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Dentine Dysplasia Type I: A Case of Rootless Teeth Treated with Extraction and Immediate Implant Placement

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ABSTRACT

Dentine Dysplasia is a rare genetic dental condition characterized by abnormal dentine development with distinctive alterations in pulp and root structure. This case highlights the potential challenges in diagnosis and management. This report demonstrates a previously undiagnosed, rare case of Dentine Dysplasia Type I in a 24-year-old female presenting with upper tooth severe mobility. Radiographic evaluation revealed altered tooth morphology, complete pulpal obliteration, and periapical radiolucency. Treatment involved tooth extraction, periapical lesion curettage, immediate implant placement, and prosthetic rehabilitation. This case highlights the effective use of dental implants in managing Dentine Dysplasia Type I via advanced imaging techniques and a tailored prosthetic approach. The importance of early diagnosis and regular checkups in the management and conservation of oral health is emphasized in such cases.

Keywords: Dentine dysplasia, Dental implants, Rootless teeth, Pulpal obliteration, Dental anomaly, Atypical dentin.

1. Introduction

Dentine dysplasia (DD) is a rare genetic dental condition characterized by abnormal dentine development, while enamel remains normal (1). It is primarily classified into two distinct forms: type I (radicular DD), which affects the roots of the teeth, and type II (coronal DD), which primarily involves abnormalities in the crowns. DD is most commonly inherited through autosomal dominant transmission and affects both primary and permanent teeth, leading to various dental complications that often require specialized management (2).

Type I DD, typically presents with normal crowns, but short, blunted, or even absent roots. Radiographically, affected teeth often show obliteration of pulp chambers and root canals, sometimes with crescent-shaped remnants of pulp tissue near the

cemento-enamel junction. These dental anomalies commonly result in increased tooth mobility and spontaneous abscesses, occurring without any history of cavities or trauma (3). In primary teeth, the roots may appear as thin spicules. Early diagnosis and treatment are crucial for preserving dental function and preventing complications (4).

Diagnosis of DD is primarily based on clinical and radiographic evaluation. Genetic testing can provide confirmation, particularly in cases with a suspected familial pattern (4). Due to the normal appearance of tooth crowns, DD is sometimes misdiagnosed or diagnosed late, which can lead to inappropriate treatments that fail to address the underlying condition (2). Recent advances in dental imaging and genetic testing have significantly enhanced the ability to diagnose and manage this condition more effectively (5).

This case report describes the clinical presentation, diagnosis, and successful management of dentine dysplasia type I in a 24-year-old female patient. Radiographic assessment unveiled a characteristic feature of dentine dysplasia Type I (DD1), after six months, the patient demonstrated improved oral health-related quality of life with stabilized implant-supported prostheses providing functional and esthetic benefits. This emphasizes the importance of early diagnosis and intervention in managing DD1, underscoring the effectiveness of a multidisciplinary approach in enhancing oral function and esthetics.

2. Case Report

A 24-year-old Jordanian female patient presented with mobility in upper first premolars. Her main complaint was this persistent tooth mobility which kept on getting worse for a couple of years, despite attending many dental appointments and seeking specialist periodontal consultations regularly, which mostly involved regular scaling or some irrelevant blood testing, with no clear diagnosis nor proper solution for

the issue, which left her feeling hopeless and tired mentally and physically. Clinical examination revealed a straight facial profile and well-formed lips. Intraoral assessment showed a normal crown and gingival appearance, along with generalized white spots on the incisal third of the crowns (Figures 1 and 2). There were no signs of gingivitis nor periodontitis and the patient had good oral hygiene. Radiographic evaluation which included periapical x-rays and (cone beam computed tomography (CBCT) CS 8200 3D's advance edition) showed variation in tooth size and shape, as well as pulp chamber obliteration and periapical radiolucency. First premolars had the shortest roots in both arches with the largest periapical radiolucency present around the root of the upper right premolar which explains the patient's chief complaint, most teeth present shorter than normal roots and some degree of pulp obliteration (Figures 3,4 and 5). The upper right and left first premolars exhibited grade III mobility. Mild misalignment was noted in the upper anterior teeth, and the patient had a thin gingival biotype. No congenitally missing teeth were observed.



Figure 1: Extraoral view showing normal malaligned teeth



Figure 2: Lateral extraoral photograph



Figure 3: Periapical x-ray of the mobile upper right first premolar showing altered tooth proportions, obliteration of pulp chamber and periapical radiolucency

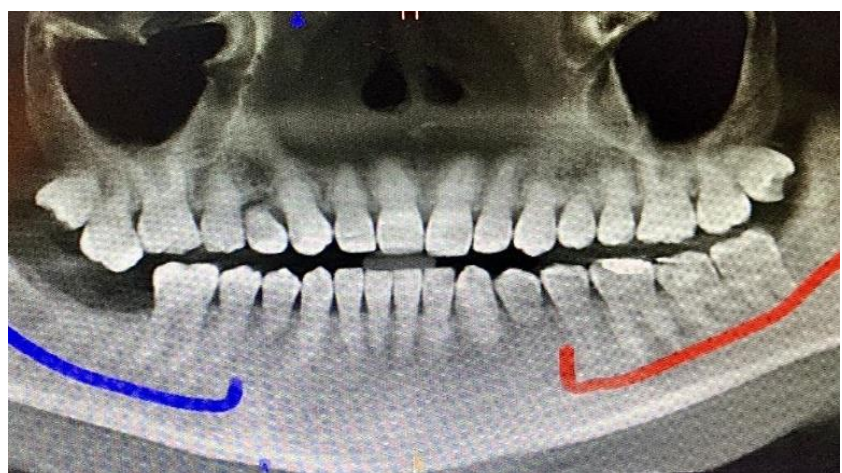


Figure 4: Panoramic x-ray taken from CBCT showing multiple teeth with extremely short roots indicating DD I

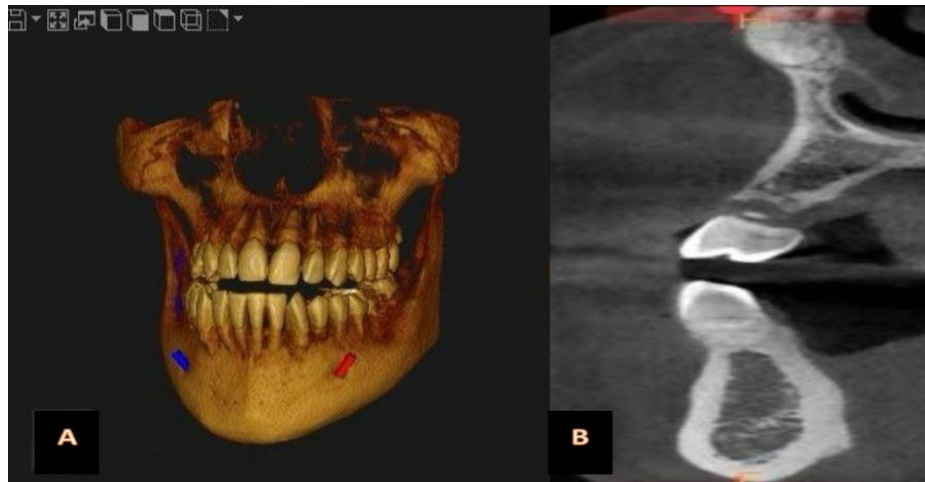


Figure 5: CBCT dental image section showing: A: 3d construction of the patient maxilla and mandible, B: assessment of the upper right premolar bone

Similar findings were observed in other teeth throughout the maxillary and mandibular arches. Based on these clinical and radiographic observations, the patient was conclusively diagnosed with dentine dysplasia type I.

The treatment plan was discussed with the patient and involved extraction of the mobile teeth, followed by immediate implant placement in the extraction sockets of upper right and left first premolars with regular follow up appointments for the assessment of the implants and the remaining affected teeth. The patient consented to the proposed treatment. Initially, CBCT scan confirmed enough bone thickness to support dental implants (Figure 5). There was no need for bone grafts, unlike the case with other case reports. The procedure was performed under local anesthesia (2% lidocaine with 1:100000 epinephrine), beginning with the extraction of teeth (Figure 6). A crestal incision was made without any releasing incisions; given the patients' thin gingival biotype. Periapical lesions were thoroughly curetted before implant placement, followed by the immediate placement of 2 Straumann implants (BLT 4.1*10 mm) in the conventional manner.

Two months post-implant placement, gingival formers were inserted and left in place for two weeks. After that, the prostheses were completed using cement-retained crowns attached to screw-retained abutments, which was preferred to screw-retained crowns for its good esthetics as shown in Figures (7, 8, 9). Immediate implants offer the advantage of preserving bone structure and reducing treatment time, which is especially beneficial for dentine dysplasia type 1

patients who often experience early tooth loss and rapid root resorption. This approach helps maintain oral function and esthetics with minimal delay, improving overall patient outcomes.



Figure 6: An extracted mobile rootless tooth

Regular recalls after 6 months, 1 year and one and a half years, involving scaling and periapical x-rays along with clinical examination were done to assess the condition of the implants and the remaining teeth, implants were osseointegrated with no signs of bone loss nor inflammation, one lower premolar started showing some signs of periapical lesion formation and mobility, for which the patient was advised to plan for an implant replacement. The long-term management strategy and monitoring protocol for the remaining dentition involved regular monitoring clinically and radiographically every 6 months; which helps early detect progression of the disease, along with periodic teeth cleaning and mobility assessment. The patient was briefly presented with the different treatment options available to address teeth which may show adverse

changes in the future, emphasizing the importance of being conservative, trying to keep natural teeth for the

longest time possible and only replacing the ones with bad prognosis.

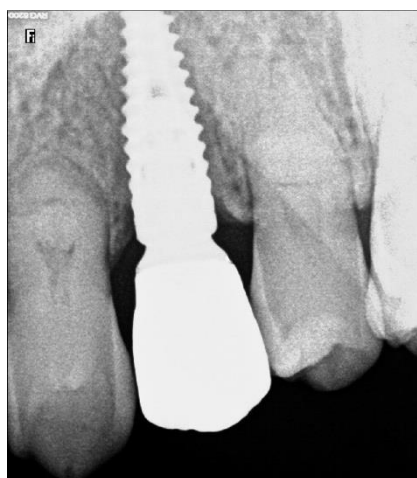


Figure 7: Implant placed to replace UR4, recall x-ray after one and a half years of surgery

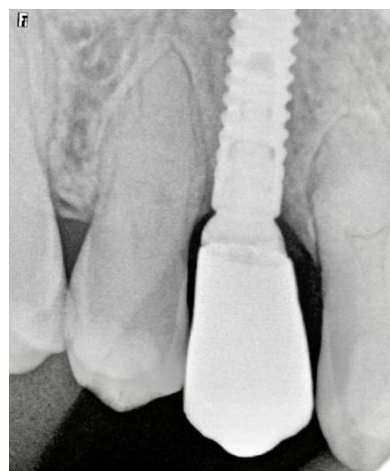


Figure 8: Implant placed to replace UL4, recall x-ray after one and a half years of surgery



Figure 9: Post-operative pictures of the implant retained prosthesis placed to restore upper first premolars

3. Discussion

Teeth affected by DD exhibit distinctive clinical and radiographic characteristics. Type I DD, the more prevalent form (estimated at 1 in 100,000 individuals), typically presents with normal teeth color and shape in both primary and permanent dentitions (6). Occasionally, a subtle bluish-brown translucency may be present. Patients may tend to have misaligned teeth within the dental arch, and they may experience tooth drifting and exfoliation with minimal or no trauma.

Several findings, like thinner dentine; larger scalloped dentinoenamel junctions; teardrop-shaped lacunae in the enamel; rodless enamel; and irregular collagen fibers, were also found (7). In the coronal pattern (type II), primary teeth crowns resemble those seen in dentinogenesis imperfecta, displaying similar color, size, and contour. Permanent teeth, on the other hand, have a normal appearance in these areas. We can further categorize DD as generalized, affecting more

than 30% of teeth, or localized, affecting less than 30% of teeth.

Around 20% of teeth affected by type I DD exhibit periapical lesions, which can be cysts or granulomas. These lesions often result from microscopic communication between the oral cavity and the residual pulp (1). Notably, the presence of periapical lesions associated with healthy, non-carious teeth is a distinctive feature for diagnosing this condition.

Distinguishing DD from other conditions primarily involves considering dentinogenesis imperfecta. While both disorders can lead to altered tooth color and obliterated pulp chambers, certain distinctions can aid in diagnosis. Teeth in dentinogenesis imperfecta have bulbous crowns with constriction at the cervical region, while teeth in DD typically possess normal-sized, shaped, and proportioned crowns. Periapical rarefying osteitis, which occurs in healthy teeth, is common in DD1 (1).

Managing Type-I DD-affected teeth is challenging, often requiring prosthodontic replacement as the most practical treatment. A multidisciplinary approach is generally recommended. Treatment options for teeth affected by DD include regular monitoring and preventive care for teeth that are asymptomatic and functional, even though this does not stop disease progression. Endodontic treatment can be considered when pulpal or periapical pathology is encountered, but it is often a challenging and complex approach, because pulp canal is obliterated and root morphology is abnormal, that results in a guarded prognosis (8,9,11); for permanent teeth, maintaining tooth health might necessitate endodontic intervention. However, occluded pulp cavities complicate endodontic treatment, especially in cases of periapical rarefying osteitis. It is not advisable to perform periapical curettage and retrograde filling on teeth with very short roots. Teeth with cervical constrictions and short roots are also not ideal candidates for crowns. When pulp therapy is unsuccessful, affected teeth might need removal, followed by full-mouth rehabilitation (8).

Periodontal treatment and splinting can help manage tooth mobility and support function for a time period, but they do not address the underlying structural defect. Restorative treatment or prosthodontic rehabilitation may be possible when sufficient tooth structure and periodontal support remain, although long-term prognosis can be limited by compromised support and shortened roots. For teeth with poor prognosis, extraction followed by a fixed bridge, removable prosthesis or delayed implant placement may be considered. However; considering the structural limitations associated with dentine dysplasia, these options often provide only temporary and less predictable outcomes. In carefully selected cases, immediate implant placement may render a more predictable long-term treatment option which replaces compromised teeth while also preserving soft tissue contours, alveolar bone and function (4,9,11). Dental implants could be considered after complete growth, with a potential need for alveolar ridge augmentation due to early tooth loss (8).

Some conditions, like Goldbalt syndrome, osteogenesis imperfecta, Ehlers-Danlos syndrome, calcinosis, Schimke immuno-osseous dysplasia, vitamin D deficiencies, osseous changes with sclerotic bone formation, rheumatoid arthritis, and Brachio-skeleton-

genital syndrome, can show radiographic or histologic signs that look like DD. Taurodontism has also been associated with DD (9).

This case underscores the diagnostic challenges associated with DD-1. Although implant use for DD-1 cases has been reported globally (16), no prior documentation exists from Jordan nor the Arab world. To the best of our knowledge, this is the first reported case in Jordan and the Arab world involving immediate implant placement in a patient with DD-1. Uniquely, it also represents the first instance where periapical lesion curettage was performed concurrently with tooth extraction and implant placement, without a healing interval.

In this case, the diagnosis of DD-1 was delayed until two premolars exhibited advanced mobility. Early identification and timely intervention are critical to preventing premature tooth loss, limiting residual ridge resorption, and preserving both function and esthetics, while also protecting the remaining dentition.

Diagnostic errors are widely recognized in healthcare, yet dentistry lacks sufficient data on their prevalence and impact. This report highlights the consequences of diagnostic oversight and reflects broader systemic issues within dental practice. It draws attention to the risks posed by overconfidence and superficial clinical evaluations, reinforcing the need for heightened awareness and diligence in dental diagnostics.

4. Conclusions

In conclusion, this 24-year-old patient with dentine dysplasia demonstrates the necessity for a comprehensive treatment to this rare dental disorder, which impacts tooth formation and presents difficulties in terms of appearance, functionality, and oral well-being. The effective use of dental implants in this instance reinstated both the ability to perform normal oral functions and the individual's sense of self-assurance. A thorough assessment of root growth, bone density, and general dental health was essential because of the distinctively stunted and deformed roots associated with dentine dysplasia. This instance exemplifies the feasibility of using dental implants immediately after periapical lesion curettage as a therapeutic choice. A thorough evaluation, consistent monitoring, and meticulous dental care are crucial for ensuring the implants' sustained effectiveness. Progress in research and technology persistently provides

optimism for better results and improved oral health for those facing comparable dental difficulties.

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Conflict of Interests

No conflict of interest is declared.