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The interdisciplinary relationship between orthodontics and periodontics: Enhancing patient care

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Abstract

The integration of orthodontics and periodontics has become increasingly vital in the management of dental health, particularly for patients with periodontal concerns. This article explores the multifaceted benefits of orthodontic treatment for periodontal patients, emphasizing its role in addressing osseous defects and gingival discrepancies. Key aspects include preorthodontic osseous surgery to correct issues such as osseous craters and three-wall intra-bony defects, which can enhance the effectiveness of subsequent orthodontic interventions. Additionally, orthodontics can effectively treat hemiseptal defects and advanced horizontal bone loss by repositioning teeth to improve periodontal architecture. The management of gingival discrepancies, including uneven gingival margins, significant abrasion, and open gingival embrasures, is also discussed, highlighting how orthodontic movement can restore aesthetic harmony and promote gingival health. Overall, the collaborative approach between orthodontics and periodontics not only improves aesthetic outcomes but also fosters long-term periodontal stability, making it a crucial consideration in comprehensive dental care.

Keywords: Orthodontics, periodontics, osseous defects, gingival discrepancies, hemiseptal defects, preorthodontic surgery, aesthetic harmony, periodontal health

Introduction

The integration of orthodontics and periodontics has emerged as a critical area of focus in dental care, particularly for adult patients with periodontal concerns. The interplay between these two disciplines not only addresses aesthetic and functional aspects of dental health but also significantly enhances the overall periodontal condition ^[1]. This review article aims to elucidate the multifaceted benefits of orthodontic treatment for periodontal patients, highlighting how strategic tooth movement can mitigate periodontal issues and improve oral hygiene ^[2].

Orthodontic therapy offers substantial advantages for adults experiencing periodontal disease, particularly those with malpositioned teeth that hinder effective oral hygiene practices ^[3]. Malalignment can exacerbate periodontal conditions, leading to premature tooth loss. By repositioning teeth through orthodontic interventions, patients gain improved access for cleaning, which is essential for maintaining periodontal health. Furthermore, advancements in orthodontic technology have resulted in smaller, less noticeable appliances that are easier to maintain during treatment ^[4].

The potential for orthodontics to address existing periodontal defects is significant. For instance, vertical repositioning of teeth can alleviate certain osseous defects, potentially negating the need for surgical interventions. Additionally, orthodontic treatment can enhance the aesthetic alignment of gingival margins prior to restorative procedures, thus avoiding the necessity for invasive gingival recontouring that may compromise underlying bone structures ^[5-6].

Moreover, specific conditions such as open gingival embrasures and root proximity can be effectively managed through orthodontic strategies. These treatments not only restore aesthetics but also facilitate better periodontal maintenance by improving access to

interproximal areas. In cases involving fractured teeth or significant bone loss, orthodontics can play a pivotal role in preparing the dentition for subsequent restorative efforts, ensuring that the foundational structures are conducive to long-term success [7-8].

As this article will explore, understanding the relationship between orthodontics and periodontics is paramount for clinicians aiming to provide comprehensive care that addresses both functional and aesthetic needs while promoting optimal periodontal health. The collaborative approach between these specialties not only enhances patient outcomes but also fosters a holistic perspective on dental treatment planning.

Benefits of Orthodontics for Periodontal Patients

Combining orthodontics with periodontal surgery offers a range of benefits that enhance both aesthetic outcomes and periodontal health, particularly for patients with complex dental issues. This interdisciplinary approach is crucial for effectively addressing malpositioned teeth and underlying periodontal defects, ultimately improving the overall dental treatment experience.

One of the primary advantages of integrating orthodontics with periodontal surgery is the enhancement of oral hygiene. Misaligned teeth can create areas that are difficult to clean, leading to plaque accumulation and exacerbating periodontal disease. Orthodontic treatment helps align crowded or malposed teeth, allowing for better access and more effective cleaning, which is essential for patients susceptible to periodontal issues [9]. Orthodontic tooth movement can also play a significant role in correcting certain osseous defects. For example, vertical repositioning of teeth can improve conditions such as hemiseptal defects or advanced horizontal bone loss, potentially reducing the need for surgical intervention. This proactive approach can help maintain or restore bone levels around affected teeth, thereby enhancing periodontal stability [10].

From an aesthetic perspective, orthodontics can align gingival margins before restorative procedures, minimizing the need for invasive gingival recontouring that could compromise underlying bone structures. This alignment not only improves the visual appeal of the smile but also contributes to better overall periodontal health by ensuring that the gingival architecture is maintained [11].

In cases where teeth have suffered fractures or extensive wear, orthodontics can facilitate forced eruption to prepare the tooth for restoration. This allows for adequate crown preparation and enhances the retention form necessary for successful restorative outcomes. Additionally, orthodontic treatment can create optimal space for dental implants in cases of missing teeth, ensuring proper alignment and positioning of adjacent teeth.

Orthodontic interventions are also beneficial in managing gingival discrepancies such as open gingival embrasures. By repositioning teeth and reshaping them as necessary, orthodontics can help regain lost papillae and improve aesthetics in the anterior region of the mouth.

The combination of orthodontics with periodontal surgery not only addresses functional and aesthetic concerns but also significantly enhances periodontal health. By improving oral hygiene access, correcting osseous defects, facilitating restorative procedures, and managing gingival discrepancies, this interdisciplinary approach provides comprehensive care tailored to individual patient needs.

Preorthodontic Osseous Surgery

Before initiating orthodontic treatment, it may be necessary to address specific periodontal defects: Preorthodontic osseous surgery is a critical consideration in the management of periodontal defects before initiating orthodontic treatment. This surgical intervention is particularly important for addressing specific types of osseous defects that may hinder the success of orthodontic therapy and overall periodontal health. Two common types of defects that may necessitate surgical correction are osseous craters and three-wall intra-bony defects [12].

Osseous craters are interproximal, two-wall defects that often do not improve solely through orthodontic treatment. These shallow defects can create pockets that complicate oral hygiene, potentially leading to further periodontal issues if left unaddressed. In cases where the probing depth is significant (typically around 4 to 5 mm), surgical intervention may be required to reshape the bony architecture and reduce pocket depth effectively. The surgical correction involves flapping the area to access the defect, followed by contouring the bone to eliminate the crater. This proactive approach not only enhances periodontal maintenance during orthodontic treatment but also establishes a healthier foundation for long-term outcomes. For example, a patient with a 6-mm probing defect can benefit from osseous surgery, which may reduce the probing depth to 3 mm, facilitating better hygiene practices during and after orthodontic therapy [13].

Three-wall intra-bony defects present another challenge that can often be addressed through regenerative periodontal therapy prior to orthodontic treatment. These defects are characterized by a more complex bony architecture and can significantly impede successful tooth movement if not treated adequately. Regenerative techniques may involve the use of bone grafts—either autogenous or allogenic—along with resorbable membranes to fill the defect and promote bone regeneration. Following a successful regenerative procedure, a stable periodontal environment is typically established within three to six months, at which point orthodontic treatment can be initiated. This coordinated approach ensures that the underlying periodontal health is optimized, allowing for effective tooth movement without exacerbating existing conditions [14].

This interdisciplinary strategy not only improves aesthetic outcomes but also fosters long-term dental health by ensuring that patients maintain optimal oral hygiene throughout their orthodontic journey.

Orthodontic Treatment of Osseous Defects

Orthodontic treatment plays a significant role in the management of osseous defects, particularly in enhancing periodontal health and improving the overall dental structure. Two notable types of osseous defects that can be effectively treated through orthodontics are hemiseptal defects and advanced horizontal bone loss [15].

Hemiseptal defects are characterized by one- or two-wall osseous defects that often arise around teeth that are mesially tipped or have experienced supereruption. These defects can compromise periodontal health and lead to further complications if not addressed. Orthodontic treatment can effectively correct these defects by repositioning the affected teeth, thereby leveling the bony defect.

Treatment Approach

Uprighting Tipped Teeth: In cases where a tooth has tipped mesially, orthodontic uprighting can help reposition the tooth

to its proper alignment. This movement levels the bony defect by redistributing forces and allowing for better bone support around the tooth.

Intrusion of Supra erupted Teeth: For teeth that have supererupted, orthodontic intrusion can be employed to bring the tooth back into alignment with adjacent teeth. This action helps level the cemento-enamel junctions (CEJs), effectively addressing the associated hemiseptal defect.

By utilizing these orthodontic techniques, clinicians can restore periodontal health and improve the aesthetic appearance of the dentition. Post-treatment assessments often reveal significant improvements in pocket depth and overall periodontal stability, reducing the risk of future complications.

Advanced horizontal bone loss presents a unique challenge in orthodontic treatment planning. As alveolar bone recedes, maintaining a favorable crown-to-root ratio becomes crucial for periodontal health. If not addressed appropriately, this condition can lead to tooth mobility and further periodontal issues ^[16].

Treatment Considerations

- **Bracket Placement:** In patients with advanced horizontal bone loss, traditional methods of bracket placement based on crown anatomy may not be appropriate. Instead, brackets should be positioned relative to the existing bone level to ensure that tooth movement does not exacerbate the condition.
- **Equilibration of Crowns:** To accommodate for significant bone loss, it may be necessary to equilibrate the crowns of affected teeth gradually. This process allows for secondary dentin formation and helps maintain pulp vitality while creating a more favorable crown-to-root ratio.

Throughout orthodontic therapy, continuous monitoring is essential to ensure that any adjustments made do not compromise periodontal health. Regular evaluations help identify any emerging issues related to pocket depth or mobility.

By strategically positioning brackets and adjusting crown heights, orthodontists can effectively manage advanced horizontal bone loss. This approach not only improves periodontal outcomes but also reduces the likelihood of requiring additional surgical interventions post-treatment.

By employing targeted strategies that focus on tooth repositioning and careful management of crown-to-root ratios, clinicians can enhance both functional and aesthetic outcomes while promoting long-term periodontal health ^[17].

Managing Gingival Discrepancies

Orthodontics plays a crucial role in managing gingival discrepancies, significantly enhancing both aesthetic outcomes and periodontal health. By addressing issues such as uneven gingival margins, significant abrasion and overeruption, and open gingival embrasures, orthodontic treatment can restore harmony to the smile while promoting optimal periodontal conditions.

Uneven Gingival Margins

Uneven gingival margins can detract from the overall aesthetic appeal of a smile. Orthodontic movement is instrumental in repositioning these margins to achieve better symmetry and alignment.

Treatment Strategies

- **Tooth Movement:** By strategically moving teeth that are misaligned or tipped, orthodontics can help level the gingival margins. For instance, if one tooth is positioned higher than its neighbors, orthodontic intrusion can be employed to lower it, thereby creating a more uniform appearance.
- **Gingival Contour Improvement:** Aligning the teeth not only addresses aesthetic concerns but also improves the contour of the gingiva, which is essential for maintaining healthy periodontal tissues. Proper alignment facilitates better access for oral hygiene practices, reducing the risk of plaque accumulation and subsequent periodontal disease.

Significant Abrasion and Overeruption

Teeth that experience significant abrasion or overeruption can lead to complications that affect both aesthetics and function. Orthodontic treatment can intrude over-erupted teeth to create restorative space and enhance gingival health.

Treatment Considerations ^[18].

- **Intrusion Techniques:** Intruding over-erupted teeth helps restore proper occlusion while creating adequate space for restorative work such as crowns or veneers. This process not only improves aesthetics but also allows for better alignment of the dental arch.
- **Gingival Health Enhancement:** By intruding these teeth, orthodontics can improve the relationship between the tooth and the surrounding gingiva. This adjustment helps ensure that the gingival margin is positioned correctly relative to the tooth surface, promoting healthier periodontal tissues.

Open Gingival Embrasures

Open gingival embrasures, often seen in the anterior region of the mouth, can lead to unsightly gaps that impact a patient's smile. Orthodontics can effectively address this issue by restoring interproximal papillae and enhancing aesthetic appearance.

Treatment Approaches ^[18].

- **Root Movement:** Orthodontic treatment can facilitate root movement to close open embrasures. By repositioning adjacent teeth closer together, orthodontics encourages the regrowth of interproximal papillae, which fills in these gaps.
- **Combination with Restorative Techniques:** In some cases, orthodontic treatment may be combined with restorative techniques such as tooth reshaping or bonding to achieve optimal results. This interdisciplinary approach ensures that both functional and aesthetic goals are met.

These interventions not only enhance the aesthetic appeal of a patient's smile but also promote better periodontal health by improving access for oral hygiene and reducing the risk of periodontal disease. The integration of orthodontic strategies into comprehensive dental care plans ultimately leads to more favourable long-term outcomes for patients seeking both functional and aesthetic improvements in their dental health.

Discussion

The integration of orthodontics and periodontics has been well-established as a crucial aspect of comprehensive dental care, particularly for patients with periodontal concerns.

Several studies have highlighted the multifaceted benefits of orthodontic treatment in improving periodontal health and addressing various osseous defects and gingival discrepancies.

A study by Ericsson *et al.* (1978) ^[1] demonstrated that orthodontic treatment can effectively correct hemiseptal defects by repositioning tipped teeth, thereby leveling the bony architecture. Similarly, Melsen and Agerbaek (1988) ^[2] found that intruding over-erupted teeth can create restorative space while enhancing gingival health. These findings align with the strategies discussed in this article, emphasizing the role of orthodontics in managing osseous defects and improving aesthetic outcomes.

Regarding preorthodontic osseous surgery, Cardaropoli *et al.* (2007) ^[3], emphasized the importance of addressing three-wall intra-bony defects through regenerative techniques before initiating orthodontic treatment. This approach ensures that a stable periodontal environment is established, allowing for effective tooth movement without exacerbating existing conditions.

The management of gingival discrepancies through orthodontic treatment has been explored in several studies. Kokich (1996) ^[4] highlighted the ability of orthodontics to correct uneven gingival margins and open gingival embrasures, restoring aesthetic harmony and promoting better periodontal health. Spear *et al.* (1997) ^[5] further emphasized the importance of combining orthodontic strategies with restorative techniques to achieve optimal results in managing gingival discrepancies. These studies corroborate the approaches discussed in this article, demonstrating the effectiveness of orthodontics in addressing various gingival concerns.

One of the primary challenges in integrating orthodontic and periodontal therapies is determining the appropriate timing for each treatment. According to Cardaropoli *et al.* (2007) ^[3], preorthodontic osseous surgery is often necessary to address specific periodontal defects such as three-wall intra-bony defects or osseous craters before initiating orthodontic treatment. This surgical intervention aims to create a stable periodontal environment conducive to effective tooth movement. However, the timing of these surgeries must be carefully coordinated with orthodontic treatment plans to ensure optimal outcomes without delaying patient care.

In contrast, Melsen and Agerbaek (1988) ^[2] emphasized that in some cases, immediate orthodontic treatment may be beneficial, especially when addressing minor discrepancies in tooth positioning that do not significantly compromise periodontal health. This highlights the need for individualized treatment plans that consider both the severity of periodontal conditions and the urgency of orthodontic interventions.

Another significant challenge is managing the complexity of existing periodontal conditions while undertaking orthodontic treatment. Studies indicate that patients with advanced horizontal bone loss or furcation defects require meticulous planning to avoid exacerbating their periodontal issues during orthodontic therapy. For instance, Spear *et al.* (2006) ^[5] noted that improper bracket placement in patients with significant bone loss could lead to further complications, such as increased tooth mobility or the development of new periodontal pockets.

Additionally, root proximity in posterior teeth can complicate both periodontal maintenance and orthodontic movement. As highlighted by Kokich (1996) ^[4], moving roots apart during orthodontic treatment can improve access for hygiene and promote bone formation between adjacent roots. However,

this requires precise planning and monitoring throughout the treatment process to ensure that the desired outcomes are achieved without compromising periodontal health.

One promising area for future research lies in the continued development and refinement of regenerative periodontal therapies. Studies by Cardaropoli *et al.* (2007) ^[3] have demonstrated the effectiveness of bone grafts and resorbable membranes in treating three-wall intra-bony defects before initiating orthodontic treatment. However, further research is needed to explore novel biomaterials, growth factors, and stem cell therapies that could potentially accelerate bone regeneration and improve long-term stability.

Advances in orthodontic mechanics and materials may also contribute to better management of periodontal concerns. Ericsson *et al.* (1978) ^[1] highlighted the importance of carefully considering bracket placement in patients with advanced horizontal bone loss. The development of more precise bracket positioning techniques, coupled with improved archwire materials, could enhance the ability to achieve favorable crown-to-root ratios while minimizing the risk of further periodontal breakdown.

The incorporation of digital technologies, such as cone-beam computed tomography (CBCT) and intraoral scanners, holds promise for enhancing treatment planning and monitoring in combined orthodontic-periodontal cases. CBCT imaging can provide detailed information about the three-dimensional architecture of osseous defects, allowing for more precise diagnosis and treatment planning. Intraoral scanners, on the other hand, can facilitate the creation of accurate digital models for monitoring gingival changes throughout treatment, enabling clinicians to make timely adjustments as needed.

To further strengthen the integration of orthodontics and periodontics, it is crucial to promote interdisciplinary education and collaboration among dental professionals. Spear *et al.* (2006) ^[5] emphasized the importance of ongoing communication between orthodontists and periodontists for successful patient outcomes. By fostering a culture of shared knowledge and joint treatment planning, clinicians can stay abreast of the latest advancements in both fields and provide comprehensive care tailored to individual patient needs.

The future of orthodontics and periodontics lies in the continued exploration of regenerative therapies, improved mechanics and materials, digital technologies, interdisciplinary collaboration, and patient-centered research. By embracing these advancements and fostering a culture of innovation, clinicians can provide even more comprehensive and effective care for patients with complex dental needs.

Conclusion

In conclusion, the integration of orthodontics and periodontics offers significant benefits for patients with complex dental issues. This interdisciplinary approach enhances both aesthetic outcomes and periodontal health, addressing challenges such as osseous defects and gingival discrepancies. Orthodontic treatment can effectively reposition teeth to improve access for hygiene, correct hemiseptal defects, and restore gingival margins, thereby promoting better overall oral health. As advancements in regenerative therapies, digital technologies, and collaborative treatment planning continue to evolve, the potential for improved patient outcomes grows. Emphasizing interdisciplinary collaboration among dental professionals will be essential in optimizing care and ensuring that patients receive comprehensive treatment tailored to their unique needs. Ultimately, by harnessing the synergies between orthodontics and periodontics, clinicians can enhance the quality of care provided to patients, leading to healthier

smiles that are both functional and aesthetically pleasing.

Conflict of Interest

Not available

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