

Restorative Management of a Pediatric Patient with Vitamin D–Resistant Rickets and Arrested Caries: A Case Report

Dr. Asha Rani¹, Dr. Ritu Namdev², Dr. Arun Kumar³, Dr. Ruchi Singhal⁴

¹BDS, MDS Ex PG Student, Department of Pedodontics Post Graduate Institute of Dental Sciences,
Rohtak, Haryana, India

²BDS, MDS Senior Professor and Head, Department of Pedodontics Post Graduate Institute of Dental Sciences,
Rohtak, Haryana, India

³BDS, MDS Professor, Department of Pedodontics Post Graduate Institute of Dental Sciences, Rohtak, Haryana, India

⁴BDS, MDS Associate Professor, Department of Pedodontics Post Graduate Institute of Dental Sciences,
Rohtak, Haryana, India

ABSTRACT

Children with vitamin D–resistant rickets (VDRR) frequently present with defective mineralization of dentin and enamel, predisposing them to extensive tooth structure loss and arrested carious lesions. The dental management of such cases poses restorative and behavioral challenges because of the increased brittleness of teeth and high caries susceptibility. This case report describes the conservative restorative management of a 7-year-old patient diagnosed with vitamin D–resistant rickets presenting with arrested caries and extensive coronal destruction without pulpal involvement. Multiple teeth (53, 54, 55, 16, 62, 63, 64, 65, 26, 74, 75, 84, and 85) showed loss of crown structure and dark brown discolorations. No tooth exhibited pain, swelling, sinus tract, or tenderness on percussion. Radiographic examination confirmed multiple hypomineralized teeth with intact periapical structures. Caries excavation revealed hard, arrested lesions with no pulp exposure. Each affected tooth underwent conservative caries removal and crown build-up using composite resin restorations to restore function and esthetics. Early, minimally invasive composite rehabilitation of teeth in children with VDRR can restore form and function while preserving vitality. Regular recall and fluoride maintenance are essential to ensure long-term success.

INTRODUCTION

Vitamin D–resistant rickets (VDRR), also known as hereditary hypophosphatemic rickets, is a rare genetic disorder characterized by defective phosphate reabsorption in the renal tubules leading to hypophosphatemia and defective bone and dentin mineralization (1,2). The dental findings associated with this condition include enlarged pulp chambers, defective dentin, thin enamel, spontaneous dental abscesses, and multiple noncarious pulpal exposures (3,4). These manifestations often require multidisciplinary management combining pediatric dentistry, prosthodontics, and endocrinology.

Children with VDRR may present with extensive tooth destruction even in the absence of active caries. Due to the poor mineralization of dentin, teeth become susceptible to rapid wear and fracture. Arrested caries, hard, glossy lesions, are also common due to altered enamel permeability and chronic systemic changes (5). Preventive strategies and conservative restorative management play a critical role in preserving the dentition during growth.

This report presents a case of a 7-year-old patient with VDRR who exhibited multiple arrested carious lesions involving both arches. The patient was managed successfully by composite resin crown build-ups to restore occlusion and esthetics without pulp involvement.

CASE REPORT

Patient Information

A 7-year-old female patient with a known history of vitamin D–resistant rickets reported to the Department of Pediatric and Preventive Dentistry with the chief complaint of multiple discolored and broken teeth. The patient's medical history revealed long-term management by a pediatric endocrinologist with phosphate and vitamin D analog supplementation. There was no history of pain, swelling, or discharge from any tooth.

Clinical Examination

Intraoral findings (Figures 1 and 2) showed extensive loss of crown structure in multiple deciduous and permanent teeth:

53, 54, 55, 16, 62, 63, 64, 65, 26, 74, 75, 84, and 85.

Lesions were dark brown, hard on probing, and non-tender, consistent with arrested caries. The surrounding mucosa was healthy. None of the teeth showed mobility or signs of periapical infection. Tenderness on percussion (TOP) was negative in all affected teeth.



Figure 1: Preoperative intraoral maxillary occlusal view showing extensive crown destruction due to arrested caries.



Figure 2: Preoperative mandibular occlusal view.

Radiographic findings:

A preoperative orthopantomogram (Figure 3) revealed multiple radiolucent areas involving enamel and dentin without pulpal communication. The developing permanent tooth buds appeared normal. No periapical radiolucencies were noted.



Figure 3: Preoperative orthopantomogram showing multiple hypomineralized teeth with intact periapical structures.

Diagnosis

- Systemic diagnosis: Vitamin D-resistant rickets (confirmed medically).
- Dental diagnosis: Multiple arrested caries with post-carious structural loss without pulpal involvement.

Treatment Plan

The objective was to restore the lost tooth structure conservatively and maintain vitality. The treatment plan included:

1. Selective caries removal limited to soft dentin.
2. Isolation using cotton rolls and high-volume suction (rubber dam isolation was avoided due to multiple teeth involvement).
3. Etching, bonding, and composite resin build-ups to restore occlusal anatomy and maintain vertical dimension.
4. Occlusal adjustments and finishing.
5. Oral hygiene reinforcement and fluoride varnish application.
6. Regular follow-up every 3 months.

TREATMENT PROCEDURE

After obtaining informed consent from the parent, caries excavation was performed using a slow-speed round bur. All cavities revealed hard dentin floors and intact pulp chambers. As no pulp exposure occurred, no pulpotomy or pulp therapy was required. Teeth were conditioned with 37% phosphoric acid for 15 seconds, followed by application of a bonding agent (5th generation). Incremental composite resin build-up was done to restore crown form in all affected teeth.

Finishing and polishing were completed using fine-grit diamond burs and polishing discs. Figure 4 shows the postoperative views, demonstrating satisfactory anatomic contour, occlusal harmony, and esthetic improvement.



Figure 4: Postoperative intraoral views showing successful composite crown build-ups.

Follow-Up and Outcome

At the 3-month and 6-month follow-up visits, all restorations were intact with good marginal adaptation and no secondary caries or sensitivity. The patient demonstrated improved mastication and oral hygiene. Regular fluoride varnish application and dietary counseling were continued to prevent recurrence.

DISCUSSION

Vitamin D-resistant rickets (VDRR) has significant oral implications due to defective dentin mineralization and enlarged pulp chambers, which increase the risk of pulpal involvement even in noncarious teeth (6,7). However, in the present case, despite extensive tooth structure loss, no pulpal exposure occurred. This suggests that the lesions were arrested and that conservative management was appropriate.

The management objectives in VDRR include preservation of tooth vitality, prevention of infection, and restoration of function (8). Literature reports emphasize early diagnosis and preventive management using topical fluorides, dietary control, and minimally invasive restorations (9,10). In this patient, composite resin restorations were chosen for their superior esthetics, adhesion to enamel and dentin, and ability to provide full coronal reconstruction without aggressive tooth preparation.

Arrested caries are characterized by a hard, smooth, and dark surface, indicating remineralization and inactivity (11). Removing only softened dentin helps maintain pulp health and conserve tooth structure (12). The absence of tenderness and radiographic pathology confirmed the lack of pulpal inflammation, allowing a purely restorative approach.

The use of composite resin in hypomineralized teeth has been documented to provide acceptable results when appropriate etching and bonding protocols are followed (13). Periodic review remains essential, as these children are susceptible to recurrent caries and developmental enamel defects in permanent teeth (14).

CONCLUSION

Children with systemic conditions like vitamin D-resistant rickets require careful, conservative dental management tailored to their altered tooth structure. In this case, early restorative intervention with composite build-ups preserved tooth vitality, restored function and esthetics, and enhanced quality of life. Long-term preventive care and interdisciplinary follow-up are vital to maintain oral health in such patients.

This case demonstrates that even in systemic mineralization disorders, teeth exhibiting arrested caries without pulp involvement can be successfully managed using direct composite restorations. Such conservative management avoids unnecessary endodontic procedures and supports long-term oral function.

REFERENCES

- [1]. Batra P, Duggal R, Kharbanda OP. Dental findings in vitamin D-resistant rickets: report of two cases. *ASDC J Dent Child*. 2006;73(3):239-244.
- [2]. Seow WK. Effects of pre- and postnatal dietary and environmental conditions on dental development and caries susceptibility. *Aust Dent J*. 2012;57(1):11-25.
- [3]. Alon U, Friedman J. Hypophosphatemic rickets: the molecular basis. *Front Biosci*. 2000;5:D506-D517.
- [4]. Watanabe K, Higuchi Y, Nakano Y. Dental manifestations in X-linked hypophosphatemic rickets: histopathological and microradiographic findings. *Oral Surg Oral Med Oral Pathol*. 1984;57(3):290-295.
- [5]. Seow WK. Enamel hypoplasia in the primary dentition: a review. *J Dent Child*. 1991;58(6):441-452.
- [6]. Goodman JR, Gelbier MJ, Bennett JH, Winter GB. Dental problems associated with hypophosphatemic vitamin D-resistant rickets. *Int J Paediatr Dent*. 1998;8(1):19-28.
- [7]. Schwartz O, Rasmussen P. Dental findings in vitamin D-resistant rickets and osteomalacia. *Scand J Dent Res*. 1980;88(2):138-148.
- [8]. Pereira CM, Gomes JP, Costa LR. Management of dental abscess in a child with vitamin D-resistant rickets. *J Clin Pediatr Dent*. 2004;28(4):337-340.
- [9]. Seow WK, Romaniuk K, Slavos S. Micromorphological and chemical analysis of dentin defects in vitamin D-resistant rickets. *Arch Oral Biol*. 1989;34(10):853-862.
- [10]. Hartsfield JK Jr. Pathophysiology of hypophosphatemic rickets: a review for the dental practitioner. *Pediatr Dent*. 1990;12(4):234-237.
- [11]. Featherstone JD. The continuum of dental caries—evidence for a dynamic disease process. *J Dent Res*. 2004;83 Spec No C:C39-C42.
- [12]. Kidd EA. How 'clean' must a cavity be before restoration? *Caries Res*. 2004;38(3):305-313.
- [13]. Welbury RR, Duggal MS, Hosey MT. *Paediatric Dentistry*. 5th ed. Oxford: Oxford University Press; 2018.
- [14]. Becker A, Shapira J. Hypophosphatemic vitamin D-resistant rickets: dental findings and management. *J Clin Pediatr Dent*. 1982;6(4):281-284.