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Case Study

The Esthetic Techniques in Prosthodontics: Wax-up, Mock-up, and Digital Smile Design in Modern Practice

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Abstract

In modern prosthodontics, achieving optimal esthetic outcomes is essential for both patient satisfaction and functional success. This article explores three key esthetic techniques widely used in contemporary practice: Wax-up, Mock-up, and Digital Smile Design (DSD). The Wax-up technique allows for the creation of a detailed model to plan and visualize restorations, offering a tangible representation of the desired outcome. The Mock-up technique, often employed in conjunction with the wax-up, provides a provisional, in-mouth preview of the final result, enabling both the clinician and patient to assess and adjust the esthetic design before permanent restorations. Lastly, Digital Smile Design (DSD) integrates advanced digital technology, offering precise and customizable planning for esthetic restorations based on facial and dental analysis. These techniques, when used together, help ensure predictable, personalized, and aesthetically pleasing results, aligning with the growing demand for high-quality esthetic dentistry in modern prosthodontics.

Keywords: Wax-Up; Mock-Up; Digital Smile Design; Esthetic Restorations

Introduction

Modern dentistry is built upon three fundamental principles: biological, functional, and esthetic [1]. In recent decades, with continuous advancements in dental technologies and increasing patient expectations, esthetic dentistry has emerged as a distinct field. One of the greatest challenges in this domain is achieving predictable and harmonious results, particularly in anterior restorations, where even minor discrepancies can significantly impact overall appearance [2].

To address this challenge, techniques such as wax-up and mock-up have become essential tools in treatment planning. These methods allow for a preview of the anticipated outcome before any irreversible modifications are made, enhancing both treatment predictability and patient confidence [3]. More recently, digital prefigured design techniques have further refined the planning process, offering greater precision and customization.

The aim of this paper is to provide an in-depth analysis of these emergent methods in esthetic dentistry and their impact on treatment planning and execution. Additionally, the objective of presenting two successfully treated cases is to highlight the critical role of wax-up, mock-up, and digital design techniques in achieving predictable and functional esthetic outcomes. The following sections will explore each of these techniques in detail, emphasizing their advantages and clinical relevance.

The wax-up in prosthetic rehabilitation

Diagnostic wax-up (DW) plays a crucial role in achieving predictable esthetic outcomes by allowing clinicians to pre-visualize the final restoration, ensuring better treatment predictability. Traditional diagnostic wax-up involves using dental wax on study models to replicate the desired tooth morphology, shape, and occlusion [4].

One of the principal advantages of conventional wax-up is that it allows for the visual assessment of key parameters such as tooth positioning, occlusion, and proportions before irreversible changes are made to the patient's dento-periodontal structures [5]. This preliminary phase ensures that treatment is optimized for both functionality and esthetics. Notably, it enables the evaluation of occlusal stability and mandibular movement freedom, crucial elements for the balance of the stomatognathic system. Diagnostic wax-up serves as an essential tool to determine if there are any interferences, helping to address occlusal problems before clinical procedures commence [6].

In the conventional wax-up technique, the dental technician applies wax to a study model to simulate the final treatment result. This process allows for customization of the restoration, offering significant flexibility in terms of tooth volume, shape, and proportions. The technique also helps refine occlusal relationships, preparing the clinician for more effective and predictable restorative interventions. However, the accuracy and success of a traditional diagnostic wax-up are highly dependent on the technician's manual skills, and variations in artistry can sometimes affect the precision of the final restoration [7]. Additionally, it often requires considerable time and resources, such as physical materials for modeling and adjustments.

The introduction of digital technologies has brought about a paradigm shift in the diagnostic wax-up process. The digital diagnostic wax-up, which integrates facial measurements into the planning, has proven to be more accurate and efficient than traditional methods. By using advanced software, clinicians can generate 3D models of the patient's teeth and face, allowing for a more precise and comprehensive esthetic prediction. The digital approach reduces the dependency on physical materials and streamlines the entire workflow, providing greater flexibility to make adjustments without permanent alterations to the models [8,9].

A key advantage of digital wax-ups is that they enable faster modifications and offer reversibility, allowing clinicians to test different treatment options easily without committing to irreversible changes. Furthermore, the use of specialized software in digital workflows has made it easier for clinicians with less artistic ability to execute accurate wax-ups. As the digital wax-up involves minimal use of physical materials, it also reduces costs and allows for easy storage and retrieval of patient records, which can be shared across dental teams for improved collaboration [10].

The precision offered by digital diagnostic wax-ups is particularly beneficial in terms of esthetic outcomes, as it allows for more accurate predictions of tooth proportions, occlusal relationships, and the final appearance. Moreover, digital tools

enable clinicians to better anticipate functional outcomes, such as occlusal stability and mandibular movement, which are essential for creating a balanced and stable restoration. Digital workflows, as highlighted in recent literature, have been associated with improved treatment outcomes and patient satisfaction, thanks to their enhanced accuracy and efficiency [9,11].

Despite these advancements, digital wax-ups must maintain a high level of accuracy to meet the functional and esthetic needs of patients. The growing interest in digital workflows among dental professionals is a testament to the benefits of this technology, which enhances treatment planning and collaboration. However, the successful use of digital diagnostic wax-up requires proficiency with the associated software, ensuring the clinician can fully capitalize on the precision and flexibility it offers.

The mock-up in prosthodontic rehabilitation

The mock-up technique plays a pivotal role in modern prosthodontic rehabilitation by offering an efficient means to predict and visualize the final restorative outcome. This technique is a highly valuable clinical tool that allows both patients and dental professionals to assess the esthetic and functional aspects of a restoration before any irreversible modifications are made to the teeth. The mock-up, whether direct or indirect, functions as a visual and tactile prototype, enhancing communication between the dentist, patient, and dental technician.

In prosthodontics, mock-ups can be employed in various clinical scenarios such as the correction of tooth shape, closure of diastemas, or modification of vertical dimension [2,12]. They serve as a pre-evaluative tool to ensure that the final restoration meets the patient's aesthetic and functional expectations while minimizing the risk of undesirable outcomes. The mock-up also aids in preserving healthy enamel by guiding conservative tooth preparation [13]. Moreover, it assists in fine-tuning the design, enabling real-time adjustments based on both the dentist's and patient's feedback [2].

The direct mock-up technique is a simplified and cost-effective method that can be employed directly in the patient's mouth, without the need for extensive laboratory preparation. This approach uses composite materials applied directly to the unprepared teeth to replicate the planned restoration. The advantage of this technique lies in its reversibility and minimal invasiveness. The mock-up is applied without the need for tooth preparation, acid etching, or bonding agents, making it a non-invasive, diagnostic procedure [14].

Typically, fluid composite resins are used for the direct mock-up, which allows for easy application and shaping. Once applied, the mock-up can be adjusted and refined, enabling the clinician to assess the esthetic result immediately and make changes as needed before proceeding to the definitive restoration. This procedure requires no anesthesia, as it is entirely non-invasive, and provides the patient with an opportunity to visualize the anticipated aesthetic result and function. The patient can assess their new smile from both functional and esthetic perspectives before committing to permanent treatment [15].

One of the key advantages of the direct mock-up technique is the ability to make quick, reversible changes, facilitating a more patient-centric approach to treatment planning. The patient can provide immediate feedback on the form, size, and position of the restoration, allowing the clinician to adjust the design accordingly. Additionally, the direct mock-up serves as an invaluable tool for dental professionals, helping them evaluate the necessary amount of tooth preparation required for the final restoration [16,17].

In contrast to the direct approach, the indirect mock-up technique involves the creation of a wax-up or digital model on study casts, which is then transferred to the patient's mouth using a silicone key or matrix. This technique offers greater precision and control over the final design, particularly when the restoration requires more complex modifications. The indirect mock-up is typically used when the required restoration is more extensive, such as in the case of full-coverage crowns or veneers, where careful planning and detailed anatomical modifications are essential [18].

To produce an indirect mock-up, a diagnostic wax-up is first completed on a study model. This wax-up is then transferred to the patient's mouth using a silicone key filled with a bis-acryl or composite resin. The material is injected into the silicone key and cured directly in the patient's mouth, allowing the technician to reproduce the precise details of the wax-up. One of the critical factors in this process is ensuring that the wax-up is accurately transferred to the patient's oral cavity. Any inaccuracies in the transfer can lead to debonding or aesthetic complications [19,20].

The indirect mock-up technique offers several advantages, particularly when it comes to complex restorative cases where precise anatomical adjustments are crucial. It allows for the creation of a more durable and detailed mock-up, which can be used as a template for the final restoration. Additionally, it provides the patient with a clearer, more realistic representation of the final result, allowing for better decision-making and improved collaboration between the dental team and the patient [21].

In prosthodontic rehabilitation, the mock-up—whether direct or indirect—is an essential step in ensuring a successful outcome. It serves as a critical diagnostic and esthetic tool, helping to refine the treatment plan and guarantee that the final restoration will meet the patient's expectations. Mock-ups also enhance patient confidence, as they provide a tangible preview of the anticipated results.

The digital smile design in prosthodontic rehabilitation

Over 15 smile design software programs have been developed to date highlighting the growing importance of smile design in dentistry [22]. This approach focuses on crafting a visually appealing smile by considering the alignment, shape, and color of the teeth in conjunction with their relationship to the facial features. The methodology has gained considerable attention in recent years, positioning itself as a key link between prosthodontics and aesthetic dentistry [23]. By creating a digital simulation of the proposed treatment, DSD helps patients visualize the final outcome before beginning the restorative procedure, which enhances patient understanding and acceptance, and also promotes better communication between the dentist, patient, and laboratory technician.

DSD relies on digital tools commonly available in modern dental practices, including DSD software, digital SLR cameras, and smartphones for capturing high-quality images. Additionally, intraoral scanners, CAD/CAM systems, and 3D printers are used to complete the digital workflow, enabling precise restoration creation. High-quality photographic documentation is vital for an accurate facial and dental analysis. Standardized photography protocols are essential for this process, ensuring that photographs are taken with the patient's head in a fixed position to establish key reference lines for the smile design. This includes frontal, profile, and intraoral images to capture both static and dynamic aspects of the patient's dental situation [24].

The photographic protocol calls for specific images: three extraoral frontal photographs, two profile photos, and four intraoral images. These images should be taken with the patient's head in a fixed position, ensuring clarity and accuracy for proper treatment planning. The video protocol includes recordings that allow for dynamic assessment of the smile. Videos from the frontal, profile, and lateral views help capture how the teeth and lips function during facial expressions like smiling, speaking, and laughing [25,26].

The advantages of DSD are significant. It provides a visual preview of both the current dental situation and the final restorative result, allowing for the simulation of various treatment options. This technology uses high-quality images to help the patient make informed decisions and gives the dentist greater control over the final result, ensuring that both esthetic and functional goals are met with precision. By integrating dynamic aspects of the patient's smile, DSD not only improves diagnostic accuracy but also enhances patient satisfaction with the final outcome [27].

Clinical Case 1

A 33-year-old female patient presents to the dental clinic expressing dissatisfaction with the appearance of her upper central and lateral incisors (Figure 1, 2). The teeth 2.2. and 2.2. exhibit old restorations on the proximal and palatal surfaces, which have resulted in color and shape alterations. The patient desires an aesthetic and functional rehabilitation of these teeth, which involves the replacement of the outdated restorations.

Figure 1: Initial appearance in maximum intercuspation – frontal view.

Figure 2: Initial appearance of frontal teeth.

The clinical examination reveals adequate oral hygiene, the absence of periodontal lesions, stable occlusion in maximum intercuspation, and the maintenance of the vertical dimension of occlusion. Based on the findings from the clinical examination, this case falls within the indications for restoration with full ceramic veneers. Aesthetic analysis shows asymmetry relative to the midline, lack of alignment between the maxillary interincisal line and the mandibular interincisal line, a slight incongruence with crowding of the upper central incisors, and discoloration of the old restorations on the upper central incisors, the teeth 2.1.

The treatment plan involved veneering the upper anterior group, from canine to canine, which included restoring the old fillings, repositioning the incisal edge, reestablishing the vestibular curvature, and restoring the incisal curvature in alignment with the lower lip. The patient agreed with the proposed plan and signed an informed consent, also approving publication of all case details and photographs.

The treatment steps began with taking impressions of the maxillary arch to create study models, followed by mounting the models in the articulator for the wax-up process. A mock-up was then created, and gingival margin retraction was performed to facilitate impression taking. Biphasic impression taking was done in a single step using Impregum polyether, followed by impressions of the antagonist arch with alginate and recording of the intermaxillary occlusal relationships with Virtual CAD bite registration silicone. The final restorations were then completed. During the first treatment session, impressions were taken with alginate for the study models, intermaxillary occlusal relationships were recorded using a facebow for mounting the models in the articulator, dental photographs were captured, and it was decided to maintain the initial tooth color. The impressions were sent to the dental laboratory, where class IV gypsum models were created, and diagnostic wax-up modeling was performed using white wax (Figure 3).

Figure 3: Conventional Wax-up.

Using the wax-up, the vestibular curvature of the maxillary arch was restored, and the incisors were slightly lengthened to reestablish the incisal curvature. The diagnostic model obtained was then used to create external molds of the newly designed situation. The next step involved the fabrication of the mock-up (Figure 4), for which Virtual Refill Putty Fast Set addition silicone (base and catalyst)(IVOCLAR VIVADENT) was employed due to its exceptional precision in reproducing intricate details, and with which the gypsum wax-up was impressed. Subsequently, the resulting mock-up, created on the unprepared teeth using BIS-GMA composite resin, was transferred to the oral cavity with the assistance of an external mold.

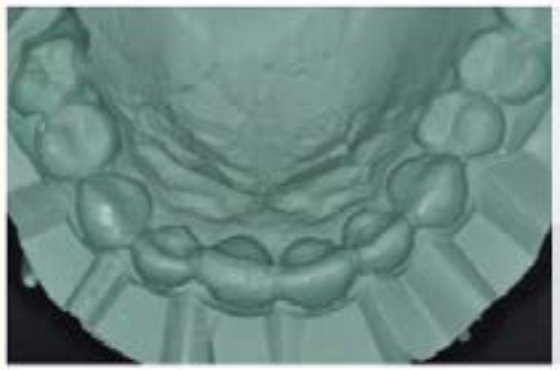

Figure 4: The mock-up created using the wax-up.

The mock-up served as the starting point for discussions with the patient regarding the aesthetic design of the future restorations. After the removal of excess resin, the mock-up was tested in the oral cavity (Figure 5), where various factors were evaluated, including speech, overbite, and overjet, and the functional positions in laterality and propulsion (Figure 6), as well as the appearance and functionality in maximum intercuspation. Additionally, axial inclination, closure of the diastemata, alignment with the incisal plane and smile line, and restoration of the vestibular curvature were thoroughly assessed.

Figure 5: Functional testing of the mock-up – anterior plan.

Figure 6: Functional testing of the mock-up in edge-to-edge position – propulsion.

After analyzing all of these details, the patient consent to proceed with the intervention. In the tooth surface preparation stage, the classical preparation technique with a juxtagingival bevel was chosen (Figure 7). Retraction cords were placed in the gingival sulcus. Following the classical preparation technique, the interdental contact point was preserved at the distal surface of tooth 1.1, and the proximal surfaces were prepared where necessary.

Figure 7: Preparation stage – frontal view.

The preparations were finished using fine and extra-fine grit diamond cylindrical burs with rounded tips, as well as coarse and extra-coarse burs. After completing and verifying the preparation with the aid of a silicon index, we decided to proceed with the fabrication of provisional restorations. For this purpose, the external mold and the Scutan technique were employed to fabricate the provisional restorations in the office (Figure 8). A light-curing composite resin was added inside the external mold and applied to the prosthetic field, and once the resin had set, it was carefully removed to avoid any fractures.

Figure 8: Provisional veneers.

For the fabrication of the final restorations, a two-step impression was taken in a single phase, using polyether (Impregnum 3M) as the impression material (Figure 9), and the occlusal relationship in maximum intercuspation was recorded with Virtual CAD Bite Registration(IVOCLAR VIVADENT). It is important to note that the gingival retraction cord was not removed from the impression during this step. The impression, along with the antagonist model, was sent to the dental laboratory for the fabrication of all-ceramic veneers using IPS e.max Press (IVOCLAR VIVADENT). Subsequently, the veneers were temporarily cemented until the next clinical session.

Figure 9: Polyether impression – two phase, single-step technique.

In the dental laboratory, models were cast from extra-durable gypsum with removable stumps, on which veneers were made using IPS e.max Press ceramic with lithium disilicate. The intraoral trial of the veneers revealed no adaptation issues, and the patient was satisfied with the aesthetic results obtained. Consequently, the adhesive cementation of the veneers was performed using Variolink (IVOCLAR VIVADENT) (Figure 10, 11). The patient was instructed on new hygiene protocols, which included brushing at least twice a day, as well as rinsing with a mouthwash based on chlorhexidine. Additionally, the patient was advised to use auxiliary cleaning methods such as an oral irrigator and dental floss, which should be used correctly to effectively clean the interdental spaces. A follow-up appointment was scheduled for 7-10 days after cementation. During this visit, the interdental spaces and gingival sulcus should be carefully examined for any residual cement, as well as the patient's oral hygiene, including the presence or absence of bacterial plaque. Subsequently, the patient was scheduled for periodic follow-ups every six months.

Figure 10: Final appearance, post-cementation – frontal view.

Figure 11: Final appearance, post-cementation – incisal view.

Clinical Case 2

A 28-year-old male patient presented to the dental clinic seeking aesthetic rehabilitation of the maxillary anterior segment and closure of the diastema and tremata (Figure 12). Orthodontic treatment was proposed as the optimal approach for closing these interdental spaces; however, the patient declined this treatment option. During the anamnesis, the patient reported the presence of the diastema and tremata since childhood. Additionally, clinical examination revealed satisfactory oral hygiene, despite the patient being a smoker.

Figure 12: Initial appearance in maximum intercuspation – frontal view.

The clinical examination revealed the absence of carious lesions and restorations in the maxillary anterior segment, the preservation of the vertical dimension of occlusion, and stable occlusion in maximum intercuspation. Additionally, a premature contact was observed in an edge-to-edge position at the level of tooth 2.1, along with a slight deviation of the maxillary midline towards the right. The occlusal examination continued with the analysis of lateral guidance. On the right side, the guidance was anterolateral, involving the maxillary canine, lateral incisor, and

first premolar in guidance with their corresponding mandibular antagonists (Figure 13). The lateral movement on the left side was guided by the canine. In the edge-to-edge position during lateral excursion, a premature contact was observed between teeth 2.2 and 3.2 (Figure 14). The proposed treatment plan included six veneers to solve all the problems and the patient signed an informed consent approving it and also the publishing of all case details and accompanying photos.

Figure 13: Edge-to-edge in right-side laterality, lateral view.

Figure 14: Edge-to-edge in left-side laterality, lateral view.

The aesthetic analysis revealed a medium smile line, with no exposure of the gingival zenith but with visible interdental papilla tips. The maxillary central incisors exhibited a rectangular shape, and an asymmetry was observed between the incisors and the canine on the right side compared to those on the left side, along with a discrepancy in the incisal curvature. Additionally, teeth 1.1 and 2.1 were positioned palatally relative to teeth 2.2 and 2.3, which were slightly positioned vestibularly, leading to a noticeable alteration in the vestibular curvature in this region. The patient expressed a desire to maintain the rectangular shape of the maxillary central incisors, achieve symmetry between the incisors and canine on the right and left sides, and establish an incisal curvature aligned with the smile line, ensuring it remains parallel to the lower lip line during smiling. The clinical examination findings, along with the patient's aesthetic preferences, were communicated to the dental technician for the fabrication of the wax-up. Impressions of both dental arches were taken using alginate, and the intermaxillary occlusal relationships were recorded with a facebow to allow for the mounting of the models in the articulator. The wax-up was utilized to analyze the compatibility between the aesthetic appearance of the future restorations, their functionality, and the patient's desires (Figure 15).

Figure 15: Wax-up – anterior view.

The clinical stage of the mock-up followed (Figure 16), during which the diagnostic modeling was transferred to the oral cavity for testing of functional, phonetic, and aesthetic aspects. By elongating the frontal group, multiple and stable contacts were achieved in the edge-to-edge position during protrusion, resulting in a functional occlusion. The aesthetic examination revealed the preservation of the rectangular shape of the maxillary central incisors (as per the patient's request), repositioning of the maxillary interincisal line, which now aligns with the facial midline, the appearance of the smile line in relation to the lower lip, as well as the closure of the diastema and the spaces between the teeth. From a functional perspective, it is crucial to assess the phonation through specific tests, as well as the intermaxillary occlusal relationships (in maximum intercuspation, lateral excursion, and protrusion).

The treatment plan involved the fabrication of ceramic veneers. For the preparation stage of the dental surfaces, retraction cords were placed in the gingival sulcus, and the classical technique of

Figure 16: Mock-up- frontal view.

preparation with a juxtagingival margin was chosen (Figure 17). This approach included preserving the existing contact points and fully preparing the proximal surfaces from the embrasure. Shaping these proximal surfaces was necessary to modify the gingival emergence profile, allowing the dental technician to close the interproximal spaces. At the incisal margin, a palatal bevel preparation was performed to achieve the highest possible strength for the veneers (Figure 18). This preparation had to be finished with a well-defined angle relative to the palatal surface and a rounded angle relative to the vestibular surface. Additionally, the preparation margin had to be at least 0.5 mm from the occlusal stop of Class II. Finally, the preparations were finished using fine and extra-fine cylindrical diamond burs with rounded tips, as well as rubber points and extra-hard polishing burs. After the preparations were completed and finished, the impression stage followed, using flowable and putty consistency polyether impression materials (Impregum 3M ESPE) in a single step to avoid further material contractions.

Figure 17: Vestibular preparations.

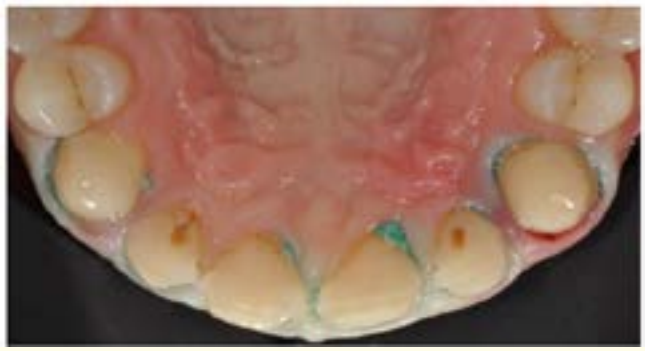

Figure 18: Incisal preparations.

After the completion and finishing of the preparations, the impression stage followed, using polyether materials with both putty and light-body consistency (Impregum 3M ESPE) in a single step to avoid additional material contractions (Figure 19).

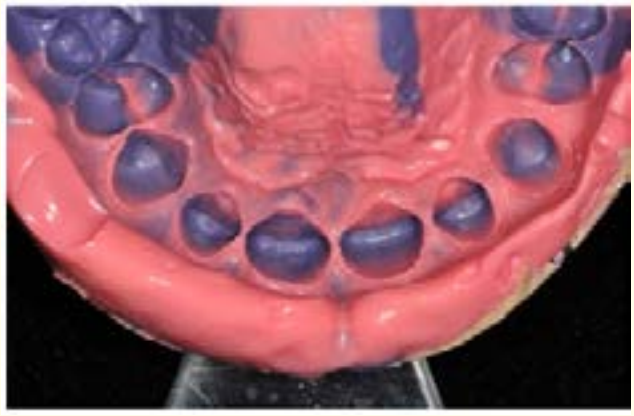

Figure 19: The impression.

The IPS e.max Press (IVOCLAR VIVADENT) full-ceramic veneers were sent to the dental office for try-in and cementation. During the intraoral try-in, no adaptation issues were detected at the preparation level, and the patient was very satisfied with their aesthetic appearance, which led to the decision for final cementation of the veneers (Figure 20, 21).

Figure 20: Final appearance, frontal view.

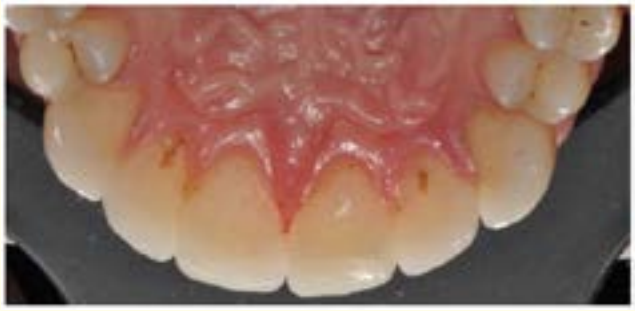

Figure 21: Final appearance, incisal view.

The patient was instructed on hygiene guidelines, including brushing at least twice a day, rinsing with chlorhexidine-based mouthwashes, and using additional hygiene tools such as dental floss and an oral irrigator. The patient was scheduled for a follow-up appointment 7-10 days after cementation. During this check-up, the level of bacterial plaque was assessed, as well as the adherence to the new hygiene guidelines. Additionally, any remaining cement at the level of the sulcus was checked. Finally, the patient was advised to undergo periodic check-ups every 6 months as part of their follow-up care.

Discussion

Aesthetic restorations such as veneers, as presented in our study, have become a pivotal solution in modern cosmetic dentistry, offering patients the opportunity to significantly enhance their smile with minimal invasiveness [28,29]. Ceramic veneers, especially those made from materials like IPS e.max Press, are widely recognized for their ability to replicate the natural appearance of teeth, providing not only superior strength and durability but also exceptional aesthetic results [30]. The demand for such restorations has increased dramatically in recent years, driven by patients' desires for beautiful, functional, and long-lasting outcomes. However, achieving predictable and successful results with ceramic veneers requires meticulous planning and the careful execution of various steps, underscoring the importance of pre-visualization techniques such as wax-up and mock-up [31].

These simulation methods play a crucial role in the treatment planning process, allowing both the clinician and the patient to visualize the expected results before proceeding with irreversible procedures. In our study, the application of diagnostic modelling through the wax-up and mock-up techniques was shown to significantly enhance communication between the dental team and the patient while ensuring that the final restoration aligns with the patient's aesthetic goals and functional needs [32].

The wax-up technique involves creating a model of the teeth using dental wax, which represents the planned restoration. This model acts as a blueprint for the final result. Once the wax-up is completed, a mock-up is fabricated, often directly in the patient's mouth, which allows both the dentist and the patient to evaluate the proposed aesthetic changes. This mock-up serves as a tangible preview of the final restoration and gives the patient the opportunity to assess the look and feel of their future smile before committing to any permanent alterations. The mock-up process facilitates real-time adjustments based on the patient's preferences, ensuring that their vision for their smile is realized [33,34].

The wax-up and mock-up techniques also serve as vital communication tools between the dentist and the dental technician. By providing a detailed, three-dimensional representation of the desired outcome, these models help guide the technician in fabricating restorations that meet both aesthetic and functional expectations. This collaborative approach minimizes miscommunication and ensures that the clinical and technical aspects of the treatment are in sync, resulting in more accurate and predictable outcomes [35].

The benefits of these techniques are not limited to improved communication. They also contribute to enhanced treatment predictability and a higher success rate in ceramic veneer treatments. By allowing both the patient and the clinician to preview the final results, the risk of dissatisfaction or failure is significantly reduced. Additionally, the mock-up serves as an

invaluable tool for assessing potential issues with occlusion or other functional considerations before the permanent restoration is placed [36,37].

In the context of minimally invasive procedures, such as the "no-prep" approach to ceramic veneers, where only minimal enamel reduction is required, the use of wax-up and mock-up techniques is especially valuable. These methods enable clinicians to carefully plan the restorations, ensuring they achieve the desired aesthetic outcome while preserving as much natural tooth structure as possible [38,39].

Conclusions

In modern prosthetic rehabilitation, pre-visualization techniques such as wax-up and mock-up play a crucial role in achieving predictable, functional, and aesthetically pleasing results. These techniques are not limited to ceramic veneers but extend to various other prosthetic treatments, including crowns, bridges, and full-mouth rehabilitations. By allowing for the visualization of proposed restorations before any irreversible procedures are carried out, these methods significantly enhance communication between the dental team and the patient.

In more complex cases, such as full-mouth rehabilitations, where multiple prosthetic units are required, the use of wax-up and mock-up techniques becomes even more invaluable. These methods allow for precise planning and provide a clear guide for both the clinician and the dental technician. The enhanced communication between the two ensures that the fabricated prostheses align accurately with the intended treatment, reducing the risk of errors and ensuring a higher success rate.

The benefits of these pre-visualization techniques extend beyond improved communication; they also contribute to increased patient satisfaction. Patients can visualize the expected outcome early in the treatment process, fostering confidence and trust in the clinician's abilities. Additionally, the ability to make adjustments based on patient feedback ensures that the final restoration is tailored to the patient's specific aesthetic goals and functional needs. Incorporating these techniques into daily clinical practice improves the predictability of various prosthetic rehabilitation procedures, and also improve overall patient acceptance and satisfaction, making these techniques essential tools in modern dental practice.

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