

## Restoration of Congenitally Missing Maxillar Lateral Incisor With Fiber Reinforced Adhesive Bridge And 18 Months Follow Up: A Case Report

\*Fikret Yilmaz<sup>1</sup>, Ozlem Ulker<sup>2</sup>

<sup>1,2</sup>(OndokuzMayisUniversity, Faculty of Dentistry, Department of Restorative Dentistry, Turkey)

Corresponding Author: \*Fikret Yilmaz

**Abstract:** Among the congenitally missing teeth in permanent dentition maxillar lateral incisors are most frequently missing teeth. Because of being at anterior region lack of these teeth effects phsycologic and social status of the patients and in terms of esthetic, phonetic and physiology replacement of these teeth immediately is very important for the patients. With the developments in adhesive technologies fiber reinforced adhesive bridges are an alternative to traditional methods for treatment of this condition, because of being more conservative, more economic and a reversible method for being noninvasive to abutment teeth or dental tissues. In this case report restoration of congenitally missing maxillar lateral incisor with fiber reinforced adhesive bridge and 18-months follow-up have been expressed.

**Keywords:** Hypodontia , Polyethylene fiber, Ribbond , Adhesive Bridge

Date of Submission: 10 -10-2017

Date of acceptance: 27-10-2017

### I. Introduction

Hypodontia (congenital missing teeth or dental agenesis) is one of the most frequently observed developmental anomalies. In permanent dentition, the missing teeth is most frequently seen in second mandibular teeth and at similar frequency in maxillary lateral incisional teeth.<sup>1</sup> The missing anterior tooth is a severe problem for the patient and it is important to restore the missing teeth in order to immediately improve the patient's psychology and recover the facial aesthetic and phonetic.<sup>2</sup> The treatment of this situation involves various treatment options such as classic fixed dentures, resin-bonded fixed dentures (Maryland bridge), and implant treatment.<sup>3</sup> The implant treatment might not be a useful solution in case of the loss of local soft and hard tissue.<sup>4</sup> The classic fixed partial denture is the most invasive approach due to cutting the abutment teeth.<sup>2</sup> Although the Maryland bridge is a less invasive approach, the usefulness is limited because of the unaesthetic appearance of the metal cast used and because the metal tooth connection is not durable.<sup>5</sup> Nowadays, the composite resin is an alternative to the metal that has been traditionally used in such dentures.<sup>6</sup> Together with the development of new polyethylene fibers that can adhere more strongly to the composites, the advancements in adhesive technology in recent years made it possible to manufacture the dentures that don't require cutting teeth and that are more esthetical.<sup>7</sup> In this case presentation, the restoration of congenitally missing maxillary lateral incisor tooth by using adhesive bridge reinforced with polyethylene fiber, as well as its 18-month clinic follow-up.

### II. Case Report

As a result of the intraoral examination (Fig 1), radiological examination using panoramic X-ray (Fig 2), and anamnesis of 18 year-old systemically healthy woman, who have applied to Restorative Dentistry Department of Dentistry Faculty of OndokuzMayis University with the complaint of missing left maxillary lateral incisor tooth, the case was diagnosed for congenital missing tooth. In the examination, it was determined that there was no restoration in any of abutment teeth on both sides of gap, that the periodontal health status was good, and that the patient had good oral hygiene. In anamnesis performed in order to restore this defect, it was determined that the implant treatment has been applied for two times before but the attempts have failed because of insufficient amount of bone in buccal zone. Thus, together with the other options, our patient having Class I closure and overjet that was slightly more than the normal level was informed about the fiber-reinforced adhesive bridge offering a minimal invasive approach by protecting the permanent teeth adjacent to the missing tooth. Then, the approval of patient regarding the fiber-reinforced adhesive bridge application was obtained and the procedure was initiated. First of all, in order to construct the pontic, the impressions of maxilla and mandible of patient taken and a model was obtained. Then, in order to remove the plaque that might affect the natural color of abutment teeth, the teeth were cleaned with prophylaxis paste. The color of patient's teeth was

determined under the daylight. By using a strip crown that is in form of left maxillary lateral form and has an appropriate size, the body of composite resin was prepared. In order to make the color of the pontic in harmony with the abutment teeth and to ensure a natural appearance, the micro-hybrid composites with various colors (A1, IE, JE, and AO2) were used with layering technique (GC Gaenial, GC Corp., Tokyo, Japan) (Fig 3). The design of pontic was made using the modified ridge lap. And then, by using a flowable composite (Aelite Flow, Bisco, Inc., Schaumburg, USA) for temporarily attaching the pontic to abutment teeth and the premature contact with the side movements was checked. Following the height control, the bridge was removed. In this case, Ribbond (Ribbond Inc., Seattle, WA, USA) was used as polyethylene fiber. In order to adjust the length, the dental floss was used on the model. Ribbond was cut by using the special cutter in the way extending from right maxillary central tooth to left maxillary canine tooth in palatine and covering the medial triangular incisoincisional direction. In palatine of pontic and center of location planned for placing Ribbond, a groove made with a diamond bur. And then, the finishing and polishing of the pontic was performed using SofLex (3M ESPE, St.Paul, MN, USA) discs.

Following all these procedures, the adhesion phase is initiated. First of all, the abutment teeth were washed and dried. And then, 37% phosphoric acid (Etch-37™ w/BAC, BISCO Inc., USA) and Adper™ Single Bond (3M ESPE, St.Paul, MN, USA) were applied for 15 seconds to the location, where the Ribbond would be placed, and to the zone, where the pontic would attach. After that, LED light device Elipar™ S10 (3M ESPE, St.Paul, MN, USA) was used for 20 sec. for polymerization. Before applying Ribbond, Adper™ Single Bond (3M Espe, St.Paul, MN, USA) that is a non-filling adhesive was used for wetting, and then the material was kept from the light within a dappen glass until used. Then again the pontic attached to the abutment teeth with flowable composite and after that the flowable composite (Aelite Flow, Bisco, Inc., Schaumburg, USA) applied to the groove on the palatine of pontic. After Ribbond was fixed on the pontic. Then, the A2-color micro-hybrid composite (GC Gaenial, GC Corp., Tokyo, Japan) was used for fixing the Ribbond to the abutment teeth. Following this step, the top of Ribbond was closed with micro-hybrid composite (GC Gaenial, GC Corp., Tokyo, Japan). Remaining composite was removed by using an oral spatula, and the contours were corrected. It was paid attention to ensure that Ribbond is totally covered with composite and it has no contact with external environment. The adhesive system and composite resin were polymerized for 40 sec. using Elipar™ S10 (3M ESPE, St.Paul, MN, USA) LED device.

Finally, the occlusion control, anterior guidance, and contact with side motions were performed, as well as the height control. After this, the finishing and polishing of composite covering Ribbond were accomplished. The patient was informed about the importance of restoration, which we made, in terms of usage life. (Fig 4 and Fig 5) In controls performed after 18 months, it was determined that the patient was using the restorations without any problem, that there was no debonding or fracture, and that the patient was satisfied with the aesthetical appearance. (Fig 6).

### **III. Discussion**

The traumatic or congenital case of missing permanent anterior tooth can be restored using various treatment options<sup>5</sup>. The minimal invasive approach, protection of tooth structure, aesthetic, and costs are the factors playing role in restoring the missing teeth<sup>8</sup>. In order to protect the healthy tooth tissues, metal-supported ceramic or completely ceramic bridges that require the preparation on teeth were not considered. Since a more conservative approach became possible together with the development of implant restorations in cases of missing single tooth,<sup>9</sup> this option was removed from the alternatives since the implant treatment was tried for two times but failed due to the loss of bone in buccal zone.

When compared with the metal-framed Maryland bridge that is another treatment option<sup>5</sup>, the fiber-reinforced bridges, which offer more aesthetical solutions<sup>5</sup> for young permanent teeth since there is no metal appearance and no metal reflection on the young permanent teeth with translucent dental tissues, is an important alternative because of various advantages of this option such as ease of application, reparability, and long-time durability. For these reasons, in this case, it was preferred to apply adhesive bridge obtained by bonding the body, which is made of composite resin or acrylic tooth or patient's own tooth, by using reinforced polyethylene fiber.<sup>7</sup> Because the tooth of patient was missing congenitally, it wasn't possible to use it as the pontic. With their dentin and enamel colors, the new generation composites offer very aesthetical outcomes by ensuring natural appearance especially for anterior incisal part<sup>10</sup>. For this reason, by using various colors of composite resins and left maxillary lateral strip crown that has similar shapes with the missing tooth, a composite resin pontic was obtained. While producing the pontic, the layering was made using dentin and enamel composites, and it was aimed to obtain a natural opacity and translucence<sup>5</sup>. In designing the pontic, the modified ridge lap design was used in order to ensure the cleanability and to provide an appropriate gingival outlet profile.<sup>2</sup> This design was preferred in order to accurately perform the polishing and to obtain a smooth convex surfaces.<sup>11</sup>

The adhesive bridges made of fiber-reinforced composites can be constructed directly intraoral or indirectly extra-oral. The indirect method was performed for this case since it offers better working conditions, higher composite transformation degree, and better polishing when compared to direct method<sup>6</sup>.

Since there is no sufficient distance for placing Ribbond between the maxillary and mandibular teeth in occlusal closure, it was necessary to groove 1-1.5mm channel in abutment teeth.<sup>12</sup> But, because there was overjet above the normal limit, no channel was grooved on the abutment teeth.

In this case, Ribbond used as polyethylene fiber is a strap made of polyethylene fibers having high molecular weight and high elasticity coefficient (117 GPa).<sup>13</sup> Ribbond increases the flexural bending strength and modulus providing the resistance of composite resins against the cracks<sup>14</sup>. Reinforcing the composite resins by using fibers was shown to increase the fracture resistance and strength.<sup>15</sup> Beside the advantages it offers, this method is also an option that depends on the operator and requires selection of appropriate case.<sup>2</sup> Even though the fiber-reinforced adhesive bridge applications were considered as a temporary method for restoration of missing anterior single tooth, they can be applied as permanent restoration under favor of ease of application and their non-invasive character.<sup>16</sup> There are studies reporting 3-4.5 years of usage for the restorations performed using this method<sup>17,18</sup>. Since this treatment method is a non-invasive and revocable method, other treatment options can be applied any time.<sup>19</sup>

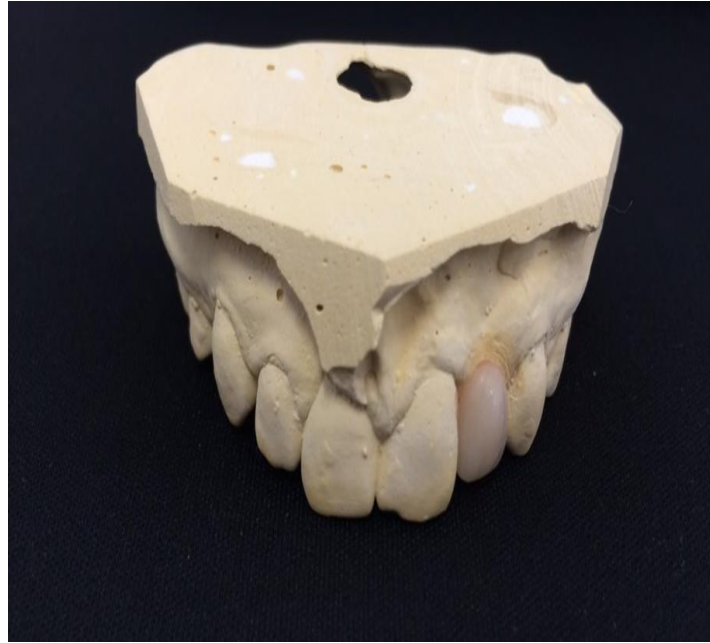
#### IV. Figures



**Figure1** Intraoral view of the missing lateral incisor



**Figure2** Orthopantograf showing missing lateral incisor



**Figure 3**Build up of the pontic on the model



**Figure 4**Fiber reinforced adhesive bridge



**Figure 5**Palatal view of the fiber reinforced adhesive bridge



Figure 6View of the fiber reinforced adhesive bridge after 18 months follow up

## V. Conclusion

The fiber-reinforced adhesive bridges can be an alternative to the classical bridges because they protect the tooth tissues when used in accurate indications and with the accurate design.

## References

- [1]. PJ. De Coster, LA. Marks, LC. Martens and A. Huysseune, Dental agenesis: genetic and clinical perspectives, J Oral Pathol Med, 38(1), 2009,1-17.
- [2]. A. Khetarpal, S.Talwar and M. Verma,Creating a Single-Visit, Fibre- Reinforced,Composite Resin Bridge by Using a Natural Tooth Pontic: A Viable Alternative to a PFM Bridge, J ClinDiagn Res., 7(4),2013, 772-5
- [3]. CP. Marinello , KH. Meyenberg, N. Zitzmann , H. Lüthy , U. Soom and M. Imoberdorf,Single-tooth replacement: some clinical aspects, J Esthet Dent. ,9(4), 1997,169-78.
- [4]. M. Danan, M. Degrange, T. Vaideanu and BrionM. ,Immediate replacement of a maxillary central incisor associated with severe facial bone loss: use of Bio-Oss collagen--case report,Int J Periodontics Restorative Dent, 23(5), 2003,491-7.
- [5]. A. Chafaie and R. Portier, Anterior fiber-reinforced composite resin bridge: a case report, Pediatr Dent.,26(6), 2004,530-4.
- [6]. CC. van Heumen , JW. van Dijken, J. Tanner , R. Pikaar, LV. Lassila, NH. Creugers, PK. Vallittu and CM. Kreulen ,Five-year survival of 3-unit fiber-reinforced composite fixed partial dentures in the anterior area, Dent Mater. , 25(6), 2009,820-7.
- [7]. S. Belli and F. Ozer, A simple method for single anterior tooth replacement, J Adhes Dent. ,2(1), 2000,67-70.
- [8]. A. Parolia, KM. Shenoy, MS. Thomas and M. Mohan, Use of a natural tooth crown as a pontic following cervical root fracture: a case report, AustEndod J., 36, 2010, 35-38.
- [9]. H. Kermanshah, F Motevasselian. Immediate tooth replacement using fiber-reinforced composite and natural tooth pontic. Oper Dent, 35(2),2010, 238-45.
- [10]. L. Vanini. Light and color in anterior composite restorations. Pract Periodontics Aesthet Dent., 8(7),1996, 673-82;
- [11]. RS. Stein. Pontic-residual ridge relationship: A research report. J Prosthet Dent, 16, 1996,251-85.
- [12]. HE. Strassler, FG. Serio.Stabilization of thenatural dentition in periodontal cases using adhesive materials. Periodontal Insights, 1997,4-10.
- [13]. MC. Vitale, C. Caprioglio , A. Martignone, U. Marchesi, AR. Botticelli. Combined technique with polyethylene fibers and composite resins in restoration of traumatized anterior teeth. Dent Traumatol., 20(3), 2004,172-7.
- [14]. VM. Karbhari, H. Strassler. Effect of fiber architecture on flexural characteristics and fracture of fiber-reinforced composites. Dent Mater.,23,2007,960-68.
- [15]. P. Pfeiffer,L.Grube. In vitro resistance of reinforced interim fixed partial dentures. J Prosthet Dent.,89,2003,170-174.
- [16]. P. van Wijlen. A modified technique for direct, fibre-reinforced, resin-bonded bridges: clinical case reports. J Can Dent Assoc., 66(7),2000,367-71.
- [17]. N. Unlu, S. Belli. Three-year clinical evaluation of fiber-reinforced composite fixed partial dentures using prefabricated pontics. J Adhes Dent., 8(3), 2006, 183-8.
- [18]. MA. Freilich, JC. Meiers, JP. Duncan , KA. Eckorte, AJ. Goldberg. Clinical evaluation of fiber-reinforced fixed bridges. J Am Dent Assoc.,133(11), 2001,1523-1534.
- [19]. A. Gupta, RK. Yelluri, AK. Munshi. Fiber-reinforced Composite Resin Bridge: A Treatment Option in Children. Int J ClinPediatr Dent., 8(1), 2015.62-5.

\*Fikret Yilmaz. "Restoration of Congenitally Missing Maxillar Lateral Incisor With Fiber Reinforced Adhesive Bridge And 18 Months Follow Up: A Case Report." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) 16.10 (2017): 85-89