix by David Clark in 2007 to solve the numerous issues and drawbacks of previous systems utilized for conservative direct space closure with composite resin. The anatomical structure of the Bioclear matrix resembling the contour of natural tooth makes it possible to precisely reproduce the tooth's margins, contacts, contours and emergence profile. The Bioclear matrix ensures smooth and perfectly contoured interproximal composite restorations and wedge-free closure of small areas with high contact.[3] Having less curvature than

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conventional diastema closure matrices, they are used for aesthetic and restorative procedures when small areas need to be restored. The composite can be injected or positioned into the embrasure without causing an overhanging margin.

The commercially available Bioclear matrix series includes (1) Original Anterior matrix - A series (2) Original Anterior matrix - DC series (3) BT matrix series (4) HD matrix - A series (5) HD matrix – DC series (6) Evolve posterior matrix series (7) Biofit HD series (8) Biofit blue series (9) 360° Veneer matrix series. The original anterior matrix – A series are used in small anterior interdental space closure and DC series for diastema closure larger than 1mm with the matrix having more curvature compared to the A series. The BT matrix series are intended to be used for faster black triangle closure than with the original anterior matrix series. The HD matrix -A series are stiffer than traditional Bioclear matrices which allows for injection/placement of composite into the embrasure without fear of leaving an overhanging margin. Whereas, HD matrix DC series are used for closing large black triangles where there is still a contact between the teeth. The evolve posterior matrix series are specifically used for posterior space closure. The Biofit HD matrix series offers 30% more buccal/lingual and occlusal wrap than traditional matrices and will be appropriate for 75 % of all posterior molar cases. The Biofit blue series matrices are formed with transparent blue 50 µ mylar, with the clarity of the mylar allows thorough light-curing while maintaining the interproximal anatomic contour. The Bioclear 360° Veneer comes as a 6 tooth kit with 12 matrices that are specially designed to create a 2 part form around the tooth by using both mesial and distal abutting matrices. The two cases presented here aims to portray the benefits and the efficiency of bioclear matrix system in conservative management of anterior spacing.

2 | CASE 1

An 18-year-old female patient, reported with a chief complaint of gap between the upper front teeth since 3 years. Intra oral examination revealed disto-labial migration with extrusion of right upper central incisor, spacing in the anterior region extending from distal of upper right canine to distal of left canine with black triangles in the anterior region (Fig. 1A). Radiographic examination revealed generalized horizontal bone loss extending till the middle third of root of all teeth in upper and lower arch (Fig. 1B). The habit of tongue thrusting and mouth breathing were identified following functional analysis. On periodontal evaluation, there was a probing pocket depth of 5 mm and loss of attachment of 6 mm in both maxillary central incisors with Class I gingival recession, Grade I mobility and Grade II mobility in the mandibular incisors respectively (Fig. 1C-F). High frenal attachment noted in the upper arch with positive tension test and no evidence for traumatic occlusion in the anterior region was identified which was further established with a negative fremitus test.

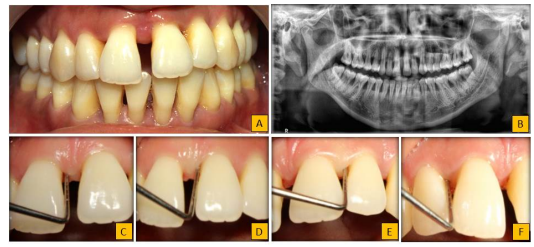

FIGURE 1 Pre-operative clinical(A); Pre-operative radiograph (B); . Pre-operative pocket depth evaluation on incisors(C, D, E, F)

The patient was diagnosed with generalised periodontitis stage II grade A with upper anterior spacing. Patient preferred restorative treatment for upper anterior spacing and to eliminate black triangles using bioclear matrices over orthodontic treatment because of long treatment duration. Splinting was planned for lower incisors after the restorative phase.

Phase 1 periodontal therapy was carried out in a span of 3 weeks followed by surgical periodontal therapy in the upper anterior region. Patient was under maintenance phase for 3 months following active periodontal therapy. Shade selection was performed using vita shade guide under natural light (Fig. 2A). Isolation was ensured using rubber dam followed by scrubbing of all upper anterior teeth surfaces using rubber cup and plain course pumice (Fig. 2B). Exposed cementum surfaces were scrubbed with 3.25 % sodium hypochlorite (NaOCl)

(SafeEndo Hypochlor 3.25 %), a technique called deproteination to improve adhesion and was rinsed thoroughly with saline solution followed by drying.[4] Etchant was applied for 20 seconds followed by rinsing and drying (Fig. 2C). The original anterior- A series Bioclear matrices with 1 mm curvature each for mesial and distal proximal surfaces of central incisors, universal size for lateral incisors and canines were selected and placed into the sulcus and checked for matrix orientation (Fig. 2D). Matrix system was seated into the sulcus followed by application of bonding agent (Tetric N-Bond, Ivoclar) and air dried for 5 seconds. Injectable composite (G-Aeniel A1, GC America) was injected starting from gingivo-proximal surface in the palatal aspect to incisal edge on the labial aspect. Co-curing was done for 20 seconds. The smooth proximal finish of final restoration eliminated the need for supplementary polishing using bur or interproximal strips (Fig. 2E-G).

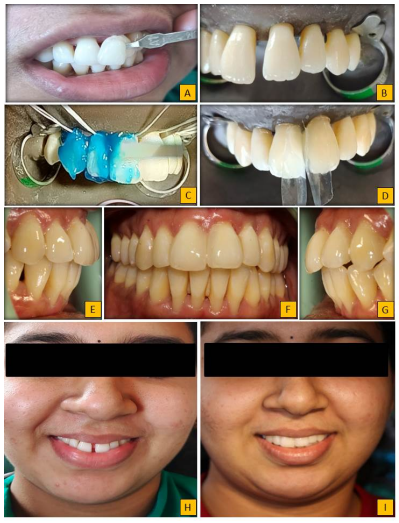

FIGURE 2 A. Shade selection; B. Rubber dam isolation; C. Acid etching; D. Bioclear matrix orientation; E. Post-operative right lateral; F. Post-operative frontal; G. Post-operative left lateral; H. Pre-operative smile; I. Post-operative smile

3 | CASE 2

A 21-year-old male patient, presented with a chief complaint of spacing between the upper front teeth. Intra oral examination revealed upper midline spacing of 2 mm between upper central incisors with papillary frenal attachment. Grade I dental fluorosis was evident with otherwise healthy periodontium. No evidence for traumatic occlusion in the anterior region was identified with ideal overjet and overbite (Fig. 3A-B).

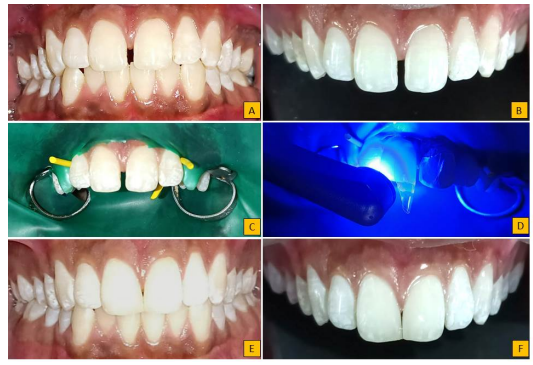

FIGURE 3 **A**. Pre-operative clinical; **B**. Pre-operative with contrast; **C**. Rubber dam isolation; **D.** Co-curing of restoration; **E**. Post-operative clinical; **F**. Post-operative with contrast

The case was diagnosed as having midline diastema with high frenal attachment and grade I dental fluorosis. Patient was advised to undergo resin infiltration treatment for the correction of grade I dental fluorosis, diastema closure using bioclear matrix followed by frenectomy to address high frenal attachment. Patient opted for diastema closure alone and denied the proposed treatments for dental fluorosis and high frenal attachment.

Shade selection was performed using vita shade guide under natural light. All upper anterior teeth were scrubbed with rubber cup and plain curse pumice under rubber dam isolation (Fig. 3C). The original anterior – DC series Bioclear matrix for the mesial surfaces of both incisors with 1 mm curvature were selected and ensured matrix orientation by placing it in to the sulcus. Etchant was applied for 20 seconds followed by rinsing and drying. Matrix system was seated into the sulcus followed by application of bonding agent (Tetric N-Bond, Ivoclar) and air dried for 5 seconds. Injectable composite (G-Aeniel A2, GC America) was injected starting from gingivo-proximal surfaces in the palatalaspect to incisal edge of the labial

aspect and co-curing was done for 20 seconds (Fig. 3D-F).

4 | DISCUSSION

Preserving the tooth's natural anatomy is the primary goal of restorative dentistry. However, for long term survival of restoration, it is indeed necessary to have a healthy periodontium or vice versa.[5] A huge number of researches had evaluated various materials and methods to accurately determine the quality and tightness of the proximal contact and its effects on periodontal health.[6] Clark used the restorative regenerative papilla (RRP) technique to minimize the open gingival area for restoring phonetics and to improve the aesthetic appearance. Even though it was difficult to restore such an enclosed space without voids, the use of Bioclear matrix in conjunction with RRP helped the author to successfully restore the teeth with good emergence profile.[7]

Similarly, in both the presented cases the natural contour of the bioclear matrix comparable with the proximal anatomy of a tooth allowed the clinician to achieve a smooth cervical curvature, favouring ideal restorative designs that are extremely conducive to papilla regeneration. This technical advantage is because of two inherent characteristic features of the matrix. The foremost being the ability of matrix to utilize the papilla, like a wedging force contrary to the conventional wedge which would give a flat cervical margin. The subsequent feature is the close resemblance of Bioclear matrix to the anatomical structure with exaggerated proximal and facial surfaces which allows only minimal or even no interproximal finishing. The final finish with round embrasure form will not compromise the overall periodontal health, provided the restoration have smooth finish without any ledge formation. This modern perspective on cervical curvature opposes the out-dated belief that, all prosthetic and restorative embrasures should be flat.[8]

The studies by Kim and Clark established that the use of Bioclear matrix for diastema closure is a predictive, additive, simpler technique that can be easily performed by all clinicians.[9] The matrix provides smooth subgingival surfaces for the restoration which leads to minimal calculus retention thereby avoiding the need for frequent scaling and thus reducing sensitivity. This non-invasive technique satisfies patients' needs while offering the benefits of simplicity and consistent outcomes, making it accessible to even the most general practitioners.[9] Diastema closure with resin-based composite in direct restorative technique is simple and in-expensive when compared to indirect restorations particularly porcelain laminate veneers. Also the main advantage is that this treatment can be reversed and does not impede future orthodontic treatment.[10]

In case report 1, the teeth were periodontally involved with prolonged exposure of cementum to oral environment. It has been previously proven through chemical, micrographic and scanning electron microscopy (SEM) studies that prolonged exposure of cementum surface to oral environment causes progressive hyper mineralization.[11-13] Another study demonstrated that the zone of hyper mineralization can be created following a gingivectomy procedure after 21 days and can be re-established after 4–8 weeks following root planing.[14] The efficiency of bonding on cementum surfaces may be compromised because of long term cementum exposure to oral environment. To improve adhesion, the cementum surfaces can be conditioned with aqueous solutions of NaOCl through a deproteination step prior to any adhesive treatment. The deproteination capacity of NaOCl may be intensified by employing a rubbing action since the intrinsic fibrillar arrangement of intact cementum is not calcified. [15] The first patient underwent surgical procedure and root planing as a part of phase 1 periodontal therapy. Root planing removed the hyper mineralized cementum surface and the scrubbing protocol implemented with 3.25 % NaOCl aqueous solution acted as an adjuvant to increase adhesion of bonding agent.

Discolorations of composite restorations are determined by many factors, such as degree of conversion during light-curing procedures, absorption and solubility, organic and inorganic chemical composition etc. Degree of conversion is reduced when oxygen inhibition layer (OIL) is formed on composite surface, thereby weakening the mechanical properties of composite restoration. Application of a light-curing protocol performed in the absence of oxygen may improve the physico-chemical properties, as well as the polishability of resin composites. The physico-

chemical properties such as polishability of composites can be well controlled and improved by strictly following the light curing protocol without the presence of oxygen. Also discoloration and colour stability are also influenced by the presence or absence of OIL. OIL can be prevented by either applying glycerine while curing composites or by applying transparent Mylar strips.[16] In both situations, usage of transparent Bioclear matrix prevents oxygen contact while curing the composite thereby preventing oxygen inhibition layer allowing proper degree of conversion and reduces staining of the restoration in the long term.

5 | CONCLUSION

The successful duplication of natural interproximal contour is essential in determining the shape of interdental papilla which plays a key role in safeguarding periodontal health. The restorative management of anterior spacing using Bioclear matrix was able to deliver superior aesthetics along with marginal adaptation. Even though, Bioclear matrix is capable of reproducing the anatomical contours with precision, future studies are required to establish the superiority of this system over the other alternatives.

Acknowledgements

Nil

Conflict of interest

The authors have no conflicts of interest to declare.

Supporting Information

Additional supporting information may be found at the journal's website.

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How to cite this article: Sahiba U, Gowri S, Prathap MS, Shetty H, Kutty SM. Conservative aesthetic approach in management of anterior spacing using Bioclear concept – A case series. Int J Orofac Res. 2024;8(1):17-22. https://doi.org/10.56501/intjorofacres.v8i1.1074