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Restoration of a Mesiolabial Rotated Maxillary Lateral Incisor with Layered Zirconia: A Conservative Esthetic Approach

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Abstract: Restoration of anterior teeth with compromised alignment presents both esthetic and functional challenges. This case report presents the rehabilitation of a Mesiolabial rotated maxillary lateral incisor using a layered zirconia crown, offering a conservative and highly esthetic solution. A 22-year-old female patient reported with a chief complaint of an unesthetic appearance due to a Mesiolabial rotated and Mesiolabial rotated maxillary left lateral incisor. Clinical examination revealed a significant labial tilt with mild rotation of the tooth. After careful evaluation, a minimally invasive crown preparation was performed without orthodontic correction, followed by the placement of a layered zirconia crown. The use of high-translucency zirconia ensured optimal shade matching, durability, and patient satisfaction. This case highlights the importance of material selection and precise clinical execution in achieving successful esthetic rehabilitation of malaligned anterior teeth

Keywords: *Mesiolabial Rotated Lateral Incisor, Layered Zirconia, Anterior Crown, Esthetic Rehabilitation, Conservative Preparation.*

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I. INTRODUCTION

Anterior teeth play a critical role in both dental esthetics and functional harmony. Any deviation in their position, angulation, or alignment can significantly impact a patient's smile, self-esteem, and masticatory efficiency. Among such challenges, the presence of a Mesiolabial rotated maxillary lateral incisor presents a unique clinical scenario, often requiring a multidisciplinary approach for correction (1,4).

Conventional treatment options include orthodontic realignment, composite bonding, or full-coverage crowns, each with specific limitations. In situations where orthodontic correction is declined or not feasible, conservative prosthetic restoration becomes a viable alternative (2,5).

The choice of restorative material plays a pivotal role in such cases. Layered zirconia has emerged as a popular material in restorative dentistry due to its superior mechanical strength, excellent biocompatibility, and enhanced translucency in newer formulations (3,6,7). Unlike layered ceramics, monolithic zirconia crowns eliminate the risk of chipping while offering a natural appearance, making them particularly suitable for anterior restorations (8,9).

This case report describes the management of a Mesiolabial rotated maxillary lateral incisor using a layered zirconia crown. It emphasizes a minimally invasive approach aimed at preserving tooth structure while achieving optimal esthetic and functional results (3,6,10).

II. CASE REPORT

A 22-year-old female patient presented to the Department of Prosthodontics with the chief complaint of an unesthetic appearance of the upper left front tooth. The patient expressed dissatisfaction with the alignment of his smile and reported feeling self-conscious in photographs and social interactions. He requested a treatment solution that would improve esthetics without undergoing prolonged

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orthodontic therapy. The patient was medically fit with no history of systemic illness or drug allergies. Dental history revealed a previous root canal treatment performed on the maxillary left lateral incisor (#22) approximately 1 months prior.

➢ *Clinical Examination:*

Intraoral examination revealed a Mesiolabial rotated maxillary left lateral incisor (#22). The crown was slightly shorter in height and projected labially in comparison to its contralateral counterpart (#12). The mesiodistal space available between the adjacent central incisor (#21) and canine (#23) was inadequate for standard restoration due to the tooth's angulated position and rotation.

The surrounding teeth were caries-free and displayed healthy periodontal status. The patient exhibited a normal overjet and overbite with Class I molar and canine relationships. The smile line was moderately high, requiring a restoration with superior esthetics.

➢ *Radiographic Findings:*

A periapical radiograph of tooth #22 showed satisfactory root canal obturation, with no signs of periapical pathology or root resorption. The bone support around the tooth was intact.

➢ *Diagnosis:*

- Labially Mesiolabial rotated maxillary left lateral incisor (#22)
- Inadequate mesiodistal space for crown restoration
- Previously root canal-treated tooth
- Esthetic concern due to malalignment and asymmetry

➢ *Treatment Considerations:*

The patient was presented with the option of orthodontic correction followed by restorative treatment; however, he declined due to time and cost constraints. After comprehensive evaluation and patient consent, the treatment plan included:

- Minor enamel slicing of the adjacent central incisor (#21) and canine (#23) to optimize space
- Conservative crown preparation of tooth #22, preserving maximum tooth structure
- Fabrication and placement of a layered zirconia crown to restore esthetics, function, and symmetry

III. TREATMENT PROCEDURE

➢ *Tooth Preparation:*

The maxillary left lateral incisor (#22), which had undergone prior root canal treatment, was selected for prosthetic rehabilitation due to its labial tilt and unaesthetic appearance.

Clinical examination revealed limited mesiodistal space between the central incisor (#21) and canine (#23), likely due to the mesial rotation and tilting of the lateral incisor. To optimize space for the final restoration and prevent overcontoured crown morphology, minimal proximal slicing of the adjacent teeth (#21 and #23) was performed conservatively using a diamond disk. Care was taken to remain within enamel limits.

A full-coverage crown preparation was performed on the lateral incisor, taking into account the angulation of the root canal-treated tooth:

- Incisal reduction: 1.5–2.0 mm
- Axial wall reduction: 1.2–1.5 mm
- Taper: 6–10° with a uniform path of insertion
- A deep chamfer finish line (1 mm) positioned slightly Supragingivally
- Conservative correction of the tilt to avoid unnecessary dentin removal and ensure long-term structural strength (2,5)

Gingival retraction was done using a size 000 braided cord impregnated with aluminum chloride for hemostasis and soft tissue management.

➢ *Impression and Temporization:*

Digital scanning was performed using a Prime intraoral scanner. A tooth coloured acrylic temporary crown was fabricated chairside and cemented using non-eugenol temporary cement. The patient was instructed to avoid sticky or hard foods until final crown delivery.

➢ *Laboratory Procedure:*

Based on the digital scans, a layered zirconia crown was designed and fabricated. A high-strength zirconia core was milled using CAD/CAM technology, and a feldspathic ceramic layering was added to replicate the natural translucency and surface texture of adjacent teeth (3,6,7). The crown was customized for incisal translucency, surface texture, and gingival contour harmony.

➢ *Try-In and Cementation:*

During the crown try-in, the framework fit, shade match, and esthetic contours were evaluated and found to be acceptable. The prepared tooth was cleaned with pumice and isolated. The crown was cemented using dual-cure self-adhesive resin cement, with gentle pressure maintained until initial set.

➢ *Post-Cementation Evaluation:*

After removing excess cement, occlusal contacts were assessed and adjusted in centric and lateral excursions. The final restoration demonstrated excellent shade blending, natural contours, and alignment. The patient expressed high satisfaction with the functional and esthetic result. Post-operative instructions were given, and the patient was recalled after 2 weeks and 3 months for follow-up assessments.

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Fig 1 Pre-Operative Intraoral Photograph (a) Frontal View (b) Occlusal view

Fig 2 After Tooth Preparation (a) Frontal View (b) Occlusal view

Fig 3 Temporization by using Tooth Coloured Acrylic

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Fig 4 After Cementation (a) Frontal View (b) Occlusal view

Fig 5 Post-Operative Facial Photograph

➢ *Follow-Up and Outcome*

The patient was recalled for evaluation at 2 weeks. At the 2-week recall, soft tissues appeared healthy with no signs of inflammation or trauma. The patient reported no discomfort or sensitivity. Functional assessments showed a stable occlusion in centric relation and smooth guidance during lateral and protrusive movements.The layered zirconia crown exhibited natural translucency, well-blended color match, and a lifelike incisal edge, making it indistinguishable from the surrounding dentition. The patient reported significant improvement in confidence and satisfaction with his smile.Radiographic evaluation confirmed continued periapical health of the root canal-treated tooth (#22) with no evidence of failure, root fracture, or bone loss. The restoration remained intact without any signs of chipping, debonding, or wear.

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IV. DISCUSSION

Restoring a mesiolabial rotated maxillary left lateral incisor tooth presents multiple clinical challenges, including compromised path of insertion, limited space, and the need for high esthetic outcomes. In this case, a labially Mesiolabial rotated , root canal-treated maxillary lateral incisor required prosthetic management in the absence of orthodontic intervention.

When space is limited due to tooth rotation or misalignment, conservative enamel slicing of adjacent teeth is a practical solution to create room for ideal prosthetic contours without compromising structural or periodontal health (1,2). This approach allowed for correction of spatial deficiency without over-reducing the Mesiolabial rotated tooth, which was already structurally compromised due to endodontic treatment.

The decision to use a layered zirconia crown was driven by the esthetic demands of the anterior maxilla. While monolithic zirconia offers strength and reduced chipping risk, layered zirconia provides superior optical properties, including enhanced translucency, opalescence, and enamel-like surface texture, making it more suitable for visible anterior restorations (3,4,6).

CAD/CAM-generated zirconia frameworks provide strength and dimensional accuracy, while the feldspathic ceramic layering enables natural characterization and custom shading. However, this system is technique-sensitive, and chipping of the veneering ceramic remains a known complication (7). In this case, the veneering ceramic remained intact during follow-up, supported by optimal occlusal design and protective guidance.

Proper tooth preparation, careful digital workflow, and cementation protocols contribute significantly to long-term success. Airborne-particle abrasion of the internal zirconia surface followed by adhesive cementation with resin cement ensures durable retention, especially on endodontically treated teeth where additional retention features may be limited (5,8).

This case demonstrates that, when executed carefully, layered zirconia crowns can offer exceptional esthetics and functional performance for malpositioned anterior teeth, particularly when orthodontic options are not viable.

V. CONCLUSION

Restoration of a Mesiolabial rotated , root canal-treated maxillary lateral incisor using a layered zirconia crown presents a conservative yet highly esthetic treatment option in cases where orthodontic correction is not preferred. This case highlights how strategic tooth preparation, minor proximal enamel slicing, and the use of modern zirconia-based materials can harmonize function, esthetics, and longevity in complex anterior restorations. With appropriate material selection and meticulous clinical execution, layered zirconia crowns can successfully rehabilitate compromised teeth while meeting patient expectations for natural-looking outcomes.

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