

# Multidisciplinary Dental Treatment in the Esthetic Zone: Rehabilitation of A Congenitally Missing Maxillary Lateral Incisor

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## ABSTRACT

The present study is a case report of a 24-year-old patient with a missing maxillary right lateral incisor. The case report uses a multi-disciplinary team approach in providing aesthetic and functional rehabilitation of teeth. The first team of periodontist took care of the gingival tissue health which was a pivotal aspect for the future orthodontic and implant procedure. The orthodontic procedures not only involved creating space for the missing lateral incisor but also involves creating an ideal occlusion. The final restoration is achieved with implants using surgical techniques to achieve aesthetic results as well as to preserve the bone and the gingival anatomy of the papilla for better outcomes.

**Keywords:** Dental implants, esthetic zone, multidisciplinary dental treatment, papilla preservation, roll technique, orthodontics.

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## I. INTRODUCTION

Aesthetic appearance is known to mark one of the important factors to make a good impact which lasts for a long time. Current trends in the social media world have even further increased the demand for perfect appearance in our beauty conscious society [1], [2].

Improved facial aesthetics is known to have a positive effect on self-esteem as well as improve the quality of life [3]. Facial beauty traits of symmetry, averageness and secondary sexual characteristics influence the attractiveness of an individual [4]. Out of many characteristics and traits of facial beauty, dental appearance forms an important part contributing to facial aesthetics [3].

In the current times, increased focus has been attributed to aesthetic dentistry in addition to the rehabilitation of the functional aspects of the dentition. With advances in dentistry and more demand for providing aesthetic solutions, dental implants form an integral part of aesthetic dentistry [5].

Implant placement in the aesthetic zone involves factors like three-dimensional position of the implant, positioning of the prosthesis, gingival health, and preservation of bone structure. Placement of the implant in the aesthetic zone is a technique sensitive procedure which needs good planning. Any errors in the handling of soft and hard tissue can lead to failure of aesthetics and dissatisfaction from the patients [6]. A study by [7] in five-years follow up study has reported a success rate of 96% of implants in the aesthetic zone. However, the same study reported an aesthetic failure of 9% of the implants placed.

In addition to the correct handling of the implants in the aesthetic zone, a symbiotic effect of the use of orthodontic treatment complements the overall aesthetic and functional rehabilitation [8]. Orthodontics aids in achieving the ideal

tooth position to achieve successful aesthetics and structural outcomes. This can be achieved by management of crowding, increased overjet, overbite and closing excessive spacing which will achieve better facial and smile aesthetics [9].

The present case study involves multidisciplinary dentistry by involving orthodontics, implantology and prosthodontics for the aesthetic restoration and rehabilitation of the congenitally missing upper right lateral incisor.

## II. CASE DISCUSSION

A healthy twenty-four years old male, with congenitally missing upper right lateral incisor, presented with all other teeth in good dental condition. However, minimal amounts of plaque and calculus were associated with mild Plaque-Induced Gingivitis.

The patient was interested in restoring the missing tooth and has been interested in dental implants; as far as he knows, this is the best treatment option to restore the edentulous site (Fig. 1). Thus, he attended a private clinic specialized in dental implantology and was evaluated by a periodontist (M.S.A.).



Fig. 1. Buccal view showing missing upper right lateral incisor.

Intake consultation showed that he needs initial periodontal therapy to control the gingival inflammation by means of oral hygiene education and scaling. Advice was given to consult an orthodontist before any definite restorative treatment would be performed. Considering that a single dental implant would be the treatment of choice after proper radiographic analysis of the edentulous site (Fig. 2 and 3). Orthodontic consultation was later done by an orthodontist (M.A.B.) who evaluated the patient and reported that the patient has class III malocclusion on class I skeletal base complicated with generalized spacing and missing of the upper right lateral incisor.



Fig. 2. Buccal view showing malocclusion and spacing between teeth at intake.



Fig. 3. Panoramic radiograph: At intake.

Orthodontic treatment was initiated after completing the initial periodontal therapy. Treatment strategy aimed to close the spaces in lower and upper arches with opening the space for placement of a dental implant in place of missing upper right lateral incisor. Treatment plan included up-righting of the upper right central incisor (Fig. 4). The patient was given clearance by his orthodontist and referred back to continue implant-based restoration for the missing tooth; he had a fixed retainer which was attached to upper anterior teeth (Fig. 5). Three-dimensional radiographic evaluation was performed (Fig. 6).



Fig. 4. Buccal view after orthodontic treatment and alignment of teeth.

Implant placement surgery was performed by MSA for the edentulous site using a papilla preservation flap design to reduce any attachment loss on interproximal aspects of adjacent teeth with vertical incisions that extended towards the mucogingival junction (Fig. 7). Osteotomes were used for ridge widening towards the buccal aspect to compensate for the ridge defect for better aesthetics (Fig. 8). A dental implant with diameter of 3.75 mm and length of 11.5 mm was placed (Fig. 9). Nylon 5-0 sutures were used to fixate the flap properly for primary intention healing after placing the cover screw on the implant (Fig. 10). A two-stage dental implant technique was held and no temporary restoration was used with the consent of the patient who has been used to having a missing front tooth and did not mind waiting few more months, especially that he was advised that this would probably give better chances for a better aesthetic result at the end of the treatment (Fig. 11).



Fig. 5. Occlusal view of upper right lateral incisor after orthodontic treatment.

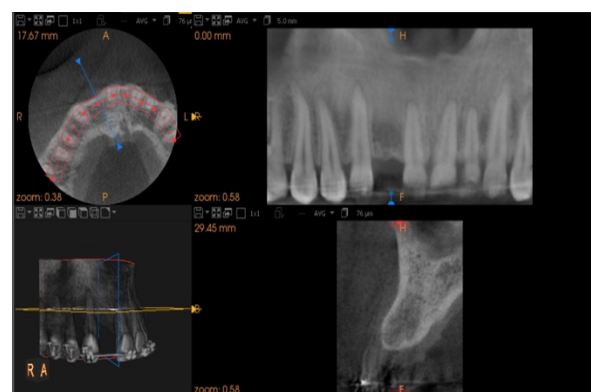


Fig. 6. Cone Beam Computer Tomography: Different views showing the site of upper right lateral incisor.

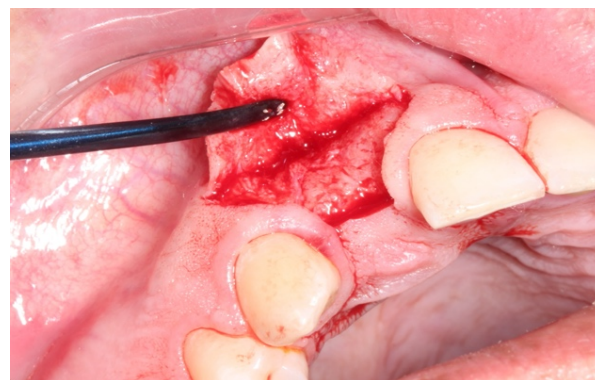


Fig. 7. Intraoperative view showing incisions and open flap.





Fig. 8. Intraoperative view showing osteotomy.



Fig. 9. Intraoperative view showing dental implant inserted in place.

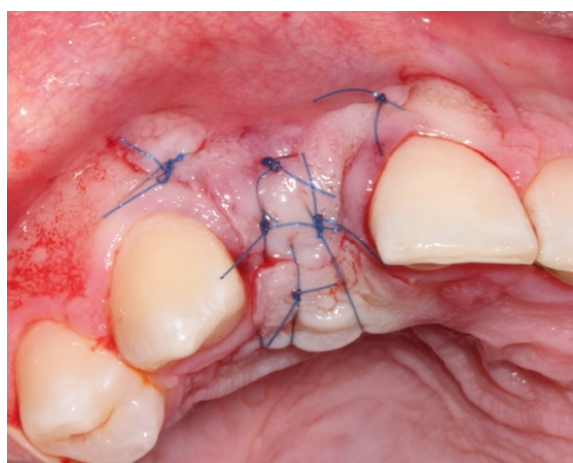


Fig. 10. Immediate postoperative view showing sutures.



Fig. 11. Occlusal view showing surgery site three weeks after surgery.

A healing period of three months after implant insertion surgery was allowed to pass (Fig. 12). Periapical radiograph was obtained (Fig. 13). Clinical ridge evaluation showed a residual buccal depression Seibert Class I defect which was then decided to be improved during the exposure surgery (Fig. 14) [10]. A simple manipulation of the supra-implant mucosa was attained by means of roll technique which was done together with the exposure of the implant and placement of the healing cap (Fig. 15) [11]. Nylon 5-0 sutures were used in the second surgery which were removed after one week (Fig. 16). Healing was allowed for three weeks before an impression was taken (Fig. 17). The dental lab constructed a screw-retained single Zirconium crown with Ti-base (Fig. 18) [12].

Patient was highly satisfied with the end result of the surgical procedures, orthodontic therapy, and final restoration. Periapical radiograph was obtained on the one-year follow-up (Fig. 19). Clinical evaluation showing the aesthetic results and healthy peri-implant tissues (Fig. 20).



Fig. 12. Buccal view taken three months after surgery.



Fig. 13. Intraoral radiograph: Three months after implant surgery.





Fig. 14. Occlusal view showing surgery site three months after surgery.



Fig. 18. Occlusal view after placement of permanent screw-retained crown.

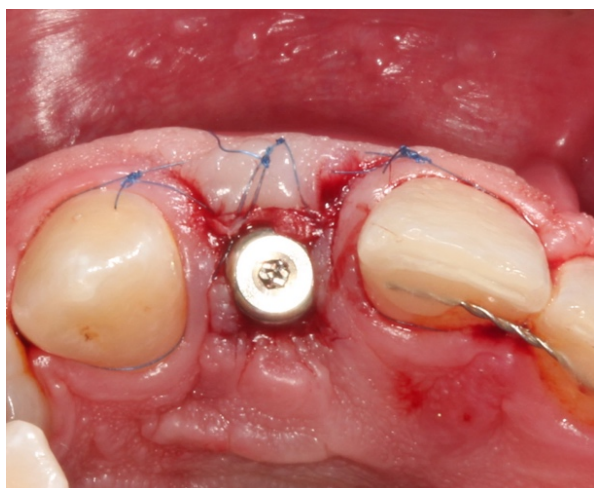


Fig. 15. Occlusal view immediately after exposure surgery.

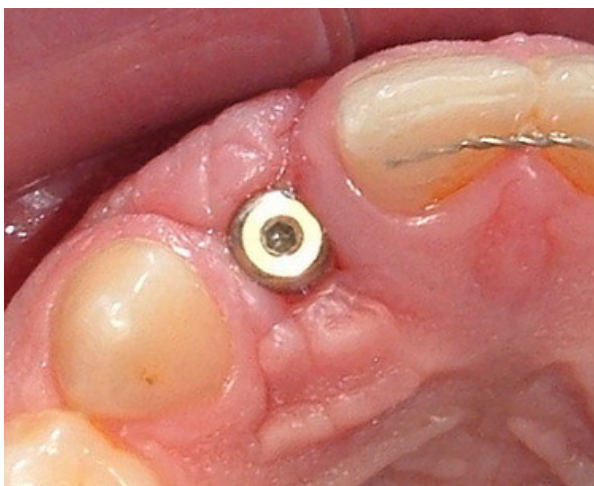


Fig. 16. Occlusal view of implant site one week after exposure surgery.



Fig. 17. Occlusal view of implant site without healing cap.



Fig. 19. Intraoral radiograph: Showing implant with permanent crown.



Fig. 20. Buccal view showing final restoration of implant on upper right lateral incisor.

### III. DISCUSSION

Dentistry has shown vast advances to achieve biomimetic results in the aesthetic rehabilitation of the missing tooth. Proper treatment planning is of prime importance to achieve aesthetic results [6], [13]. Treatment planning should involve understanding the anatomical aspects of the clinical case which should be managed by the multidisciplinary approach to achieve optimal results [14]. In addition, understanding and incorporating aesthetic expectations of the patient should also be considered [15]. The present case reports

rehabilitation of a missing lateral incisor. The primary anatomic consideration done was to evaluate the space available for the replacement of the missing tooth and the nature of gingival thickness.

The 24-year-old patient presented with a thick gingival biotype which has its significant benefit on the surgical outcomes [16]. The gingival biotype was evaluated in a Palestinian university student population using clinical parameters and found that 29% of the volunteers had clearly identified thick-flat biotype, while thin-scalloped biotype was clearly identified in 27% of the participants [17].

Another aspect was to understand the aesthetic demand of the patient which aids in achieving the treatment plan strategy. In the present case report the patient was very well aware of all the options of aesthetic replacement and considered the dental implant as the best option for aesthetic results. Dental implants are considered to be highly approved treatment in Palestine considering its aesthetic outcomes [18]. Dental implants are a popular trend among the dentists of Palestine as well. A cross-sectional study by Assaf et al has shown that dental practitioners in Palestine have good experience in dental implantology [19]. Additionally, most of the general dental practitioners stated that they prefer to perform dental implant surgical procedure by a periodontist or an implant specialist [20]. Hence in the present case, treatment was performed with the team of specialists to achieve optimum results.

First step of treatment involved an initial periodontal therapy before proceeding to the next phase of treatment. Initial periodontal health is important for proceeding with the orthodontic treatment as well as to facilitate good healing during the implantology phase. The present case reported a case of mild gingivitis, hence advanced procedures were not necessary and good gingival healing was achieved with basic periodontal cleaning. The ongoing maintenance of good oral hygiene is a key factor in preventing peri-implantitis in the future [21].

The present study involves the use of orthodontic treatment to create adequate space for the tooth to be replaced and for achieving the best aesthetic and functional outcome. Considering the high prevalence of malocclusion, orthodontic treatment is of great importance in the population in Palestine [22]. With the need of correcting malocclusion and the aim of improving the quality of life, orthodontic treatment is essential in nowadays dental practice [23].

The present case study uses an implant for the replacement of missing teeth. A preliminary treatment planning for the implant prosthesis was done using Cone Beam Computer Tomography (CBCT) analysis [24], [25]. CBCTs are known to give accurate anatomical relationships and are routinely used in treatment planning for placement of implants [26], [27]. Furthermore, CBCT imaging is the preferred choice in implant treatment planning among the dental practitioners in Palestine [28].

The present case report involves the use of a single implant for the aesthetic zone. This type of implant placement provides an aesthetic result out of the implant placement [29]. The present study uses a papilla preservation flap design along with osteotomes to compensate for the ridge defect. Other procedures can also be done to mask the bone defects. The placement of soft tissue graft [30] and crown lengthening

procedure can also provide aesthetic results in cases of bony defect [31]. To achieve the maximum aesthetics the present study uses roll technique to preserve the mucosa [11]. In a ten-year follow-up study, this technique is known to provide good aesthetic outcome [32].

The present case report also involves methods to prevent peri-implantitis. The use of screw retained crowns is pivotal for improving peri-implant health as compared to cement retained crowns [12]. A 3-year prospective study shows better peri-implant soft tissue health with screw retained crowns as compared to cement retained crowns [33]. The present case report also avoided the use of removable partial denture as a temporary restoration. Due to the lack of occlusal rest the removable partial dentures exert undue forces on the ridge which affects the peri-implant health and periodontal health of the abutment teeth [34].

#### IV. CONCLUSION

The present case report to replace the missing lateral incisor involves the use of multi-disciplinary team approach to restore the aesthetics to the patient satisfaction as well as maintenance of the functional equilibrium and providing ideal occlusion. The treatment approach used in this case aims to achieve the optimum aesthetic results along with the restoration of function. The use of a multi-disciplinary approach is pivotal for the expert opinion in achieving the desired result and maximum patient satisfaction. Cooperation and understanding of the patient are also necessary as well as the willingness to undergo all necessary procedures to get such top-quality results.

#### CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

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