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Halterman Appliance For Impacted Mandibular Permanent First Molar – A Case Report

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Case Report

History

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ABSTRACT

In pediatric dentistry, Stainless Steel Crowns (SSC) are widely used. However, insufficient reduction for primary tooth preparation performed SSC distally can cause overhanging margins, obstructing adjacent permanent teeth eruption, and alignment problems. Treatment of ectopic erupted permanent first molars involves various management strategies. In 1982, Halterman introduced a specialized appliance for impacted maxillary first molars. This case report presented to utilization of the Halterman appliance for the orthodontic uprighting of the mandibular left permanent first molar in an 8-year-old boy who presented for a routine dental examination after previous dental treatment with SSCs performed under general anesthesia.

Key words: Impacted Permanent First Molar, Halterman Appliance, Overhanging, Stainless Steel Crown.

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Introduction

Ectopic eruption of the first permanent molars is a localized disturbance whereby these molars deviate from their normal eruption trajectory and instead emerge beneath the distal region of the second primary molars. Additionally, the first permanent molars exhibit a failure to erupt in their expected position.[1] The literature has explored diverse approaches for the clinical management of ectopic eruption. One notable clinical strategy for handling ectopically erupting permanent first molars was proposed by Kennedy and Turley in 1987.[2]

In 1982, Halterman introduced an appliance specifically designed to address impacted permanent maxillary first molars. This innovative device incorporated a bondable occlusal button, chain elastic, and a curved distal hook. Notably, the support for this appliance was derived from the second primary molar, ensuring the effective correction of the impacted molars.[3]

Since 1947, Stainless Steel Crowns (SSC) have been widely utilized as the primary choice for post-endodontic management following pulpectomy in primary teeth. The remarkable success rate of SSC can be attributed to the material's exceptional reliability, durability, adaptability, and cost-effectiveness.[4] As a result, SSCs have emerged as the preferred material in pediatric dental practice, cementing their status as the material of choice.[5]

Insufficient tooth preparation, especially in the distal aspect, can result in the formation of overhanging margins, particularly when there is a missing adjacent tooth. Consequently, this can lead to the impaction of the adjacent permanent teeth during their eruption, hindering their proper alignment within the dental arch.[6] The deviated eruption pathway or impaction caused by overhanging margins is primarily observed on the distal surface of the second primary molar, occurring prior to the eruption of the first permanent molar.[7]

The primary aim of this case report was to document and visually depict the successful management of an impacted permanent mandibular first molar attributed to an overhanging SSC on the primary mandibular second molar in an 8-year-old male child. Furthermore, the article sought to delve into the causative factors and therapeutic approaches for similar instances, drawing upon a meticulous review of pertinent literature in the field.

Case Report

Patient Information

An 8-year-old male patient was referred to the Department of Paediatric and Preventive Dentistry for a follow-up visit following previous dental treatment under general anesthesia. The patient had undergone treatment for early childhood caries four years ago, including multiple teeth treated with endodontic therapy and

restoration using SSC. The patient was currently asymptomatic with no relevant medical or family history.

During further intraoral examination, it was noted that the mandibular left permanent first molar did not erupt at the same pace as the contralateral permanent first molar, considering the child's chronological age. Radiographic findings using radiovisiography (RVG) showed the presence of an overhanging SSC concerning the mandibular left second primary molar. Consequently, the eruption path for the mandibular left permanent first molar was obstructed, and the mesial aspect of the tooth was found to be impacted beneath the distal surface of the overhanging SSC on the mandibular left second primary molar. (Figure 1)

Clinical and Radiographic Findings

In the intra-oral examination, SSC was present concerning the mandibular right and left first and second primary molar and maxillary right and left second primary molar. Maxillary right and left first primary molar was missing which was extracted 4 years back under general anaesthesia.

Diagnostic Assessment

RVG was taken for all the SSCs. SSCs concerning the mandibular left second primary molar was found to be overhanging. The mandibular left permanent first molar was found to be impacted below the distal edge of the SSC in the mandibular left second primary molar. Thus, impaction of the mandibular left permanent first molar under the SSCs was confirmed

Timeline

Treatment was planned for 4 to 6-week period from the start of the impression making to debonding of the appliance.

Case Managements

Treatment

Halterman appliance incorporates both wire components and elastics, strategically utilized to apply controlled forces to induce upright tooth movement.

Halterman appliance was planned for the distal movement of the mandibular left permanent first molar. Upper and lower alginate impressions were made for the diagnostic cast. Banding with 0.018X0.005” SS banding material was done in the Lower left primary second molar over the SSC. A lower alginate impression was made, and a band transfer was done. Halterman appliance was fabricated, trimmed. and polished. The appliance was trial-fitted and adapted.

An occlusal button was placed on the occlusal surface of the mandibular left permanent first molar as mesially as possible using transbond light cure adhesive. After bonding of the occlusal button, Halterman appliance was luted with Glass ionomer cement (GIC) in concerning the second left primary molar. A short elastic chain was engaged onto the distal extension of the wire component of the Halterman appliance. The engaged elastic chain was extended and the other end was engaged on the occlusal button on the mandibular left permanent first molar. This provided the distal force necessary for the movement of the teeth. (Figure 2)

Follow-Up and Outcomes

The Patient was followed up after 1 week to check the compliance. The patient was later followed in the 3rd and 6th weeks. At the end of 3rd week elastic chain was changed. At the end of the 6th week, the mandibular left permanent first molar was at the level of the occlusal plane, and the desired movement of the teeth was achieved which was confirmed through RVG. (Figures 3 and 4)

Discussion

Multiple strategies can be utilized for the treatment of impaction of permanent mandibular first molars. These approaches encompass techniques like precise striping of the distal surfaces of deciduous mandibular second molars and the insertion of orthodontic separators to create a distinct separation between the mandibular left permanent first molar and the mandibular left primary second molar.[8] The principal use of the Halterman appliance is to reposition the ectopically erupted teeth.[3] The literature reports several variations of the Halterman appliance, incorporating specific modifications to enhance its effectiveness. Such modification involves the addition of a U-shaped bend in the distal extension of the appliance and utilizing a reverse band and loop appliance with a bonded button attached to the permanent molar.[9,10] On the other hand in the case report, the appliance was used to reposition the mesially impacted left permanent first molar due to an overhanging SSC in the left primary second molar. The simple modification in the appliance provided sufficient force for the distal movement of the impacted left permanent first molar. Care was taken to monitor the direction of movement of the tooth via periodic recall and review. The patient was followed up for 3 months postoperatively after the removal of the appliance.

The case elucidates the proficient management of an incidental identification of an impacted mandibular left permanent first molar. This impaction was attributed to the presence of an adjacent overhanging SSC in the mandibular left primary second molar. SSC have become integral within the domain of pediatric dentistry, necessitating meticulous placement and adhesive techniques while considering prospective complications. In this context, the Halterman appliance emerged as an efficacious tool for expediently and conservatively repositioning the tooth.

Conclusions

Proper adaptation of SSC, especially on the distal surface is crucial to avoid impaction of the adjacent teeth. Pediatric dentists must be cautious of potential consequences of minor negligence of the SSC treatment performed under general anesthesia and must possess knowledge about different treatment options and appliances to effectively address specific cases. Additionally, regular monitoring and follow-up

examinations are essential to ensure the success of the treatment and maintenance of the long-term oral health of the patient.

Informed Consent

Informed consent was obtained from the patient's parent prior to the start of the treatment.

Conflig of Interest

None.

Acknowledgement

None.

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A B

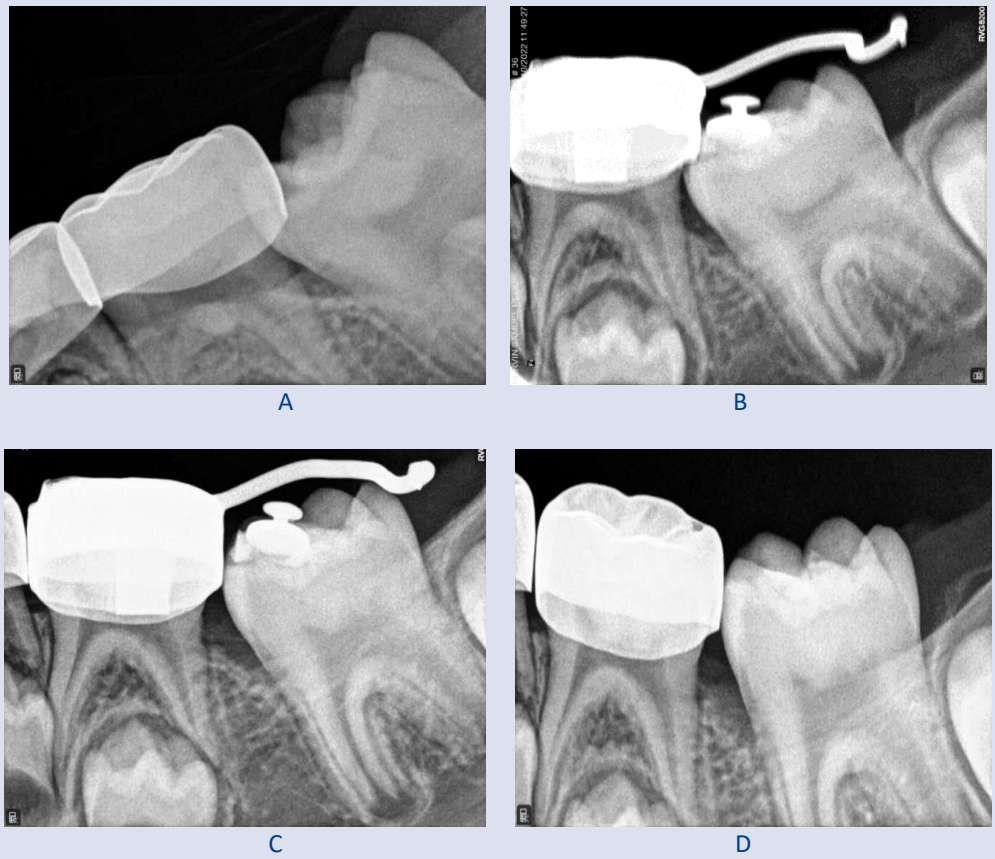
Figure 1. Pre-operative clinical images (A) occlusal view (B) left lateral view

A B

Figure 2. Intra operative clinical images with halterman appliance (A) occlusal view (B) left lateral view

A B

Figure 3. Post-operative clinical images with orthodontic elastic separator (A) occlusal view (B) left lateral view



A B C D

Figure 4. Radiographic Images (A) pre-operative images (B) after insertion of appliance (C) 3RD week follow-up (D) post-operative images