

Bridging The Gap: A Holistic Approach To Orthodontic Failure Via Periodontal And Prosthetic Treatment.

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ABSTRACT

This report presents a case of a 19-year-old female patient reported to the department of periodontics with complaints of loose tooth in the upper front teeth region, following a failed orthodontic treatment. she desired an aesthetic smile.on examination, mobility was noted in the upper anterior, a comprehensive treatment planning with meticulous strategies was planned involving periodontic and prosthodontic approaches to correct aesthetic and functional irregularities.

Keywords : Implant failure, frenectomy, crown lengthening, zirconia crown.

INTRODUCTION

Dental implants have revolutionized the field of restorative dentistry, providing a durable and aesthetically pleasing solution for tooth replacement. They mimic the function and appearance of natural teeth, making them a preferred choice for many patients seeking to restore their oral health. Despite their high success rates, dental implants are not without complications, especially in specific patient populations. One such group includes young individuals who are undergoing orthodontic treatment, as their ongoing dental and skeletal developments can significantly impact implant outcomes ^[1].

In younger patients, the presence of growth and development can pose unique challenges. Changes in jaw dimensions, tooth positioning, and occlusal relationships can influence the stability and integration of dental implants. These factors leads to complications such as implant failure, which may result from inadequate bone support, altered biomechanical forces, or infection.

This report focuses on the case of a 19-year-old female patient who had an implant failure in the anterior region following a failed orthodontic treatment. The patient sought care for congenitally missing lateral incisors,for which two implants were placed to replace the missing laterals and orthodontic treatment was initiated to correct the malocclusion. no periodontal consideration which led to the failure of the implant and resulted in mobile anterior teeth. This case illustrates the complexities associated with faulty orthodontic treatment and dental implant placement in patients, emphasizing the need for thorough periodontal considerations before planning treatments in dentistry.

Through a detailed examination, treatment interventions, and subsequent outcomes, this report aims to provide valuable insights into managing failed orthodontic treatment and subsequent failure of dental implants due to faulty treatment planning It highlights the importance of interdisciplinary collaboration among dental professionals to enhance patient care and optimize treatment strategies, ultimately ensuring successful outcomes for young individuals requiring tooth replacement.

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CASE REPORT

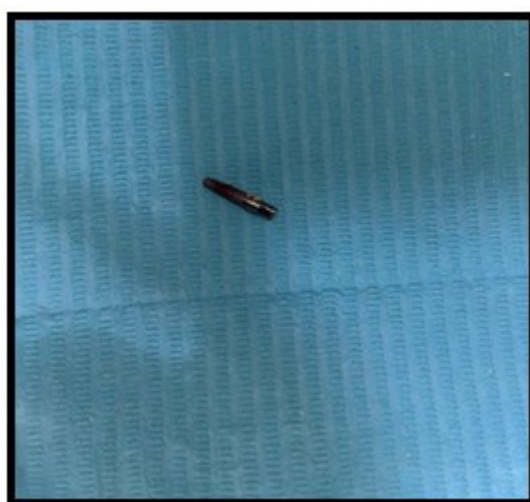
A 19-year-old, systemically healthy female patient reported with the chief complaint of loosening of teeth in the upper front teeth region for the last 3 months. On examination grade II mobility 11,21,23,24 and congenitally missing 41,22,12 and implant placement done in 12,22,41. The surrounding gingival tissue showed signs of inflammation and peri-implantitis, A high frenal attachment was noted in the upper labial frenum, On Radiographic investigations, vertical bone loss extends until the apical third around the implant, irt 22, and extends till the middle third, irt 12 [Fig:1] and on periodontal examination, pockets seen in relation to 11,13,21,23,24.

Treatment planned for this case was frenectomy initially to remove the high frenal attachment, retrieval of failed implant in 22, as 12 implant was stable. intentional root canal treatment in 13,11,21,23,24, crown preparation in 13,11,21,23,24, open flap debridement and followed by a implant supported FPD 13,12,11,21,22,23,24.

Figure 1. shows per operative image of clinical image and with failed implant.



Figure 2. Retrieved failed implant



Written informed consent was obtained from the patient before the surgical procedure. Local infiltration was given using 2% lignocaine with 1:80000 adrenaline to anesthetize the area. Then Haemostat will be inserted to the deepest depth of the vestibule and With the help of No.15 Bard Parker blade, two parallel vertical incisions will be given. The resected triangular frenum will be removed and underlying tissue exposed. And then Horizontal incision will be made to separate the attached

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fibers with gradual blending of vestibular tissue[**Fig: 4a**]. Later 4-0 silk suture will be placed[**Fig:4b**],Then, The patient was recalled after a week for suture removal^[3].

Root canal therapy in relation to 11,13, 21,23,24 was the decided treatment plan Access cavity preparation was done with an endo access bur of 32 and widened buccolingually and extended into cingulum gingivally.The patency was checked using no. 10 k file and even working length was also using the After cleaning and shaping were performed an intracanal calcium hydroxide medicament was given for 1 week. During the next visit after a week, the tooth was asymptomatic and obturation was done[**Fig : 3**].

Figure 3. images shows radiograph of Intentional root canal treatment done in relation to 11,13,21,23,24.

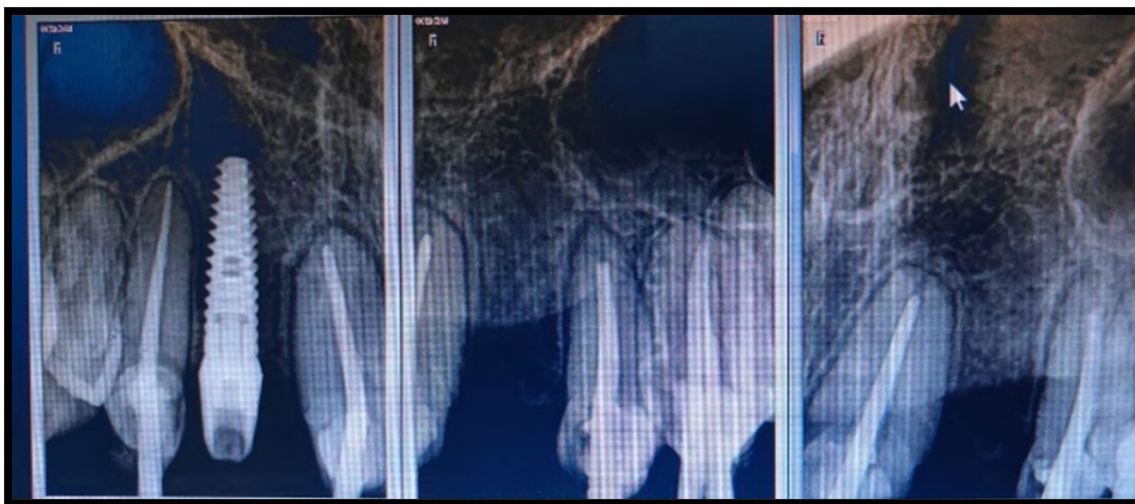


Figure 4(a). conventional frenectomy procedure done,



Figure 4(b). image shows of suturing done



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An inadequate clinical crown height with 11,13 and 21,23,24 was noted, crown lengthening was planned. The level of incision was marked by placing bleeding points. With adequate width of attached gingiva, using a no. 15 blade, the initial internal bevel incision was performed 2 mm above the gingival margin to achieve the ideal contour on both labial aspects^[6]. Following tooth preparation^[Fig:5] Prior to beginning of teeth preparation, the shade selection was done using vita shade guide. The axial reduction of approximately 1.2 to 1.5 mm and incisal reduction of 1.5 to 2.0 mm was carried out^{1,2}. All the line angles were rounded off. A circumferential chamfer finish line was prepared for all the teeth from canine to canine. Impression procedures were performed with addition silicon and then sent to the laboratory. Later resin trial try-in was done^[Fig:6]. Frame trial for zirconia crown was prepared^[Fig:7]. And then try-in was done^[7]. Final prosthesis zirconia crown with gingival contour^[Fig:8], bonded with resin cement with good emergence profile^{[8][9][10]}.

Figure 5. shows, Tooth preparation done in relation to 11,13,21,23,24 and crown lengthening done.



Figure 6. Resin trail try-in was done.



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Figure 7. Frame trial for zirconia crown and try-in was done .



Figure 8. Final prosthesis zirconia crown with gingival contour.



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Figure 9.



[A] Per - Operative Images



[B] Post - Operative Images

DISCUSSION

This case illustrates the critical importance of thorough diagnostic evaluations before carrying out the orthodontics treatment. Misinterpretation of radiographs and failure to identify underlying dental issues can lead to significant treatment delays and complications.

Orthodontic failure can often be traced back to improper diagnosis, which undermines the foundation of effective treatment planning. When orthodontists misinterpret the underlying dental and skeletal issues, it can lead to inappropriate appliance selection or misguided treatment objectives. Patients may experience prolonged treatment times, suboptimal aesthetic outcomes, or even functional issues, all of which could have been prevented with a thorough and accurate diagnosis. Such failures not only impact patient satisfaction but also increase the need for corrective measures, ultimately straining both patient and practitioner resources.

According to the Carlotti, A. E. et al., the diagnosis and treatment planning of the patient should be arrived at through the clinical examination along with detailed study of the usual orthodontic records like frontal and lateral cephalograms, temporomandibular joint laminagraphs, panoramic radiographs, submental vertex radiographs, dental casts that use hinge-axis, leaf-gauge bite registration, extraoral and intraoral photographs, orthodontic medical history.^[12]

Tavares, C. A. et al., states, Before placement of the orthodontic appliances, the patient advised to know about periodontal status, following of scaling, root planing, and oral hygiene instructions will be given.^[13]

During implant placement to predict the implant stability, Bone density is a key factor. A good surgical technique and good stability favors implant osseointegration. Clinical studies show greater implant survival in the mandible than in the upper maxilla, due to the area's characteristics. This survival is limited by bone quality, i.e. bone density. Several studies in the literature corroborate a higher failure rate of implants placed in type IV bone. Likewise, we found good results with implants placed in type I, II, and III bone, the latter being the optimal type of bone for adequate implant stability. Bone density and implant stability are important factors for implant osseointegration, which has been widely demonstrated.^[14]

The surgeon determines the implant position during surgery by considering the pre-operative assessment and intra-operative results, including bone availability, neighboring tooth position, aesthetics, etc. A prosthetic stent combined with standard radiography can provide more information^[15]. Nonetheless, prosthetic and surgical skills must be displayed by surgeons. In static computer-assisted template-based implant surgery, the placement of the implant is virtually planned in the ideal restorative position. The surgeon then uses surgical guidelines to assist in the precise and effective execution of the osteotomy and site preparation.^{[16][17]}

Due to the burden surgical interventions required to place

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another implant, the patient refused the implant solution for fear of another failure. She preferred the conventional bridge, in order to improve the esthetics and function .

Abou-Rass coined the term “stressed pulp” and proposed the concept to help identify those teeth that have a greater potential for developing pulpal disease after prosthodontic treatment . He reported that “stressed pulps” are vital pulps that have been subjected to repeated injury, including accidental trauma, operative procedures, prosthodontic tooth preparation, or other dental procedures. Abou-Rass suggests that endodontic treatment should be considered before pulpally traumatic dental procedures are performed on teeth with pulps that have already been stressed on multiple occasions.^[18]

Nevins and Skurow state that the restorative dentist should not disturb the connective tissue apparatus or junctional epithelium during preparation and impression taking if subgingival margins are required. Because the clinician cannot distinguish where the junctional epithelium starts and the sulcular epithelium ends, they recommended limiting subgingival margin extension to 0.5–1.0 mm. A violation of biologic width occurs when the restoration margin impinges on the gingival attachment apparatus by being positioned too far below the gingival tissue crest ^[19].

During periodontal plastic surgery , More precise and cautious methods are being used to provide more aesthetically pleasing and functional outcomes. Because one of the etiological factors for the maintenance of a midline diastema is the existence of an abnormal frenum, attention to the frenum has become crucial. Procedures called frenectomy or frenotomy can be used to address the abnormal frenum^[20]. Kruger (1964) and Archer (1961) introduced the classical technique. this approach was advocated in the midline diastema cases with an aberrant frenum to ensure the removal of the muscle fibres which were supposedly connecting the orbicularis oris with the palatine papilla^{[21][22]}.

The benefits of zirconia ceramic prostheses include a wear pattern similar to tooth enamel, a tooth-like translucent appearance, and exceptional biological stability near the periodontium and oral tissues ^[23]. Lithium silicate ceramics are widely used for a variety of applications, including veneers, single crowns, and small anterior bridges. Furthermore, we would like to combine larger and more comprehensive restorations in the posterior area, as well as increase the indication alternatives. According to Lohbauer et al. (2018), CAD/CAM zirconia ceramic restorative materials are the sole way to achieve this goal ^[24]. The most widely used third generation's extremely variable indication range and the recently developed fifth generation mixed zirconias in a CAD milling block are mostly perplexing. It is advised that this generation be treated with anything from the very tiny three-span bridges in the anterior region to the authorization of

14-unit bridges. This makes the concept of a single zirconia material obsolete; instead, a range of material variations can be produced for specific applications ^[25].

Smile rejuvenation can positively impact a patient's self-esteem and emotional health through an improved appearance. This era of development and technology led to the creation of different biomaterials. zirconia- crowns offer a good esthetic result with minimum tooth preparation combining strength and could be considered as a treatment option in selected clinical cases.

CONCLUSION

In conclusion, the role of the periodontist is crucial in any dental treatment, particularly before any procedures are undertaken. Their expertise in diagnosing and managing periodontal conditions ensures a solid foundation for successful outcomes. A thorough periodontal evaluation allows for the identification of any underlying issues that could compromise treatment success, such as bone loss or active periodontal disease.

Before proceeding with any restorative or orthodontic interventions, the periodontist should engage in comprehensive treatment planning that includes assessing the patient's periodontal health, discussing potential risks, and formulating strategies to address any concerns. By collaborating with other dental specialists, the periodontist can help create a multidisciplinary approach that optimizes both functional and aesthetic results. Ultimately, prioritizing periodontal health not only enhances the effectiveness of restorative procedures but also contributes to the long-term success and stability of the treatment. By addressing these fundamental aspects early in the process, periodontists play an indispensable role in ensuring that patients achieve and maintain healthy, beautiful smiles.

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