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IP Annals of Prosthodontics and Restorative Dentistry

Journal homepage: https://www.aprd.in/

Case Report

Custom made cast post and core on a mandibular premolar using direct approach

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ARTICLE INFO

Article history:
Received 15-07-2023
Accepted 06-09-2023
Available online 10-10-2023

Keywords:
Base metal alloy
Core
Custom post and core
Direct pattern
Dowel
Metal ceramic restoration
Pattern resin
Porcelain fused to metal

ABSTRACT

Custom-made cast post and core plays a crucial role in the restoration of extensively decayed teeth, offering a level of flexibility that addresses the specific needs of each case. The core serves as an anchor within the root canal, providing stability and support for the subsequent prosthetic restoration. The process of creating a design for a cast post and core involves strategic decision-making. This can be achieved through two primary methods: direct formation within the patient's mouth or indirect fabrication on a model. Each approach presents its own set of advantages and considerations. In the direct method, where the design is crafted within the patient's mouth, a unique challenge arises due to the inherent variations in root alignment. The creation of custom-made cast post and core is a multifaceted process that requires careful consideration of factors such as root alignment and anatomical intricacies. The utilization of inventive approaches, like the direct method presented here, showcases the ongoing advancements in restorative dentistry, ultimately leading to successful outcomes in challenging cases. In the present case report, a custom-made cast post and core was fabricated using a direct method.

1. Introduction

In 1728, Pierre Fauchard made a pioneering contribution to dentistry by introducing metal posts, known as tenons, as a means to anchor dental bridges. These posts were ingeniously screwed into the tooth structure, laying the foundation for modern post and core techniques. As time progressed, the methods and materials employed in post and core procedures have undergone significant evolution.[1]

During the year 1930, a pivotal advancement emerged in the field of dentistry with the introduction of the cast post and core. This innovation marked a departure from the conventional one-piece post crowns. The cast post and core technique revolutionized dental practice by granting practitioners the ability to meticulously customize the alignment of the core within the prepared canal. This flexibility not only ensured better fit but also enhanced the overall success of the restoration.[2]

Nevertheless, the pursuit of a harmonious balance between aesthetic appeal and optimal occlusion in restorations remains a challenge that demands considerable clinical judgment. This challenge is particularly pronounced when dealing with premolars, where the presence of divergent canals adds an extra layer of complexity to the restoration process.[3]

The intricacies of working within the posterior oral region are further compounded by issues of accessibility and visibility. These challenges become especially pronounced when restoring premolars using cast post and core.[4] To address these complexities, techniques for crafting cast post

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https://doi.org/10.18231/j.aprd.2023.034

and core in mandibular premolars have been categorized into two primary methods: direct and indirect pattern fabrication.

The comprehensive nature of this process underscores the necessity for collaborative efforts between endodontists and prosthodontists. Endodontists play a crucial role in ensuring the success of root canal treatments, while prosthodontists are responsible for achieving both the longevity and aesthetic excellence of restorations.

While both direct and indirect methods offer their advantages, this article focuses on the direct approach for fabricating a cast post and core in a mandibular premolar. By delving into this procedure, the piece sheds light on the intricacies, challenges, and potential complications that may arise during this innovative and impactful dental technique.

2. Case Report

A 58-year-old male patient was referred from the Department of Conservative Dentistry & Endodontics to initiate crown placement procedures (3-unit bridge) for an endodontically treated mandibular left second premolar and second molar. The patient's medical history was found to have no bearing on the proposed treatment plan. The second premolar had deteriorated due to caries, leading to the development of a periapical abscess and prompting the patient to seek dental intervention. Both the external and internal oral examinations yielded normal results. While the mandibular left second premolar displayed significant decay, it featured three partially intact walls that were, however, thin in nature.

The devised treatment strategy encompassed the utilization of tailor-made cast post and core, succeeded by the application of porcelain fused to metal crowns for both the second premolar and second molar. The patient provided consent for the recommended treatment course. Radiographic evaluation included IOPA of the patient which revealed endodontically treated mandibular left second premolar and second molar (Figure 2).

Fig. 1: Radiographic evaluation (IOPA)

In the case of the mandibular premolar, the procedure initiated by eliminating the temporary restoration from the access cavity, revealing the underlying gutta-percha. Using progressively larger Gate Glidden drills (Mani Gates Drills, Mani, Inc. Japan) gutta-percha removal was conducted from the root canal. The root canal underwent shaping through a sequence of Peeso reamers (Mani Peeso Reamers, Mani, Inc. Japan) with diameters gradually increasing from smaller to larger sizes. Radiographic evaluation was done to evaluate the amount of gutta-percha to be removed (Figure 2).

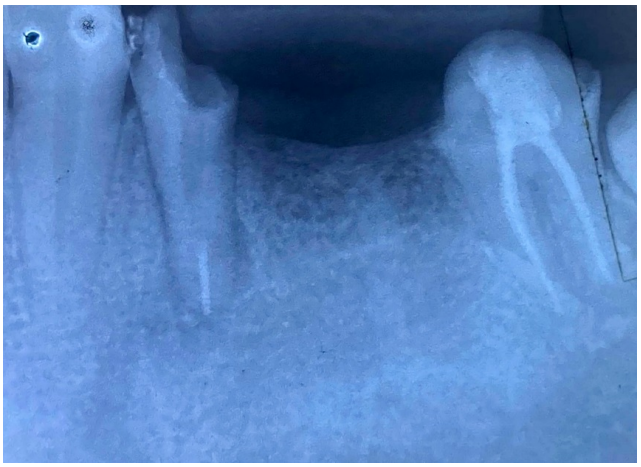

Fig. 2: Radiographic evaluation (IOPA) showing post-space preparation

After the preparation of the post space (Figure 3), a ferrule preparation was executed to lend support to the tooth's core.

Fig. 3: Post-space preparation

The pattern resin (EZ-Pattern, Hudens Bio, South Korea) was mixed and positioned within the root canal, meticulously creating a pattern that would ensure a precise fit (Figure 4).

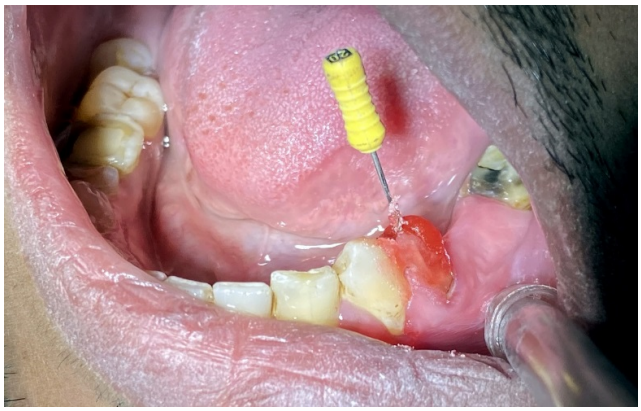

Fig. 4: Post-space direct pattern fabrication

Following this, the resulting pattern (Figure 5) was individually cast using a base metal nickel chromium alloy (Bellabond plus, Bego, Germany).

Fig. 5: Final direct pattern

And was subjected to standard laboratory finishing and polishing procedures (Figure 6).

A comprehensive evaluation of the fit for the cast component of the post and core was carried out to ensure a seamless fit without any constraints. Before the permanent cementation of the components, a radiograph was obtained (Figure 7).

Fig. 6: Final pattern after casting

Fig. 7: Radiographic evaluation to check the fit of the post before cementation

Fig. 8: Final prostheses in the patient's mouth

Cementing was accomplished using the glass-ionomer cement (GC Fuji Gold Label Type 1 Luting Cement, GC Corporation, Tokyo, Japan), securing the component in place. Established clinical protocols were followed to fabricate metal-ceramic crown restorations (3-unit bridge) for the mandibular left second premolar and second molar (Figure 8).

The patient was engaged in regular annual follow-up appointments and consistently expressed contentment with the treatment outcomes during these visits.

3. Discussion

The following method outlines a direct approach for crafting a cast post and core pattern within a mandibular premolar. The cast post and core offer a unique advantage by allowing modification of the crown restoration's shape without being confined by the root canal's angle.[5] However, while this advantage is noteworthy, it's important not to overlook potential drawbacks, including reduced post-retention, susceptibility to root fractures, and the potential for corrosion issues. Challenges specific to the posterior mandibular region stem from limited access and visibility, primarily due to the presence of saliva and the positioning of the tongue.[6]

The pattern resin used in the present case report offers a plethora of advantages. This method is notably efficient and time-saving when it comes to crafting direct post and core patterns. This technique can generate castings with precise dimensions, which ultimately saves valuable time and effort in the fabrication process. Moreover, it preserves valuable tooth structure and avoids subjecting oral tissues to the heat of polymerization or potential chemical irritation from excess monomer, as is often the case with traditional methods. Moreover, it solidifies in roughly 5 minutes, creating a precise and robust pattern that doesn't shrink. This pattern can be trimmed, manipulated, and invested without concerns about breakage, chipping, distortion, or temperature fluctuations. It burns away at the same temperature as wax, leaving no residue behind.

The present case report shares similarities with the approach proposed by Mattoo et al., wherein a component of the assembled cast post slides onto the core.[7] It is always paramount to exercise heightened caution throughout the direct pattern fabrication process. Employing a serrated plastic tip proves invaluable in shaping patterns within the oral cavity. Enhancing grip through the inclusion of a custom handle at the tip diminishes the risk of inadvertent swallowing. Moreover, marking the handle contributes to the proper orientation of the pattern during its insertion into the root canal. Addressing this concern becomes pivotal during direct pattern fabrication, as an incorrect pattern placement while the material is still malleable can result in an ill-fitting pattern at a later stage.[8]

4. Conclusion

Crafting a direct pattern in the mandibular premolar region can present occasional challenges. Yet, the utilization of the pattern resin emerges as a valuable tool, enabling a systematic build-up of the post and core, ultimately contributing to positive results. The technique detailed in this article is marked by its simplicity, and with dedicated practice, can be refined to yield consistently successful outcomes.

5. Conflict of Interest

None.

6. Source of Funding

None.

7. Acknowledgement

The authors would like to acknowledge Dr. Ritika Sharda (PG student) for her immense contribution and support in the publication.

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Cite this article: Sikri A, Sikri J. Custom made cast post and core on a mandibular premolar using direct approach. *IP Ann Prosthodont Restor Dent* 2023;9(3):175-178.