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CANTILEVER FIXED PARTIAL DENTURE - REVIEW

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ABSTRACT The cantilever fixed partial denture (FPD) is a dental restoration featuring one or more abutments at one end while being unsupported at the opposite end. Forces acting on the cantilevered pontics can lead to tilting and rotational movements of the abutments. In a cross-arch unilateral cantilever FPD, the distal cantilevered unit experiences relatively less force compared to the contralateral posterior abutment. The absence of terminal abutments unilaterally results in lateral bending forces that trigger inhibitory feedback reactions from the periodontal and/or temporomandibular mechanoreceptors. The highest strain in distal cantilevered FPDs typically occurs mesial to the furthest retainer, as most fractures tend to happen in this area. Enhancing the prognosis of cantilevered FPDs involves increasing the number of abutments while reducing the number of pontics. Abutment teeth must possess lengthy roots and adequate alveolar support, with prepared abutments necessitating sufficient length and parallel axial walls. Maintaining an equilibrated and harmonious occlusion, along with excellent oral hygiene, is crucial. Cantilevered FPDs, backed by adequate periodontal support, can replace any tooth in the dental arch, serving as a valuable alternative to removable partial dentures. Typically, a cantilevered FPD requires a minimum of two abutment teeth, although an exception exists for the replacement of a maxillary lateral incisor with the canine as an abutment. Another option to consider is the osseointegrated implant. While the popularity of osseointegrated implants is increasing, leading to a potential decline in the need for tooth-supported cantilevered FPDs, they will likely continue to serve as an alternative treatment option.

KEYWORDS : Cantilever, FPDs, Pontics, Abutment

INTRODUCTION

It's often preferable to opt for a fixed rather than removable restoration when replacing a missing tooth. However, in cases where there are abutments present only on one end of the edentulous space, a conventional fixed partial denture (FPD) may not be feasible, and a cantilever FPD could be the appropriate solution.

A cantilever FPD is a fixed dental restoration where one end has one or more abutments while the other end lacks support, creating a unique arrangement that results in a Class I lever system. When the cantilevered pontic is subjected to occlusal forces, these forces are transmitted to the abutment(s), which can lead to damage, as noted by many dentists. Consequently, some clinicians are hesitant to recommend cantilever FPDs for their patients due to the observed high incidence of complications. Despite the therapeutic intent, improper use of the cantilever principle can inadvertently contribute to the onset and progression of periodontal issues. However, when employed judiciously and when specific criteria are met, a cantilever FPD can provide valuable dental restoration. This article explores the essential factors for achieving successful outcomes with cantilever FPDs.2

Mechanical Features

The forces exerted on the cantilevered pontic are primarily resisted through rotational and tilting movements by the abutment teeth rather than along their long axes. To maintain the integrity of the supporting periodontium and prevent material failure, it's essential to comprehend the characteristics of each component of the prosthesis.

It's generally recommended to have single cantilevered pontics with at least two abutments, although this recommendation may vary based on the specific clinical conditions and the position of the pontic within the dental arch. The muscles involved in mastication typically exert the strongest forces in the posterior regions of the arch. Therefore, when a cantilevered pontic is positioned posteriorly, additional abutments may be necessary to withstand these forces.

Complete crowns are preferred as retainers for cantilevered FPDs to achieve maximum retention and resistance. Secondary retentive grooves and box preparations can be utilized when needed to enhance retention further.

Research indicates that the connector serves as the weakest link in an FPD due to its high concentration of stress. To mitigate and distribute stress effectively, it's advisable for connectors to adopt a U-shaped outline form rather than a sharp V-shaped one. Additionally, connectors should possess adequate thickness to ensure strength and rigidity, preventing deformation or fracture under stress. However, excessive thickness can impede oral hygiene access.

Pontic Design Considerations

Clinical research consistently demonstrates the occurrence of mucosal irritation in the vicinity of FPD pontics. This reaction tends to be more pronounced with cantilevered pontics, given their support at only one end, which heightens the probability of movement and consequent mucosal trauma during functional activities.

Achieving an optimal tissue response may depend more on the pontic's design and effective plaque control rather than solely on the material from which the pontic is fabricated, particularly when the pontic's surface is adequately glazed or polished. Nonetheless, it's essential to meticulously craft the tissue surface of the pontic to ensure selective tissue contact, thereby minimizing pressure on the mucosa. Additionally, pontics should be meticulously contoured to ensure not only pleasing aesthetics but also sufficient support for the cheek and tongue, as well as facilitating access for oral hygiene maintenance.

A well-considered occlusal scheme is imperative for stress reduction by appropriately directing forces to the abutment teeth, thereby ensuring that the cantilevered pontic serves solely as a centric occlusal stop without inducing disclusion. Moreover, narrowing the occlusal table of the pontic can effectively reduce the loads transmitted to the abutment teeth. A practical guideline involves limiting the buccolingual width of the pontic to match or be less than that of the smallest abutment crown, thereby optimizing occlusal dynamics and promoting long-term stability.

Maintanance Of Abutment Periodontium

The treatment process extends beyond the mere cementation of the restoration and necessitates subsequent steps, including occlusal adjustment and adherence to a rigorous oral hygiene regimen. The presence of bacterial plaque alongside the potentially detrimental stresses caused by the cantilevered pontic can swiftly lead to the rapid degradation of the supporting tissues. Hence, it is imperative for dentists to implement plaque control methods and for patients to effectively execute them to achieve an optimal tissue response. The success of this restoration hinges crucially on the level of cooperation from the patient, without which achieving desirable outcomes becomes unattainable.

Summary

The prevailing approach in replacing missing teeth involves the utilization of an FPD securely anchored at both ends, representing the

pinnacle of contemporary treatment modalities. Although the cantilever is recognized as a compromise solution, it holds a distinct preference over the RPD, particularly in cases of unilateral edentulous conditions. A widely shared viewpoint underscores the significance of augmenting the number of abutment teeth while concurrently diminishing the count and dimensions of cantilevered pontics. While the ideal scenario entails abutments boasting impeccable periodontal support, intriguingly, research reveals that extensive cross-arch FPDs featuring cantilevers can be successfully integrated even with minimal reliance on the periodontal ligament, provided the occlusion remains stable and harmonious.

The cantilever's intrinsic deflective capacity, in conjunction with its ability to trigger mechanoreceptors within the periodontium, contributes to a notable reduction in stress exerted on the restoration, thereby offering vital support to compromised periodontal ligaments. Additionally, the expanded vertical space facilitated by the cantilever permits the fabrication of a more substantial restoration, thereby fortifying the prosthesis against mechanical failures. However, it is paramount to acknowledge that while cantilever FPDs are deemed suitable for clinical scenarios characterized by lower stress levels, the scholarly community remains divided on the proposition that a removable prosthesis within the opposing dentition results in diminished stress.

Efficient stress distribution within cantilevered FPDs necessitates that the abutment adjacent to the pontic boasts adequate alveolar support, while meticulous preparation of the farthest abutment is imperative to forestall potential retainer dislodgement. Notably, technical setbacks are more prevalent when nonvital teeth serve as abutments due to the gradual deterioration of tooth structure, with inadvertent overloading a plausible consequence, given their heightened pain threshold.

Within geriatric cohorts, a notable preference for the comfort afforded by cantilever FPDs over RPDs is observed, with the former requiring minimal upkeep during subsequent clinical follow-ups. Nonetheless, the burgeoning advancements in osseointegrated implants herald the potential for a gradual decline in the utilization of cantilever FPDs, albeit sparingly employed in select cases.

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