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Combined periodontal and prosthetic approach for anterior teeth rehabilitation – a case report

Zintegrowane podejście periodontologiczne i protetyczne w rehabilitacji estetycznej zębów przednich – opis przypadku

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Summary

Aesthetic dentistry is a major focus for patients today, especially concerning the appearance of the maxillary anterior teeth. Achieving an optimal smile demands a holistic approach that integrates not only tooth shape and shade but also the harmony of the surrounding periodontal tissues.

One of the most significant challenges in this area is the loss of the interdental papilla, resulting in the appearance of aesthetically displeasing 'black triangles' that disrupt smile harmony. These gaps can make the teeth look aged and severely compromise the patient's self-confidence. Functionally, they can cause phonetic issues and discomfort from food impaction. Moreover, a gummy smile, defined by excessive gingival display during smiling, compromises the aesthetic appearance of the anterior teeth and disturbs the overall harmony of the smile, reducing facial attractiveness and patient satisfaction.

Addressing these complex dilemmas often requires periodontal surgical interventions to ensure the long-term success of fixed prostheses

Streszczenie

Stomatologia estetyczna jest dziś priorytetem dla pacjentów, zwłaszcza w odniesieniu do wyglądu zębów przednich szczęki. Osiągnięcie optymalnego uśmiechu wymaga holistycznego podejścia, które uwzględnia nie tylko kształt i odcień zębów, ale także harmonię otaczających tkanek przyzębia.

Jednym z największych wyzwań w tym obszarze jest utrata brodawek międzyzębowych, skutkująca pojawieniem się nieestetycznych „czarnych trójkątów", które zaburzają harmonię uśmiechu. Luki te mogą sprawiać, że zęby sprawiają wrażenie starych i tym samym poważnie obniżać zaufanie pacjenta do własnego wyglądu. Mogą powodować funkcjonalne problemy z wymową i dyskomfort związany z zaleganiem resztek jedzenia. Ponadto „uśmiech dziąsłowy", charakteryzujący się nadmiernym uwidacznianiem dziąseł podczas uśmiechu, pogarsza estetykę zębów przednich i zaburza ogólną harmonię uśmiechu, zmniejszając atrakcyjność wyglądu twarzy i zadowolenie pacjenta.

Rozwiązanie tych złożonych problemów często

and to restore a balanced, natural-looking smile.

The present paper aimed to report a successful case of aesthetic rehabilitation of the maxillary central incisors and highlight the pivotal role of periodontal procedures in optimizing the aesthetic outcome and securing its long-term stability.

wymaga interwencji chirurgii periodontologicznej, aby zapewnić długoterminową skuteczność protez stałych i przywrócić zrównoważony, naturalny wygląd uśmiechu.

Celem niniejszej pracy jest przedstawienie przypadku udanej rehabilitacji estetycznej górnych siekaczy przyśrodkowych oraz podkreślenie kluczowej roli zabiegów periodontologicznych w optymalizacji efektu estetycznego i zapewnieniu jego długotrwałej stabilności.

Introduction

Today, aesthetic dentistry is a major concern for patients, especially relating to maxillary anterior teeth.[1] Optimal outcomes require careful attention not only to tooth shape and shade but also to the surrounding periodontal tissues. Achieving a balanced and natural-looking smile requires the harmonious integration of both gingival and dental aesthetics. Mimicking the natural morphology of central incisors, including the subtle ridges and concavities on the labial surface, is a critical step in achieving a lifelike appearance. Additionally, in this region, the loss of the interdental papilla is a significant concern that can lead to the formation of black triangles – gingival embrasures. These dark gaps can make teeth appear older or unhealthy. From a functional perspective, they may lead to persistent discomfort due to food impaction and impaired phonetics. Additionally, from an aesthetic standpoint, they can significantly compromise the individual's smile and self-confidence.

This issue not only presents a major cosmetic concern for patients but also poses complex clinical dilemmas for dentists to obtain patient satisfaction. Close collaboration between the periodontist and the prosthodontist is essential.

The present paper aimed to present a successful case report of an aesthetic rehabilitation of the maxillary central incisors. It also aimed to emphasize the crucial role of periodontal procedures in optimizing the aesthetic outcome and ensuring its long-term stability.

Clinical presentation

A 45-year-old healthy female patient presented to the fixed prosthetic department at the clinic dentistry of Monastir, Tunisia. Her chief complaint was the aesthetic rehabilitation of crowned maxillary central incisors. She was bothered by her gummy smile and the visible dark areas under the crown margins. She was very anxious and reported feeling uncomfortable.

The clinical examination showed ceramic crowns on maxillary central incisors with unacceptable aesthetic appearance related to their shape, proportion, high opacity, and colour mismatch. Their gingival contour was also disproportionate. A slight black triangle was noted between the crowns. The interdental papilla was thick (Fig. 1.A). Radiographic examination showed that the right incisor presented adequate canal filling and a metallic post while the left incisor was vital (Fig. 1.C).

The clinical examination revealed a low frenal attachment that extended directly into and across the interdental papilla (Fig. 2).

The patient declined invasive procedures. After a thorough discussion about the various

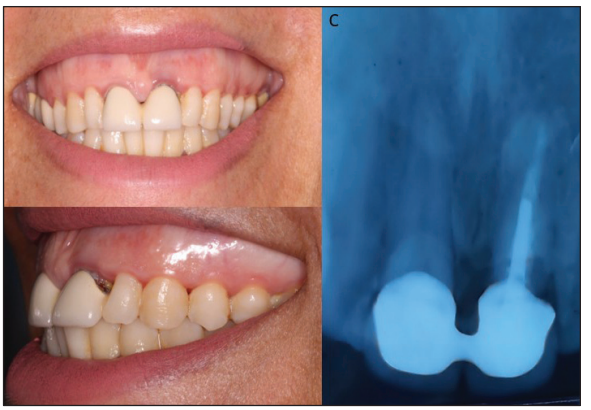

Fig. 1. Initial situation; A – Buccal view, B – Profile view, C – Periapical radiograph.

Fig. 2. Papilla penetrating frenal attachment.

Fig. 3. After the frenectomy and the gingival graft, a milled fiber post and core was placed.

alternatives, risks, and prognosis, the decision was made to proceed with two zirconia crowns following the preparatory soft tissue periodontal therapy.

After removing the existing crowns, adequate provisional prostheses were placed. To free the papilla and improve the gingival smile line, a frenectomy was performed. This was followed by a gingival graft, a procedure in which a subepithelial connective tissue graft was used to convert thin facial gingiva into a thicker tissue, enhancing stability and aesthetics (Fig. 3).

Following the removal of the crowns, the extraction of the metallic post in tooth 21 required the use of the Masserann extraction kit. The manipulation was invasive, leading to weak intra-radicular dentine walls. As a consequence, a milled fiber-reinforced composite post-and-core was selected due to its dentine-like elastic modulus, which promotes homogeneous stress distribution and significantly reduces the risk of root fracture. Furthermore, the FRC's adhesive properties facilitate a cohesive monoblock structure, enhancing retention, integrity, and the long-term prognosis of the compromised tooth.

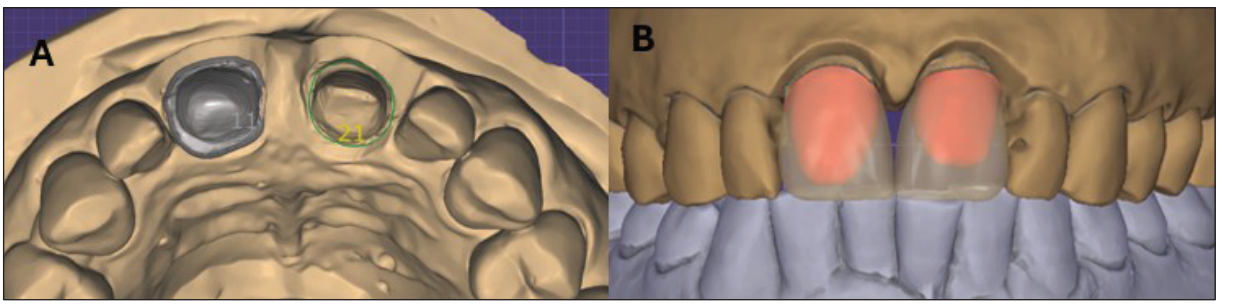

Fig. 4. Virtual conception of crowns.

Fig. 5. Final result with a minor gingival black space.

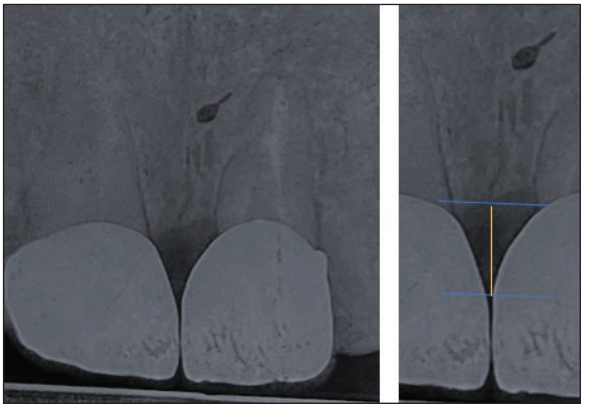

Fig. 6. Radiological control showing distance from the contact point to the crest of bone (≤5mm).

Fig. 7. Two years follow-up showing the disappearance of the gingival black space.

After a healing period of two months, a remarkable improvement in the smile was obtained. There was also a noticeable enhancement in the shape of the interdental papilla. Prosthetic steps followed, and zirconia crowns were cemented (Fig. 4, 5).

The outcome was highly satisfying and the patient was very pleased. While a minor gingival black space persisted, the papilla's size and shape were successfully regenerated, and the improved form of the teeth contributed to the patient's high satisfaction (Fig. 4). Radiologically, the papilla was supported as the distance from the contact point to the bone crest was ≤5 mm (Fig. 6).

After two years, a follow-up examination revealed the complete disappearance of the gingival black space (Fig. 7).

Discussion

The restoration of the maxillary central incisors, as a frequent aesthetic concern, requires a comprehensive assessment. The present clinical case exposes three major

problems: teeth shape, black triangles and the gummy smile.

The careful clinical examination is considered the first key to achieving optimal results. This step revealed a high frenulum attachment, which was the main cause of the black triangular space, the altered appearance of the interdental papilla and the gummy smile. This prominent or hypertrophic labial frenum contributed to increased upper lip mobility, often resulting in excessive gingival display (gummy smile).[2] Diagnosis of an abnormal frenum often involves observing blanching of the interdental papilla or marginal gingiva upon lip traction, indicating fibrous or high attachments.[3-7] This condition may be associated with various factors, such as short or hypermobile lip, altered passive eruption, vertical maxillary excess or gingival overgrowth.[3,8] Aberrant frenal attachments, especially those that are thick, fibrotic, bifid, or fan-shaped, have also been implicated in the development of midline diastemata, papillary loss and soft tissue recession in the anterior maxilla.[4,9] Treatment options for frenectomy vary from conventional scalpel methods to electrosurgery and advanced laser.[4,10,11] In the presented clinical case, the frenectomy contributed to an improvement of the gummy smile. It also enabled the correction of the interdental papilla shape and its regeneration, leading to the resolution of the black triangles. The interdental papilla, which fills the embrasure space, is a key determinant of smile aesthetics and periodontal protection. In this region, the loss of the interdental papilla is a significant concern that can lead to the formation of black triangles. Its regeneration critically depends on adequate osseous support, the integrity of the surrounding soft tissue, and the maintenance of a sufficient blood supply.[11,12] The presence of interdental papilla has been correlated with the vertical distance from the contact point to the alveolar bone crest, where a distance of 5 mm or less often ensures complete papilla fill.[13] This can explain its regeneration in the presented clinical case.

Identifying the periodontal biotype is of critical importance. Originally introduced in 1991, this concept emphasizes the necessity of adequate keratinized tissue width and thickness for maintaining periodontal stability and ensuring the longevity of fixed prosthetic restorations.[8,14,15] Research has shown that a thick gingival biotype is associated with reduced gingival recession and helps to mask the underlying colour of dark substrates, thereby enhancing the aesthetic result.[16] Because of reduced gingival thickness and bone support, patients with a thin periodontal biotype present a significant challenge in fixed prosthodontics. Following restorative or prosthetic procedures, they are more prone to gingival recession, mucosal transparency, and marginal tissue loss.[17,18]

For optimal periodontal health, a minimum of 2-5 mm of keratinized tissue is recommended following such procedures.[7] Restorative success also depends on maintaining appropriate distances between the prosthetic margins, bone crest, and biological width, which should ideally be at least 3 mm.[19] When inadequate soft tissue volume is present, soft tissue grafting or a transplant is needed to achieve appropriate gingival contours and thickness.[20,21] This procedure aims to support long-term tissue stability and aesthetics by enhancing and optimizing the gingival profile. It demonstrated, also, excellent predictability for increasing gingival thickness, masking prosthetic margins, and improving colour match around anterior restorations.[22,23] For the presented case, an autograft using a subepithelial connective tissue graft was performed using the coronally advanced flap technique.

During the diagnostic step, the dimensions of anterior teeth have to be attentively assessed. The height of the central incisors can be increased to optimize the gingival architecture and

achieve a proper height-to-width ratio, which is approximately 75% (1,24).[1,24] This explains the use of crown lengthening procedures, which are another critical intervention employed to re-establish ideal tooth proportions and improve the relationship between the restoration and the gingival margins.[6]

On the other hand, the temporization phase plays a critical role in shaping the gingival contours around restorations. The subgingival profile should be transferred accurately in the impression. It optimizes the integration between the gingival contours and the limits of the final restoration. Provisional restorations play a key role during the healing phase by guiding tissue maturation and shaping the emergence profile. It acts as a prototype for the final restoration; well-contoured provisional restoration helps evaluate and refine soft tissue parameters such as gingival zenith, papillary fill, and buccal contour.

Conclusion

The aesthetic rehabilitation of maxillary central incisors remains a significant challenge due to their prominent position, critical role in smile aesthetics, and the high expectations of patients. In contemporary practice, with patients increasingly aware of aesthetic dentistry, attention to both the "white" and "pink" components is essential. Periodontal integration is therefore a key factor in achieving optimal aesthetic outcomes. Successful rehabilitation requires an interdisciplinary approach, often involving periodontal procedures, and relies on effective communication with the patient to align treatment goals with their expectations.

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