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Surgical and orthodontic management of an impacted maxillary central incisor associated with supernumerary teeth: A case report

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Abstract
Detecting impaction of the maxillary permanent central incisor early is crucial as it's a rare occurrence in dental practice. Its treatment poses challenges due to its significant role in facial aesthetics. Timely identification of these teeth is crucial for preventing complications. The clinical case involves a 13-year-old male presenting with an impacted left central incisor in the anterior region of the maxilla. The obstruction caused by impacted supernumerary teeth hindering the eruption of the permanent incisor necessitated surgical removal. Employing a combined approach involving surgical exposure and orthodontic force application successfully guided the impacted left maxillary central incisor to its appropriate position within the dental arch.

Keywords: Supernumerary teeth, mesiodens, impaction, surgical exposure, orthodontic force

Introduction
Impaction refers to the complete or partial failure of a tooth to erupt beyond the typical age of eruption [1] In mixed dentition, permanent tooth impaction is uncommon; nonetheless, central incisor impaction is typically identified when the tooth fails to emerge [2].
Tooth impaction may occur due to various factors, including differences in arch length, barriers formed by the mucosa or bone, retention of deciduous teeth, and the presence of supernumerary teeth [3].
The primary reason behind the impaction of the maxillary central incisor is typically attributed to supernumerary teeth. These additional teeth form as a result of disruptions during the early stages of tooth development, specially during initiation and proliferation phases [4].
Mesiodens refers to a lateral or midline extra tooth. The region of the maxillary incisors (64.3%) is where supernumerary teeth are most frequently found, with mesiodens making up 32.4% of such presentations [4]. Supernumerary teeth can lead to various complications such as spacing, diastema, root deformation, teeth malpositioning, and failure of eruption [5].
The treatment for dental impaction caused by supernumerary teeth uses a combined surgical and orthodontic approach [6].
This case report aims to explore a pediatric patient's situation where the eruption of their upper central incisor was delayed due to the presence of two extra teeth, and to detail the approach taken in managing this case.

Case Report
A 13-year-old male patient reported to the department of paediatric dentistry with the primary concern of his upper left front tooth failing to erupt, a condition he had been experiencing for the past six years.
On general examination, patient had no notable dental and medical history. On extraoral examination, patient showed a prognathic profile and lip incompetency.
Intraoral examination revealed the absence of the permanent left central incisor in the maxillary arch (Figure 1).

Additionally, a bony hard swelling was observed on the upper labial aspect of tooth 21, which was non-tender upon palpation.

Fig 1: Intra oral photograph revealing missing maxillary permanent left central incisor.

On radiographic examination, intra oral peri apical radiograph revealed impacted left upper central incisor along with two additional supernumerary teeth in the anterior maxillary region (Figure 2).

Fig 2: IOPAR revealing 2 supernumerary teeth

Based on both clinical observation and radiographic evidence, a tentative diagnosis of an impacted left maxillary central incisor resulting from supernumerary teeth was established.

The necessity to remove both supernumerary teeth was elucidated to both the patient and their parents, aiming to facilitate the natural eruption of the permanent central incisor. Treatment procedure comprised of the placement of the edge wise orthodontic brackets from 15 to 25 (Figure 3).

Fig 3: Placement of edgewise brackets from 15 to 25.

The procedure was divided into surgical and orthodontic phase.

Surgical Phase

A crevicular incision was made over the unerupted 21, and the labially positioned supernumerary tooth was removed (Figure 4 a,b). In order to extract the supernumerary tooth close to the root of 21, a releasing incision was made from 22 to 12 (Figure 4 c). The flap was raised to remove the other supernumerary tooth (Figure 4 d). The flap was repositioned and 4- 0 black silk interrupted sutures were placed (Figure 4 f). The area was covered with a periodontal COE- pack. The patient was kept under antibiotic coverage for 5 days. The patient returned for a follow-up appointment after one week, during which the sutures were removed, and favorable healing progress was noted.

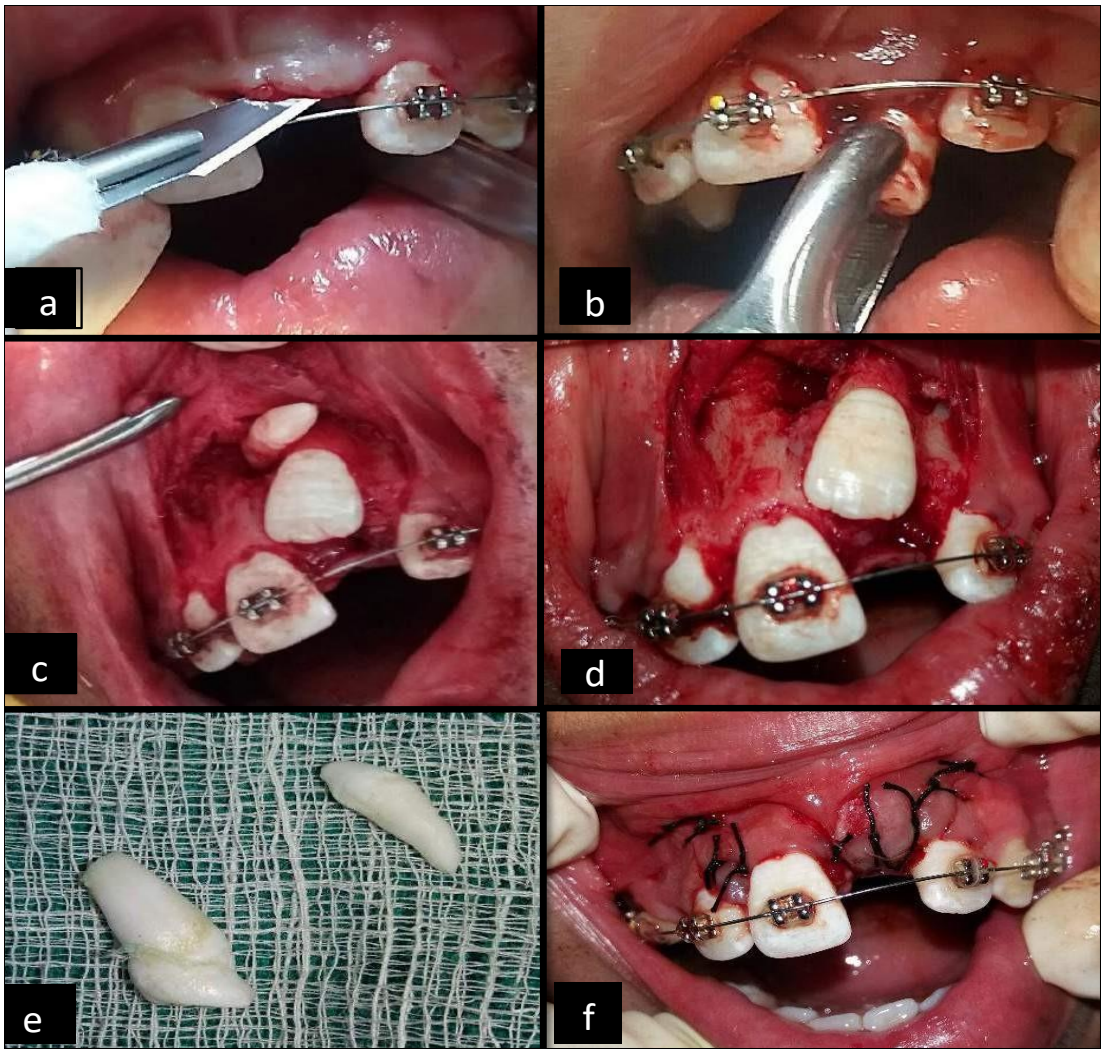

Fig 4: (a) Crevicular incision made over 21 (b) Supernumerary tooth extracted (c) Releasing incision given from 12 to 2 (d) Other supernumerary tooth extracted (e) Extracted supernumerary teeth (f) Suture placement

Follow Up

The patient was advised for a follow up every month to monitor the spontaneous eruption of 21. The central incisor began to spontaneously erupt after a three-month period of follow-up (Figure 5).

Fig 5: Spontaneous eruption after 3 month follow up

Orthodontic phase

Once the major portion of 21 was visible, a bracket was placed over it, and ligature wire was attached to 0.014" rectangular arch wire such that when orthodontic force was applied, the left central incisor would erupt to its position in the dental arch (Figure 6 a,b). Patient was recalled monthly and the ligature wire was tightened in every visit. After 4 months, proper alignment of the left central incisor within the maxillary arch was achieved (Figure 7).

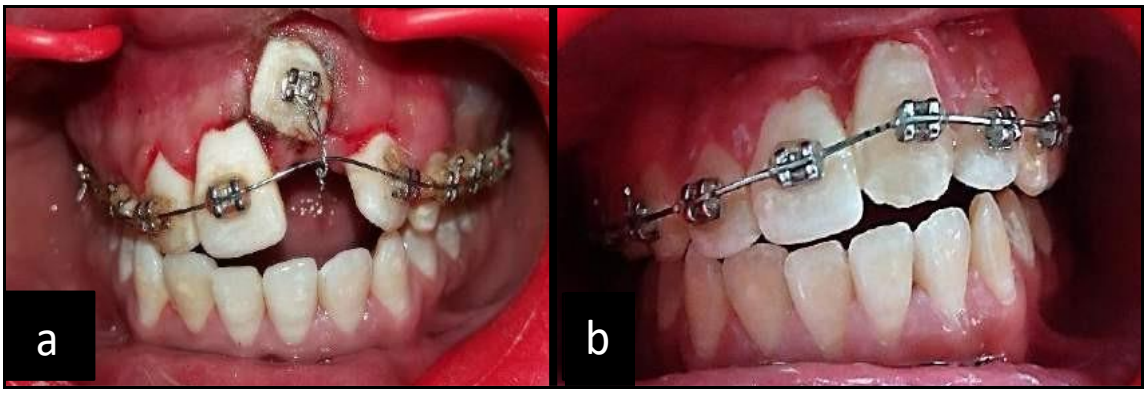

Fig 6: (a) Placement of bracket and ligature wire over 21 (b) Follow up after 3 months

Fig 7: Alignment of 21 in the maxillary arch

Discussion

An impacted tooth refers to a tooth that is unable or delayed in its ability to erupt into its intended functional position. One of the most frequent adverse effects of having supernumerary teeth in the anterior region of maxilla is incomplete eruption of maxillary incisors [3]. Several theories have been suggested to explain the etiology of supernumerary teeth, including the hyperactivity of dental lamina, phylogenetic theory, and dichotomy of tooth bud [7].

There are different ways to manage impaction caused by supernumerary teeth. These methods include removing the supernumerary teeth or tooth only, removing both the supernumerary teeth and the bone covering the impacted teeth, or making an incision in the fibrous tissue over the alveolar ridge to encourage eruption. These methods may be used with or without orthodontic traction [4].

With timely removal of mesiodens, spontaneous eruption of upper incisors has been observed in approximately 54–60% of cases. To achieve optimal tooth positioning in the dental arch, orthodontic therapy may be necessary. However, it's important to note that the complete eruption of an impacted maxillary incisor may require up to 3 years until root development is fully completed [3].

Following a comprehensive clinical and radiographic evaluation, it was determined that the current case necessitated a combined approach involving both surgical intervention and orthodontic treatment. This strategy aims to guide the unerupted maxillary central incisor into its proper position within the dental arch. Therefore, the impacted supernumerary tooth was extracted as part of the treatment plan followed by closure of flap and the tooth was awaited for spontaneous eruption for the period of 3 months. After 3 months, the tooth's eruption was seen in mesial direction thus, in order to guide the proper eruption to the required position, orthodontic traction was done.

Delaying orthodontic and surgical intervention is not advisable as it can lead to challenges in aligning teeth within the arch. There are different surgical methods available for uncovering impacted teeth prior to orthodontic treatment [8].

Becker outlines three surgical techniques for exposing impacted teeth:

1. Circular excision of the oral mucosa above the impacted tooth.
2. Repositioning the raised flap to include the attached gingiva covering the impacted tooth.
3. Closed eruption technique: raising the flap, including the attached gingiva, and then replacing it entirely in its original position after bonding an attachment to the impacted tooth [3].

The goal of early intervention is to facilitate the normal eruptive force, enabling the permanent incisors to erupt spontaneously. According to Witsenberg and Boering's, more than 54% of permanent incisors underwent spontaneous eruption following the removal of supernumerary teeth. Another study suggested that the likelihood of spontaneous eruption is higher when there is sufficient space available for eruption, with approximately 78% of permanent teeth erupting spontaneously within an average time of 16 months.[9] In this particular case, the force exerted for continuous extrusion on the impacted central incisor was minimal. Hence, the orthodontic extrusion of the teeth requires periodic monitoring so that the complications such as non vital pulp, root resorption and ankylosis are put to halt.[3]

Conclusion

The presence of supernumerary teeth can lead to the failure of adjacent permanent incisors to erupt. They must be identified and removed as soon as possible. In a clinical setting, managing anterior impacted maxillary teeth successfully might be difficult. A successful approach to bringing an impacted tooth into occlusion involves accurate diagnosis to

determine its exact position, followed by selecting an appropriate surgical technique and implementing a gentle orthodontic force system.

Conflict of Interest
Not available

Financial Support
Not available

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