Case Report

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Comprehensive orthodontic management of multiple non-syndromic mesiodens in a Class II subdivision malocclusion: A case report.

Abstract:
Mesiodens is the most common type of supernumerary tooth, typically located in the anterior maxilla. While often asymptomatic, mesiodens can interfere with normal tooth eruption and alignment, leading to aesthetic and functional concerns. Multiple mesiodens, known as mesiodentes,is an uncommon phenomenon. This report presents a rare case of three mesiodentes in a nonsyndromic male patient, describing the clinical features, radiographic findings, and comprehensive treatment approach combining surgical and orthodontic treatment.It aims to assist clinicians in recognizing the presentation of mesiodentes, understanding its consequences on eruption patterns, and selecting appropriate strategies for successful management.

Key-words: Mesiodens, Supernumerary teeth, Orthodontic treatment

Introduction:

Dental crowding is one of the most common malocclusions encountered in orthodontic practice and often presents significant challenges in achieving functional and aesthetic outcomes. The aetiology of crowding is multifactorial, including discrepancies between tooth size and arch length, premature loss or prolonged retention of deciduous teeth, and the presence of supernumerary teeth. Supernumerary teeth are defined as teeth that develop in addition to the normal dentition. The prevalence of supernumerary teeth in humans varies between 1.2-6.0% for the permanent dentition and between 0.3-0.8% for the deciduous dentition.[1] The most frequently observed type of supernumerary teeth is mesiodens, located in the maxillary midline between the two central incisors. The overall prevalence of mesiodens in the literature ranges from 0.15 % to 1.9 %.[2] While the exact aetiology of their development remains unclear, several proposed mechanisms include hyperactivity of the dental lamina, dichotomy of the tooth bud,hereditary genetic influences and phylogenetic atavism. Mesiodens can vary widely in their morphology, position, and eruption. They may be present as conical, tuberculate or molariform forms, and their eruption pathway may be vertical, horizontal, or even inverted. Although almost 75-80% of them remain impacted, some mesiodens may erupt palatally or less commonly, labially.[3] Usually diagnosed during clinical and radiographic investigations such as panoramic or periapical radiographs, they can lead to a variety of complications such as delayed eruption or impaction of permanent incisors, displacement or rotation of adjacent teeth, crowding in the anterior teeth, midline diastema, and root resorption.[4]

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Multiple mesiodens, termed as mesiodentes, occurring simultaneously are relatively rare, and their management often requires careful interdisciplinary planning.[5] In most cases, extraction of supernumerary teeth, and sometimes additional extractions to alleviate severe crowding, is recommended to facilitate proper alignment. This case report presents the successful orthodontic management of Class II subdivision malocclusion with severe maxillary crowding associated with two erupted and one impacted mesiodens. The case highlights diagnostic considerations, treatment planningand the aesthetic and functional outcomes achieved.

Diagnosis:

A 15-year-old male reported to the Department of Orthodontics with a chief complaint of irregularly placed upper front teeth, leading to an unesthetic smile. The patient's medical history was non-significant, with noassociated diagnosed syndrome. There was history of trauma to the upper anterior teeth two years ago. After obtaining consent from the patient, an examination was performed. On extraoral examination, the patient presented with an apparently symmetrical face, leptoprosopic facial form, convex profile and incompetent lips at rest. The smile arc was non-consonant, with normal incisor display and wide buccal corridor on smiling. (Figure-1)

Intraoral examination revealed permanent dentition with good oral hygiene and no evident carious lesions. Both arch forms were U-shaped with severe maxillary anterior crowding and mild mandibular anterior crowding. Two supernumerary teeth were present, with one located between the maxillary central incisors and the other located palatal to left maxillary central incisor. The case exhibited a Class I molar and canine relationship on the right side, and Class II molar and canine relationship on the left side. There was increased overjet of 6 mm, and decreased overbite of 10%. Both maxillary and mandibular midlines were discordant with the facial midline and to each other. Maxillary right central incisor had enamel fractureand left central incisor had uncomplicated crown fracture caused by trauma to anterior dentition. (Figure-2)

On radiographic assessment, orthopantomogram and intraoral periapical radiograph confirmed the presence of two eruptedmesiodentes and as well as one impacted inverted mesiodens present between the roots of central incisors, reaching to the nasal floor. (Figure 3, 4)Maxillary occlusal radiograph showed that the crown of the third impacted mesiodens was oriented palatally. (Figure 4) Cephalometric evaluation was indicative of a skeletal Class I relationship withhyperdivergent growth pattern. (Figure 3) (Table 1)

Treatment objectives:

The objectives of the treatment were extraction of the erupted as well as impacted mesiodens to facilitate the proper space closure and relieve crowding, achieving Class I molar and canine relationship bilaterally and a balanced facial profile, and improving the patient's smile aesthetic. Long-term stability of the results through proper retention was also a significant objective.

Treatment plan:

Treatment was planned in two phases:

- First phase: Surgical extraction of the impacted and erupted mesiodentes.
- The second phase: Comprehensive orthodontic treatment.

Treatment Progress:

The patient was scheduled for extraction of all three mesiodentes under local anesthesia. Fixed appliance therapy was startedusing pre-adjusted edgewise MBT (0.022″x0.028” slot)bracket system. The alignment and levelling phase commenced with 0.016″ Nickel-Titanium (Ni-Ti) arch wires. Open coil spring was used with 0.018” Stainless Steel (SS) wire to open space for maxillary right lateral incisor. (Figure 5) Levelling and alignment phase was continued, progressing to the 0.019x0.025” SS arch wires to establish proper arch coordination and midline correction. (Figure 6) Class II elastics (3/16”, 3.5 oz) were used on left side for the correction of Class II molar and canine relationship, while buccal occlusion on right side was maintained by holding box elastics (3/16”, 3.5 oz). After alignment, OPG and a lateral cephalogram were taken to evaluate the root parallelism and incisor inclination. Necessary bracket repositioning was done and settling of occlusion was achieved in six weeks by settling elastics (3/16”, 3.5 oz) on 0.016” SS wires. The total duration of the treatment was 20 months. After debonding, fixed bonded lingual retainers were placed in both arches to maintain the archived results. The treatment objectives were optimally achieved with resolution of crowding in both the arches, and Class I molar and canine relationship on both right and left sides.Optimal overjet, overbite and functional occlusion was achieved. (Figure 7)Mandibular midline was slightly shifted on completion of treatment, but the patient's overall smile aesthetics was significantly improved. (Figure 8) Cephalometric radiograph and OPG showed proper incisor

inclination and

Figure 2: Pre-treatment intraoral photographs.

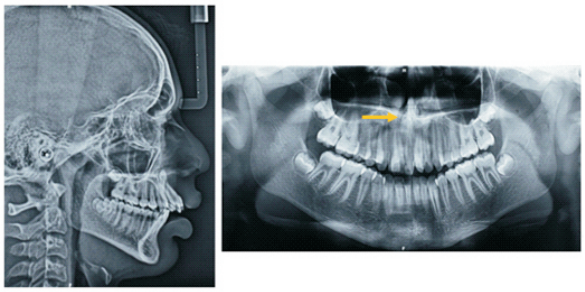

Figure 3: Pre-treatment cephalometric and panoramic radi

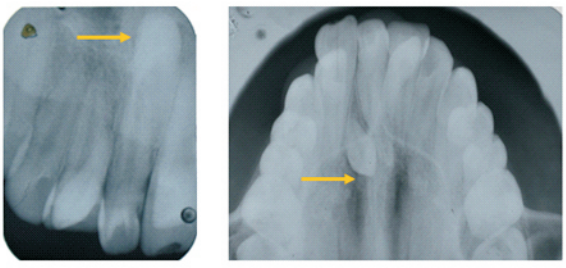

Figure 4: Pre-treatment maxillary anterior periapical and occlusal radiograph showing a third impacted inverted

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Figure 5: Intraoral photographs showing alignment and

Figure 6: Intraoral photographs showing completed alignment and levelling of arches, and restoration of maxillary c

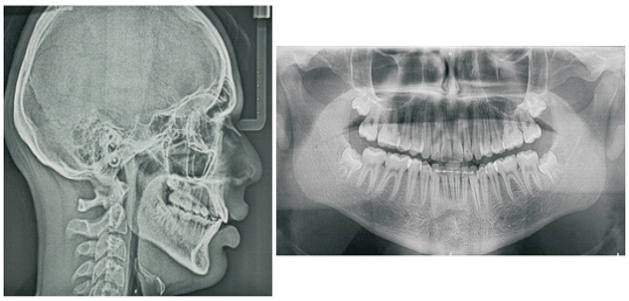

Figure 9: Post-treatment cephalometric and panoramic r

Table 1: Cephalometric evaluation.

Parameter	Pretreatment	Posttreatment
SNA	80°	79°
SNB	76°	76°
ANB	4°	3°
Wits	-1.1 mm	-0.5 mm
APP- BPP	10.5 mm	8 mm
MM bisector	0 mm	- 1 mm
SN length	75 mm	75 mm
Maxillary length	48 mm	48 mm
Mandibular length	75 mm	78 mm
N ⊥ to A point	-2.3 mm	-5 mm
N ⊥to B point	-10 mm	-8.2 mm
N ⊥ to Pog	-8.2 mm	-5.8 mm
FMA	28°	28°
SN-MP	33°	34°
Y Axis	62°	64°
Bjork's sum	120+146+125 = 391°	122+146+125= 393°
J ratio	65 %	64.5%
Gonial angle	125°	125°
Upper anterior facial height	41.1%	41.1%
Lower anterior facial height	58.9%	58.9%
Mx 1 to A-Pog	12.9 mm	8.2 mm
Mx 1 to NA	10.5 mm	7 mm
Mx 1 to NA	35°	30°
Mx 1 to SN Plane	130°	124°
Md 1 to A-Pg	2 mm	3 mm
Md 1 to NB	7 mm	7.5 mm
Md 1 to NB	30°	30°
IMPA	100 °	101°
Inter-incisor Angle	112 °	117°
Upper lip to E – line	1.1 mm	-3 mm
Lower lip to E – line	3.5 mm	0 mm
Upper lip to S – line	4.7 mm	-1 mm
Lower lip to S – line	4.7 mm	2 mm
Nasolabial angle	110°	120°
Inter labial gap	5.8 mm	1 mm
Lip strain	2 mm	1 mm

Discussion:

Mesiodens represents the most common form of supernumerary teeth, typically located in the anterior maxilla. Although its precise aetiology remains unclear, several mechanisms have been proposed, including hereditary predisposition, hyperactivity of the dental lamina, and dichotomy of the tooth bud. Most mesiodens are asymptomatic, remain impacted and are discovered incidentally during routine radiographic examinations. However, their clinical significance becomes evident when they interfere with normal eruption of incisors, causing aesthetic and/or functional disturbances.[6]

The occurrence of multiple mesiodentes is exceptionally rare, comprising approximately 10% of all mesiodens cases. The presence of more than one mesiodens can significantly influence occlusion and facial esthetics by altering the eruption path and alignment of the permanent incisors. Furthermore, multiple mesiodentes have been reported in association with craniofacial syndromes such as cleft lip and palate, Gardner's syndrome, and cleidocranial dysostosis. Familial occurrence has also been documented, suggesting a genetic component. A higher prevalence in males has been observed, with a male-to-female ratio of approximately 2:1.[3]

The current case is unique due to the presence of multiple mesiodentes in a male patient without any syndromic or familial association. The mesiodentes exhibited a conical morphology, the most frequently reported form.[7] Two of these teeth had erupted into the oral cavity, while one remained impacted in an inverted and palatal orientation, reaching the nasal floor. The resulting displacement and proclination of maxillary incisors contributed to crowding, midline deviation as well as traumatic fractures of their crown.

Radiographic imaging is imperative in the evaluation of mesiodens. While OPG aids in the initial screening, cone beam computed tomography (CBCT)helps in 3-dimensionallocalisation of mesiodens and relationship with adjacent teeth and other neighbouring anatomic structures. Hence, it is useful in preoperative treatment planningto minimize trauma to the adjacent hard and soft tissues during surgical extraction.[2] Since the patient in this report refused to undergo CBCT due to economic reasons, successful localization of impacted mesiodens in was done using OPG, intraoral periapical radiograph and occlusal radiograph.

Management of mesiodentes is guided by the extent of associated complications. Asymptomatic mesiodentes may

be managed through periodic observation. However, extraction is indicated when they cause delayed eruption, displacement, or rotation of adjacent teeth, or when associated with pathologic conditions such as dentigerous cysts.[8] Early removal during the mixed dentition period can facilitate spontaneous eruption and alignment of the permanent incisors, potentially minimizing the need for extensive orthodontic intervention.[9] In the present case, comprehensive orthodontic treatment was initiated to correct malalignment following the surgical removal of the mesiodentes. Class II subdivision correction requires careful diagnosis of asymmetry origin—whether skeletal, dental, or functional. In this patient, dental asymmetry was predominant; thus, unilateral Class II elastics and differential anchorage control were effective. After the completion of treatment, we were able to achieve a favourable Class I molar and canine relationship andfunctional occlusion, with significantimprovements in patient's dentofacial and smile aesthetics.

Conclusion:

This case illustrates the successful treatment of Class II subdivision malocclusion with three mesiodentes by surgical extraction of the supernumerary teeth followed by comprehensive fixed orthodontic therapy. It highlights the importance of early clinical and radiographic diagnosis and individualized treatment planning for the management of multiple mesiodentes.

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