CASE REPORT

"Targetting the laterals"; conservative management of tooth agenesis and peg-shaped lateral incisor by minimally invasive composite restoration: A case report

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Abstract

Maxillary lateral incisors are the most vulnerable teeth to developmental dental anomalies. These teeth are often subjected to atypical, malformative defects with a prevalence of 1.6% to 4.9%. These defects may affect the tooth's size, structure or development. Peg-shaped lateral incisors, a microdont, are a commonly encountered defect in size. Tooth agenesis, a formative developmental defect, is characterized by the failure in the formation of tooth germ. Being in a strategic position in the aesthetic zone, maxillary lateral incisors, when affected by either microdontia or tooth agenesis, can have a profound impact on dento-facial aesthetics and the self-esteem of the affected individual. Management of these dental defects by a conservative approach is the fundamental goal of minimally invasive dentistry. This case report presents a 15-year-old boy who visited the outpatient department seeking aesthetic treatment for anomalous teeth. The patient was successfully managed with a conservative approach using direct composite restorative build-up.

Keywords: Tooth agenesis; Composite resins; Aesthetics; Hypodontia; Peg Laterals.

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Introduction

Maxillary Lateral Incisors, an integrant member of dento-facial aesthetics, are the most customarily endangered teeth to anomalous presentation. These defects are categorized into: morphological, dimensional, and formative defects. Morphological defects involve abnormal variations in tooth shape, while dimensional defects refer to unusual changes in tooth size. The most common example of a structural-dimensional defect in a maxillary lateral incisor is a peg-shaped tooth.[1]

Peg-shaped laterals are distinguished by a reduction in the mesiodistal dimensions of the tooth in the incisal portion compared to the cervical part of the tooth.

This anomaly significantly affects dental aesthetics and is often associated with midline diastema and maxillary skeletal deformities. Microdontia refers to a condition in which the clinical crown is smaller than normal. A peg-lateral is a common example of isolated, non-syndromic form of microdontia. These teeth can present in a wide range of clinical presentations; they can be unilateral or bilateral, may or may not be coexistent with small size roots. However, a small clinical crown is a perpetual presentation in all such cases.[2,3]

Tooth agenesis, a developmental malfunctioning, is designated as the failure in the formation of tooth germ. It is categorized into two types: anodontia and partial anodontia. Anodontia is the complete deprivation of tooth development. However, partial anodontia is further categorized into two sub-types: hypodontia (congenital non-existence of less than six teeth) and oligodontia (congenital deprivation of six or more teeth). Hypodontia is the most common form of tooth agenesis, with a prevalence varying between 2.8% to 11.3%. According to a survey conducted on the Pakistani population, the most commonly affected tooth in hypodontia is the maxillary lateral incisor.[4,5]

These developmental anomalies require a patient-centered multidisciplinary approach. The ideal treatment plan is one that is both conservative and effective in meeting the patient's functional and aesthetic needs. This case report focuses on a conservative approach to improving dental aesthetics in a teenage boy.

Case Report

A 15-year-old male patient, reported to the Outpatient Department of Operative Dentistry and Endodontics, School of Dentistry, Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad on July 15, 2024 with the complaint of small, conical-shaped anterior two teeth along with spacing in between the front teeth. A thorough medical and dental history was carefully recorded. On intra-oral examination, the right maxillary lateral incisor was peg-shaped, the left-sided maxillary lateral incisor was missing

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with an over-retained deciduous lateral incisor. A 1.5 mm maxillary midline diastema was present between the two central incisor teeth. The over-retained deciduous tooth was non-mobile. The right-sided maxillary canine, first premolar, and second premolar teeth were in infra-occlusion. All the concerned teeth depicted normal response to pulp sensibility testing. There was Angle Class II malocclusion. Additionally, he was identified as a high-caries risk patient with multiple cavitated carious lesions (Figure 1). On radiographic examination, the permanent maxillary left lateral incisor was congenitally missing.

The patient was very dissatisfied with the unaesthetic appearance of his teeth. The patient was counselled regarding the existing dental malformation, its preferred treatment option, alternative strategies, along with the pros and cons of every option. The treatment plan was devised by considering the patient's priority, age, and aesthetic expectations. A patient-oriented treatment plan was made in conformance with the fundamentals of conservative dentistry. Since peg-shaped lateral, over-retained deciduous tooth, and midline diastema were the prime concern of the patient, it was decided to restore the affected teeth to their normal contour using direct light-cured composite restorative buildup. To address the malocclusion, fixed orthodontic treatment was advised but the patient was unwilling to pursue for a prolonged treatment plan, and preferred an immediate aesthetic solution. Parental consent was obtained. Afterwards, the restorative treatment plan was initiated.

In order to educate the patient about the projected treatment outcome, a wax-up of the pre-operative diagnostic cast was done. A silicone index was fabricated from the waxed-up cast. The procedure was carried out under rubber dam isolation using a Split-dam technique.

Figure-1: Pre-operative photographs of the patient depicting Right-sided Peg-shaped tooth, Mid-line diastema, and Left-sided over-retained deciduous lateral incisor tooth A) Maxillary Frontal view B) Right Buccal view C) Left Buccal view D) Maxillary Occlusal view.

Figure-2: The aesthetic smile makeover A) Panoramic Radiograph depicting the right-sided peg-shaped lateral incisor tooth and missing left-sided lateral incisor B) Pre-operative wax-up of diagnostic cast C) Rubber dam isolation using Split dam technique D) Silicone index fabricated from wax-up cast E) Palatal shelf made of light-cure composite for lateral incisors build-up F) Post-operative photograph of the patient depicting closure of midline diastema and anatomical re-contouring of lateral incisors by direct composite restoration.

The concerned teeth were prepared and an etch-and-rinse adhesive protocol was applied using 35% Phosphoric acid 35% (Etchant gel S Coltene, Switzerland) followed by rinsing and air drying of the concerned teeth. Afterwards, the etched surfaces of the involved teeth were rigorously coated with an adhesive (One Coat Bond SL Coltene, Switzerland) for 20 seconds. This adhesive coating was light-cured using an LED curing light (Woodpecker DTE LUX E Plus, Woodpecker, China) for 40 seconds. The palatal surfaces of the involved teeth were formed using light-cure composite resin (Brilliant NG Universal Nano Composite Coltene, Switzerland) by utilizing the silicone index followed by light curing for 40 seconds. Afterwards, the proximal walls were made and the successive composite placement was done by layering technique. The finishing and polishing steps were performed on the restored teeth. The patient was extremely satisfied by the final aesthetic outcome (Figure 2). He was advised post-restorative instructions and a maintenance recall after every 6-months interval.

Discussion

Tooth agenesis is a prevailing dento-facial anomaly involving both the deciduous and permanent dentition. It may present clinically as an isolated condition or in association with genetic syndrome/diseases like Cleft lip/palate, Down syndrome, Van der Woude syndrome, Ectodermal dysplasia, and Witkop syndrome. The non-syndromic, isolated trait is chiefly accredited to mutations in genes responsible for dental development such as PAX9, MSX1, and AXIN2 genes. Studies have highlighted that the genetic mechanism responsible for agenesis of the maxillary permanent lateral incisors is also associated with the development of peg-shaped laterals. Numerous studies have strongly validated that microdontia is a variable expression of the similar developmental disruption that results in dental agenesis.[6-8]

In this particular case, a direct composite build-up was opted as a preferred treatment option. In another case report, a retained deciduous canine was reshaped using a semidirect composite resin technique, with successful results at 18-months follow-up.[9] Since the left permanent lateral incisor was congenitally missing and the over-retained primary tooth was clinically sound, non-carious, and non-mobile, it was decided to retain and restore it. The alternative option was to extract the deciduous and peg-shaped tooth, followed by prosthetic replacement with a resin-retained fixed dental prosthesis.[10] However, this approach was more invasive. Additionally, extracting teeth would affect the alveolar ridge, thus complicating future implant placement in adulthood. The critical reasoning behind restoring the deciduous tooth to normal anatomical contour of permanent lateral incisor was to preserve the alveolar ridge height, width and contour.[11] In case if the primary tooth becomes mobile later or if the patient willingly opts for a definite restorative option in adulthood, the preserved ridge can serve as a potential site for future implant placement. A similar strategy has been employed for managing infraoccluded primary molars associated with agenesis of premolars.[12]

During the treatment planning phase, it is crucial to consider the patient's preferences, goals, and expectations from the outset. The patient should play a key role in the decision-making process, especially in aesthetic makeover.[13] In this case, the patient was only concerned about the anterior smile reconstruction. Additionally, the patient was at high-caries risk, so all carious teeth were treated using caries-control restorations. The mandibular right and left first molars were grossly carious, non-responsive to sensibility testing, and showed periapical lesions on radiographic examination. Hence, endodontic treatment was performed on these teeth on priority basis. Although malocclusion was not a concern for the patient, orthodontic treatment options were still discussed.

The primary goal of restorative dentistry is to choose the most conservative plan to achieve the desired aesthetics for the patient. Dental malformations such as these require timely diagnosis and intervention to prevent aesthetic, psychological, and functional complications.

Conclusion

Developmental dental anomalies require a patient-centred treatment strategy. Prompt diagnosis and early intervention are essential to restore both aesthetics and functionality of the patient. Treatment planning should prioritize the most conservative options to achieve optimal aesthetic outcomes. When reconstructing smiles, it is vital to actively involve patients in the decision-making process to ensure that their expectations are met with maximum satisfaction.

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