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Case Report

Immediate Posterior Mandibular Implant with Screw-Retained Provisional Crown: Enhancing Esthetics and Soft Tissue Profile

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Abstract

The dental implant is an effective and standardized procedure in single tooth loss. This case report aimes to present an immediate single tooth implant placement to the posterior mandibular area followed by a screw-retained implant provisional crown for the emergence gingival profile. After four months, the final restoration was realised.

Keywords: Single Tooth Implant; Screw-Retained Implant Crown; Emergence Gingival Profile

Introduction

Throughout history, humans have consistently experienced tooth loss. The causes of edentulous conditions are varied: trauma (especially in societies in earlier stages of cultural evolution), dental caries, periodontal disease, etc [1]. Today, dental caries have a high incidence, partly due to the elevated proportion of refined sugar in the diet of individuals in industrialized societies. In the first three-quarters of the 20th century, cavities "exploded" as a consequence of this dietary shift [2].

Options for replacing missing teeth include removable dentures, fixed partial dentures anchored on remaining teeth, or implant-supported overdentures. Removable dentures constantly stress the underlying tissues they rest on, leading to bone resorption over time [3]. Dental bridges require the preparation of abutment teeth (an irreversible procedure), which can lead to the development of caries underneath or along the crown margins. Additionally, bridges risk periodontal issues due to overloading the abutment teeth, while improper contact between tissue surface of the pontic and the mucosa in edentulous areas encourages food accumulation, jeopardizing the patient's oral health [4].

Implants offer an alternative to the above prosthetic solutions, representing a relatively recent innovation in dental medicine.

Modern implantology began with Branemark's studies on bone healing and regeneration in the 1950s and 1960s. He discovered that titanium could fuse with bone as osteoblasts grow on and into the rough surface of the titanium implant [5, 6]. Implants have the advantage of being usable for all types of edentulism. They demonstrate a high success rate, but there are several reasons for failure, the most common being issues related to osseointegration. Implants may also fracture or become infected, and peri-implantitis may develop due to poor oral hygiene or poorly designed or fixed superstructures [7-9].

In recent years, implantology has seen significant advancements. Alongside the rapid increase in the number of implants placed worldwide, various surgical and prosthetic complications have emerged [10,11]. The study of these complications, reflected in numerous articles published in specialized literature, has improved the success rate of implant-supported prosthetic restorations by defining protocols tailored to specific clinical cases [12-14]. A common issue arises with cemented restorations on implants, where cement is forced subgingivally, often exceeding the prosthetic abutment's margin during cementation. The excess cement cannot be entirely removed. For a long time, this cement excess was considered only a risk factor in the etiology of mucositis and peri-implantitis. However, in 2016, it was scientifically proven to be an etiological factor for these conditions. As a result, screw-retained restorations on implants have gained increasing popularity in recent years compared to cemented restorations [15,16].

Screw-retention is an extremely effective technique for implant fixation in bone and for loading the bone with prosthetic restorations following osseointegration. However, loosening of the screw connection between the abutment and the implant is one of the most frequent problems in implant-supported prosthetics. While resolving such issues with cemented crowns is difficult and sometimes costly, corrections for screw-retained restorations are relatively simple, provided the patient visits the dental office promptly before additional complications arise [17,18]. Methods to prevent screw loosening of the prosthetic superstructure components include factors that reduce biomechanical stress, such as proper implant positioning, sufficient implants to distribute external forces, a passive fit of the restoration, and correct occlusal balancing. Notably, short-term failures and complications with screw-retained restorations are primarily due to non-passive structures that induce stress at the bone-implant interface, leading to further consequences [19,20].

Clinical Case Report

A 42-year-old male patient in good general health presented to the dental clinic with a chief complaint related to tooth 3.6. Following clinical and complementary examinations, a significant resorption at the root level of tooth 3.6 was observed. The tooth was deemed non-restorable, so the recommended treatment plan was extraction, followed by immediate placement of a post-extraction implant and fabrication of a provisional crown. A written informed consent has been provided by the patient, accepting the treatment protocol and approving the publication of all the case details and any accompanying photos.

After the tooth extraction (Figure 1), an implant (Dentium, Seoul, Korea) was placed, carefully verifying its insertion axis (Figure 2).

Figure 1: Post-extraction aspect.

Figure 2: Verification of the implant insertion angle.

Using the chairside composite crown technique, a temporary crown was created from composite material, carefully lining the socket around the prosthetic abutment with Teflon. The assembly was then unscrewed, and the provisional crown was properly adjusted so that its final contour would lead to optimal gingival shaping (Figure 3-4).

Figure 3: The contoured, finished, and carefully polished provisional restoration.

Figure 4: The provisional crown resembles the natural tooth due to the chairside composite crown technique.

The morphological similarity between the two crowns, the natural tooth and the screw-retained structure, was evident. The provisional restoration was temporarily fixed during the osseointegration period (Figure 5).

Figure 5: The provisional restoration screwed into the implant.

The first suture was a mattress suture, ideal in this case, as it allowed intimate approximation of the wound edges to the perfectly polished provisional crown (Figure 6).

Figure 6: Lingual view: the gingiva contours the crown satisfactorily.

After approximately four months, the patient returned with satisfactory intermediate gingival shaping, and the next phase of shaping, involving the modification of the emergence profile of the provisional restoration, was initiated (Figure 7-8).

Slight ischemia is visible above, which disappeared within a few minutes. This allowed the next waiting period for epithelialization of the shaped gingiva to begin. The following images demonstrate proper gingival shaping, after which impressions were taken for the screw-retained zirconia crown (Figure 9).

Figure 7: Initial gingival shaping.

Figure 8: Second phase of shaping – correct gingival contour without significant ischemia.

Figure 9: Final gingival shaping.

The transfer abutment, surrounded by a generic light-curing composite, ensures the precise replication of the current gingival profile for the laboratory (Figure 10-11).

Figure 10: Flowable composite filled the entire space around the transfer abutment.

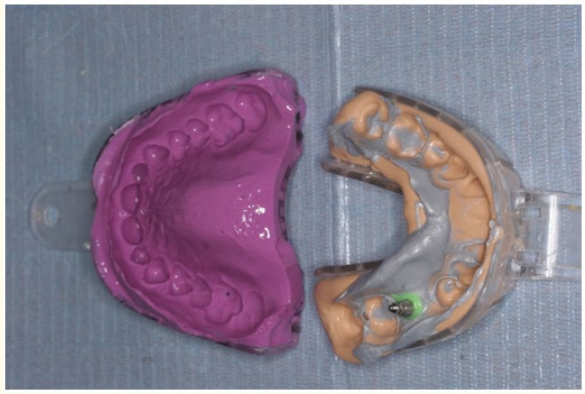

Figure 11: Negative of the gingival emergence profile obtained through shaping – faithfully reproduced by the light-curing composite and impression material.

The final restoration followed. The screw access hole was approximately in the center of the occlusal surface of the crown; its diameter was small and does not significantly reduce the ceramic's strength. With flawless occlusal adaptation, the risk of fracture was minimal (Figure 12-15).

Figure 12: Screw access hole in the metal-ceramic crown, near the center of the occlusal surface.

Figure 13: Natural appearance of the gingiva, with slight ischemia.

Figure 14: The screw access hole becomes virtually invisible after composite sealing.

Figure 15: Lingual gingiva appears satisfactory after a few minutes of slight ischemia.

Discussions

The case was meticulously planned, with clinical and radiological examinations complementing each other to establish an accurate workflow algorithm, ensuring a predictable and long-lasting outcome. The exceptional result in gingival shaping could not have been achieved if a cemented crown would have been selected as the treatment option.

Based on the analysis of the case presented, it can be established that the outcomes achieved through gingival shaping far surpass those without shaping (often associated with prosthetic superstructures fixed by cementation, though not exclusively), both aesthetically and biologically. Although cemented crowns were widely favored by clinicians in the past due to their ease of fabrication and lower cost, their popularity has significantly declined. This shift is attributed to advancements in screw-retained restoration systems and growing evidence that excess subgingival cement during cementation contributes to mucositis and, subsequently, peri-implantitis.

Conclusions

- Screw-retained restorations on implants lead to fewer biological and technical complications compared to cemented restorations.
- Screw-retention provides long-term stability and functionality, provided the surgical treatment plan (implant placement in the bone) is designed so that the prosthetic restoration can be executed correctly without compromises.

- Gingival shaping plays a decisive role in creating a bacterial barrier that protects the implant from biological complications while achieving exceptional aesthetic results. This shaping is impossible to achieve with cemented crowns.
- The use of "platform switching" implants is important for achieving the goals outlined above.
- A clinician performing implant restorations must be thoroughly trained and develop a comprehensive and precise treatment plan, ideally in collaboration with the surgeon, before placing the implants in the bone. If the prosthodontist lacks proficiency in the techniques necessary to complete the restoration, it is crucial to avoid making compromises. Instead, the case should be referred to a more qualified colleague, preferably one specializing in implant-supported prosthodontics, to ensure optimal results and patient care.

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