NEU PRESS

Diş Hekimliği Dergisi

Vol: 6 No: 2 Year: 2024 | Case Report | e-ISSN: 2687-5535

https://doi.org/10.51122/neudentj.2024.108

Maxillary Anterior Esthetic Rehabilitation of Twin Patients Following Orthodontic Treatment - Case Reports

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Article Info

Article History

Received: 21.02.2024
Accepted: 27.05.2024
Published: 30.08.2024

Keywords:
Diastema closure,
Peg-shaped lateral,
Anterior esthetic,
Resin composite.

ABSTRACT

Aim: These case reports detail the treatment of multiple diastemas, peg-shaped lateral incisors and gingival asymmetries in the maxillary anterior areas of twin patients.
Case Report: Two 21-year-old female twin patients (D.C.&T.C) visited our clinic to address their concern about gaps between maxillary anterior teeth. The teeth were vital and the surrounding tissues were healthy. In all cases, gingivectomy were performed using a 940 nm diode laser. Following a 14-day recovery time, the patient had diastema closure (D.C) and peg-shaped lateral incisors shaping (T.C) treatments. After choosing the shade, teeth were isolated using a rubber dam, no preparations were performed. G2-Bond Universal adhesive (GC) and a universal resin composite (G-aenial ACHORD, GC) were applied for restorative procedure and polymerized using an LED device for 20s. Subsequently, the macro and micro surface morphologies on the buccal surfaces were created and any occlusal interferences were checked. The restorations underwent polishing using polishing discs, silicone rubber polishers, and polishing strips. The patients were motivated to maintain dental hygiene and were told about the need for follow-up appointments.
Results: Following the restorative procedures, the patients expressed contentment with their physical appearances. During the 24-month follow-up, there were no signs of discoloration or chipping on the restorations, and the gingival contours were found to be satisfactory.
Conclusion: The utilization of laser aided gingivectomy in conjunction with direct composite resin make-ups resulted in the achievement of a balanced and aesthetically pleasing alignment of the teeth. Moreover, it is a prudent strategy for adolescent patients who have finished orthodontic treatment.

İkiz Hastalarda Ortodontik Tedavi Sonrası Üst Anterior Dişlerin Estetik Rehabilitasyonu - Olgu Raporları

Makale Bilgisi

Makale Geçmişi

Geliş Tarihi: 21.02.2024
Kabul Tarihi: 27.05.2024
Yayın Tarihi: 30.08.2024

Anahtar Kelimeler:
Diastema kapama,
Kama şekilli lateral,
Anterior estetik,
Kompozit rezin.

ÖZET

Amaç: Bu olgu raporları, ikiz hastaların maksiller ön bölgelerindeki çoklu diastemaların, kama şekilli yan kesici dişlerin ve diş eti asimetrilerinin tedavisini detaylandırmaktadır.
Olgu Raporu: 21 yaşında iki kadın ikiz hasta (D.C.&T.C), üst ön dişler arasındaki boşluklarla ilgili endişelerini gidermek için kliniğimizi ziyaret etti. Dişler canlıydı ve çevre dokular sağlıklıydı. Tüm vakalarda, gingivektomi 940 nm diyot lazer kullanılarak yapıldı. 14 günlük iyileşme sürecinin ardından hastaya diastema kapama (D.C) ve kama şekilli lateral diş şekillendirme (T.C) tedavileri uygulandı. Renk seçiminin ardından dişler bir lastik örtü kullanılarak izole edildi ve herhangi bir preparasyon yapılmadı. Restoratif prosedür için G2-Bond Üniversal adeziv (GC) ve üniversal kompozit rezin (G-aenial ACHORD, GC) uygulandı ve bir LED cihazı kullanılarak 20 saniye süresince polimerize edildi. Daha sonra bukkal yüzeylerdeki makro ve mikro yüzey morfolojileri oluşturuldu ve okluzal temaslar kontrol edildi. Restorasyonlara polisaj diskleri, silikon kauçuk lastikler ve kompozit zımparaları kullanılarak polisaj uygulandı. Hastalar oral hijyenlerini koruma konusunda motive edildi ve takip randevularının gerekliliği anlatıldı.
Bulgular: Restoratif prosedürlerin ardından hastalar fiziksel görünümlerinden memnun olduklarını ifade ettiler. 24 aylık takipte restorasyonlarda herhangi bir renk değişikliği veya kopma görülmedi ve diş eti konturlarının tatmin edici olduğu görüldü.
Sonuç: Lazer destekli gingivektominin direkt kompozit rezin restorasyonlar ile birlikte uygulanması, dişlerde estetik açıdan hoş bir dizilimin elde edilmesiyle sonuçlandı. Bu kombine tedavi şekli, ortodontik tedavisi henüz sonlanmış ergen hastalar için de ideal bir stratejidir.

To cite this article: Atalay C., Ergin E. Maxillary Anterior Esthetic Rehabilitation of Twin Patients Following Orthodontic Treatment - Case Reports NEU Dent J, 2024;6:241-9. https://doi.org/10.51122/neudentj.2024.108

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INTRODUCTION

Diastemas can be occurred by differences in tooth size, such as narrow or peg-shaped teeth, or the difference between gap in the arch and tooth size. Various methods have been documented to rehabilitate diastemas with the help of multiple dental disciplines. Orthodontic treatment is a conservative approach that can achieve satisfactory aesthetic results. However, it may not be sufficient to establish ideal proximal contacts and proper vertical and horizontal overlaps when there are differences in tooth size and shape.

Direct resin composite (RC) restorations are a reasonable treatment option for addressing aesthetic issues in anterior teeth. They are minimally invasive or noninvasive approaches that allow for functional, aesthetic, and repairable restorations to be placed in a single visit with minimal or no tooth preparation.[1,2] There is a current trend in dentistry towards simplicity, driven by the desire to minimize application failures through the use of easier-to-handle dental materials and more efficient treatment methods. One aspect of this trend is the simplification of color selection, which can be challenging due to various environmental and operator-dependent factors. As a result, the development of universal RCs has emerged.[3] These materials possess a universal opacity and come in multiple Vita shades. Developers recommend their use in a single shade increment, with the potential to match different teeth colors.[4]

In the aesthetic rehabilitation of anterior teeth, there are instances where both the teeth and gums may require simultaneous arrangement. This means that not only the appearance and alignment of the teeth are considered, but also the positioning and contouring of the gums. This comprehensive approach ensures a harmonious and natural-looking result in the aesthetic enhancement of the anterior teeth. In modern dentistry, there are various methods available for soft tissue management, including gingivectomy/gingivoplasty for gingival reshaping and crown lengthening. Among these methods, lasers have gained significant popularity.[5] Diode lasers, in particular, are widely used due to their ability to provide superior comfort for patients during gingivoplasty procedures. These lasers cause minimal tissue damage, effectively control bleeding, and promote reduced wound contraction. Additionally, the use of diode lasers results in decreased swelling and postoperative pain for patients.[6]

These case reports describe the management of multiple diastemas, peg-shaped lateral incisors and gingival asymmetries in the maxillary anterior areas of twin patients.

CASE REPORTS

Two 21-year-old female twin patients (D.C. & T.C.) visited the clinic to report diastemas in their upper front teeth following orthodontic treatment. In the intraoral examinations, it was observed that both of the patients had periodontally healthy, normal vertical and horizontal bite and canine-sparing occlusion. In addition, diastema closure was found to be sufficient for one of the twins (D.C), while wedge lateral shaping was required for the other one (T.C). On the other hand, it was necessary to eliminate gingival irregularities in order to obtain a more aesthetic appearance. After explaining the treatment options for the relief of patients' complaints, it was decided to perform a laser gingivectomy for gingival asymmetries and close the diastemas with direct RC in both patients with their consents.

Firstly, we started the procedure with topical anesthesia and drew the surgery line with a tissue marker. Then we passed to gingivectomy by holding the laser tip parallel to the teeth and perpendicular to the margin of free gingivae with a 940 nm diode laser (Diode Epic, BioLase, California, USA) device in C2 pulsed mode with a E3 fiber tip at 1,8 W power. The tissue was gently removed just like brushing off the excessive tissues until the desired contour was achieved. Then the procedure was ended up

with gingivoplasty to achieve a knife-edge shaped gingival morphology. Hemostasis was optimal so no suturing was done. The patient was given verbal instructions to avoid taking hot and spicy food for a few days and to maintain meticulous oral hygiene. Postoperative analgesics were recommended in case of pain.

Following a 14-day period of recuperation, the patients had diastema closure (D.C) and peg-shaped lateral incisors shaping (T.C) procedures. The teeth were initially cleansed using a mixture of pumice and water, applied with a rubber cup, and the suitable color was determined. In order to achieve effective separation, the maxillary front teeth were isolated using a rubber dam (Thick Blue, Nictone, Romania) and retracted either with dental floss or specialized rubber dam retraction clamps. Neither restoration type required any tooth preparations. Subsequently, the enamel surfaces of the teeth were treated with a 37% phosphoric acid gel for a duration of 30 seconds, after which they were thoroughly rinsed and dried. For the adhesive step, G2-Bond Universal adhesive (GC, Tokyo, Japan) was applied following the directions provided by the manufacturer. A light-emitting diode curing unit (Elipar Deepcure S, 3M, USA) with a light irradiance of 1370 mW/cm2 and an irradiated diameter of 10 mm was used. The irradiance was measured for each curing process to ensure proper polymerization.

The restorations were performed with the free-hand layering technique by transparent and contoured matrix bands. Monochromatic layering was performed gradually in ≤2 mm layers with universal RC, G-aenial ACHORD (A1, GC, Tokyo, Japan). Each layer was polymerized for 20 s for all composites.

For the finishing and polishing procedures, a set of aluminum oxide embedded polishing discs (Optidisc, Kerr Corp, USA) in three different grits (medium, fine, superfine) were utilized. These discs were used under dry conditions at a speed of 15,000 rpm. To set the occlusion in the protrusive and lateral movements of the mandible, a 12-blade carbide bur (Diatech, Heerbrugg, Switzerland) was employed at a speed of 30,000 rpm under water cooling. In cases where a microsurface morphology was required, a blue diamond bur (Diatech, Heerbrugg, Switzerland) was used horizontally at a speed of 5,000 rpm without water cooling. Silicone rubber polishers (HiLuster; Kerr Corp, USA) were selected to polish the labial and palatal surfaces at a speed of 10,000 rpm, following the manufacturer's instructions. Finally, interdental polishing strips (Epitex Strips, GC, Tokyo, Japan) were used. Surface re-polishing was performed during a single visit within one week after the restorations were placed to ensure complete curing.

The patients were motivated to maintain good dental hygiene and were told about the need for follow-up appointments. During the 24-month follow-up examinations, no instances of tooth sensitivity, discolorations, chippings, or fractures were observed on both the teeth and the restorations.

DISCUSSION

The presence of diastemas usually disturbs young patients aesthetically. Diastemas may occur either due to developmental factors or as a consequence of teeth not being fully aligned following orthodontic procedures. RCs, as preferred in these cases, could be used in order to achieve harmony, proportionality, and aesthetics in the anterior teeth after orthodontic treatment. Moreover, restorations made with direct RCs have some advantages. They usually do not require tooth preparation compared to laminate veneers, as they are a more conservative approach. In addition, if deterioration of marginal edge or a discoloration is observed in the RC restoration, there is a chance for repair as the treatment is reversible.

In a case report, direct midline diastema closure with composite layering technique were followed for one-year and no sensitivities, discolorations, or fractures were reported.[7] Another study conducted by Peumans et al [8], the

clinical performance of direct composite buildups for tooth reshaping were assessed over a period of 5 years. The findings showed that only 89% of the restorations were considered aesthetically satisfactory, while the remaining restorations needed to be replaced due to significant differences in color and loss of anatomic form. In the current case reports, all restorations presented satisfactory esthetic results. Similarly, Demirci et al. [9] evaluated direct composite build-ups for diastema closure after orthodontic treatment for 4 years and concluded that survival rates for the restorations were favorable for the specified period.

One potential drawback in such cases is the need for periodic re-polishing of the RCs. Nanohybrid RCs, like the ones used in these cases, initially exhibit high polishing gloss unit values. However, over time, this gloss can diminish due to various factors such as dietary habits, functional forces, and parafunctional habits.[10] On the other hand, the marketing strategies of the universal RC, G-aenial ACHORD, highlight its natural fluorescence, invisible filling, and long-lasting gloss properties.[11] Clinical follow-up at the 24-month mark has shown that restorations using this material maintain color harmony and gloss properties. Another potential drawback is the difficulty some clinicians may face with the free-hand restorative technique. It requires a high level of skill and expertise to ensure a successful and long-lasting restoration. Therefore, it is crucial for clinicians to undergo extensive training to achieve optimal results.

When it comes to area isolation in dental restorative treatments, the use of a rubber dam remains the gold standard. It offers optimal conditions for an adhesive approach by preventing contamination. Additionally, it aids in achieving effective gingival retraction, allowing for better access to the cervical region and the placement of RCs in areas previously covered by gingival tissue, as needed.[12] In both cases mentioned, a rubber dam isolation was performed. On the other hand, it is important to recognize that the use of a rubber dam is crucial, but it can impact the assessment of the final aesthetic outcome since it dehydrates the teeth. Therefore, it is recommended to evaluate the final result at a second appointment when the teeth have had a chance to rehydrate properly.

In the literature, there are studies showing that the wound created by laser surgery contracts less because of less collagen and less myofibroblast formation,[13] and has a shorter healing time and less scarring.[14] In gingivectomy with traditional methods, patients may report "fear of scalpel", pain and difficulty in post-operative recovery. In these cases, fast and comfortable recovery processes were observed after laser gingivectomy. This accelerated the treatment process and increased patient cooperation.

Frequently, when treating the esthetic concerns of a patient, clinicians usually focus on the teeth and ignore the gingivae. As a beautiful smile depends on the harmony of the white and pink aspects, simply dealing with white teeth component is not sufficient to achieve the best esthetic outcome. In pink esthetic treatments which are frequently required in esthetic smile design; soft tissues can be artistically removed and shaped with several types of lasers with the advantage of better wound healing, less contraction, reduced need for infiltration anesthesia, good hemostasis, improved vision on surgical area and enabling other procedures like impression taking and adhesive restorations at the same session. Lasers also reduce the amount of bacteria and other pathogens in the surgical field and therefore decrease the risk of infection.[15] Postoperative edema is reduced with lasers as the blood vessels and lymphatic channels are sealed, which also enable less postoperative discomfort. Additionally, with low-level-laser-therapy effect; pain, scarring and inflammation can be reduced whereas tissue repair and healing can be accelerated.[16] In gingivectomy with traditional methods, patients may report "fear of scalpel", pain and difficulty in post-operative recovery. In these cases, fast and comfortable recovery processes were observed after laser gingivectomy. This

accelerated the treatment process and increased patient cooperation.

Although the final outcomes were excellent for both patients, it is crucial to arrange monthly maintenance visits and carefully strategize all situations in order to attain consistent and long-lasting aesthetic results.

CONCLUSION

Diode laser-assisted gingivectomy and gingivoplasty have proven to be effective in achieving satisfactory results for both patients and dentists in the esthetic rehabilitation of gingival contours. These procedures offer the advantage of being more tissue-friendly and comfortable compared to other alternatives. In the case of young patients who have completed their orthodontic treatment, direct resin bonding is a conservative approach that can be employed. In cases requiring aesthetic applications, ideal aesthetic results and smile symmetry can be achieved when current restorative materials are combined with the correct treatment options. It is crucial for dentists to stay up-to-date, knowledgeable, and equipped with the latest technologies and techniques in order to meet their patients' expectations in a minimally invasive manner. By embracing these advancements, dentists can provide optimal esthetic outcomes while prioritizing the preservation of tooth structure.

Figure 1. Baseline photographs of one of the twins (D.C.) with peg-shaped lateral incisors.

Figure 2. Baseline photographs of other twin (T.C.) with diastemas.

Figure 3. Laser gingivectomy and 2 weeks recovery (A- D.C.; B-T.C.).

Figure 4. Restorative treatment protocol of the patient with peg-shaped lateral incisors (D.C.).

Figure 5. Restorative treatment protocol of the patient with diastemas (T.C.).

Figure 6. 24-month follow-up of the patient with peg-shaped lateral incisors (D.C.).

Figure 7. 24-month follow-up of the patient with diastemas (T.C.).

Ethical Approval

Since the present study did not use sources derived from humans or animals, ethics committee approval was not obtained.

Financial Support

The authors declare that this study received no financial support.

Conflict of Interest

The authors deny any conflicts of interest related to this study.

Author Contributions

Design: CA. Clinical procedures: CA, EE. Analysis and interpretation: CA, EE. Literature search: CA. Writing: CA.

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