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A Rare Case of Positional Anomaly in anterior region with Root Dilaceration and Supernumerary Teeth: A Clinical Challenge with Multidisciplinary Management Plan and literature review

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KEYWORDS

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ABSTRACT:

Dental transposition is a rare anomaly, most frequently involving the maxillary canine, and is usually unilateral. Though reports of different transposition patterns exist, transposition of the maxillary canine into the central incisor position is extremely scarce, particularly when associated with anomalies such as root dilaceration, supernumerary teeth, or peg-shaped laterals. Trauma, obstruction, or genetic factors may disturb the normal eruptive sequence, leading to these anomalies.

This case describes an adolescent presenting with the transposition of the permanent maxillary canine toward the central incisor site, a dilacerated maxillary central incisor, and a supernumerary tooth in the premolar region. Such a constellation of anomalies is exceptionally rare and demands interdisciplinary management. A phased orthodontic plan, combined with surgical guidance, was adopted to address esthetic and functional concerns while preserving periodontal health. The case emphasizes the importance of early diagnosis, radiographic evaluation, and carefully staged multidisciplinary management for successful outcomes.

1. Introduction

Tooth eruption follows a complex, genetically and environmentally controlled process. Disruptions in this sequence may result in anomalies such as supernumerary formations, root dilaceration, or positional abnormalities. Among these, tooth transposition defined as the positional interchange of two teeth is one of the rarest findings in clinical practice [1,2].

Transposition occurs in approximately 0.13% to 0.51% of the population, with the maxillary canine being the most frequently involved tooth due to its late eruption and lengthy eruptive path [1,3]. Transposition to the central incisor site is exceptionally rare and almost always associated with additional anomalies such as dilaceration or supernumerary teeth [3,7].

Supernumerary teeth, which occur in 0.1–3.8% of permanent dentitions, most often develop in the anterior maxilla and can interfere with eruption or alignment [4]. Root dilaceration represents another anomaly, characterized by an abrupt curvature in tooth morphology, usually resulting from trauma to the primary predecessor or a developmental disturbance [5,9].

The coexistence of transposition, root dilaceration, and supernumerary teeth presents a unique clinical challenge. Successful management requires interdisciplinary planning, minimally invasive surgical assistance, and carefully controlled orthodontic biomechanics [3,10].

2. Case Report

A 15-year-old female presented to the Department of Pediatric and Preventive Dentistry with a chief complaint of irregular upper front teeth persisting for five years. Medical, dental, and family histories were unremarkable. Extraoral examination revealed no facial asymmetry, and her profile was straight.

Intraoral findings revealed Angle's Class I molar relation bilaterally, retained 53, and labially erupting 11. A supernumerary tooth was observed between 15 and 16. Caries was present in 36 and 46. [Fig 1]

Fig.1.A-Maxillary arch showing unerupted 11 and supernumerary tooth between 15 and 16 and retained 53. B-Mandibular arch showing dental caries wrt 36 and 46.

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An intraoral periapical radiograph (IOPAR) of the maxillary anterior region showed that 11 had root dilaceration in the apical third, curving distally. Tooth 13 had migrated mesially, partially overlapping 11, while 12 showed a normal developmental trajectory though incompletely erupted. This indicated a developing 13 to 11 transposition. [Fig 2]

Fig.2 IOPAR taken with respect to 11

An orthopantomograph (OPG) confirmed complete permanent dentition, retention of 53, a rudimentary supernumerary tooth between 15 and 16, and the malpositioned canine overlapping the maxillary incisor roots. The final diagnosis was Angle's Class I malocclusion with, labially erupting 11 with distal root dilaceration, transposition of 13 seen and retained 53 with supernumerary teeth between 15 and 16 and associated carious 36 and 46.[Fig.3]

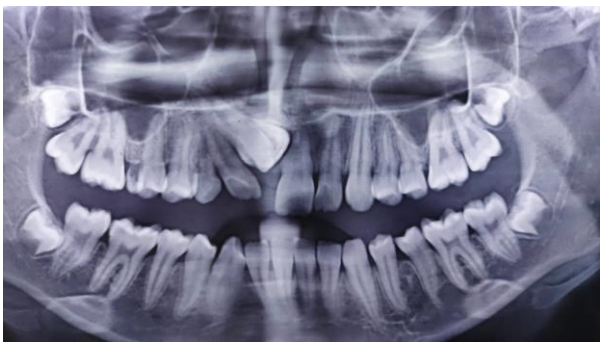

Fig.3 OPG taken showing confirmed complete permanent dentition, retention of 53, a rudimentary supernumerary tooth between 15 and 16, and the malpositioned canine overlapping the maxillary incisor roots

3. Treatment Plan

A multidisciplinary approach integrating orthodontic and surgical management can be done. The planned sequence is divided into three orthodontic phases, combined with selective surgical intervention. Phase 1 deals with initial alignment and space management which includes full-arch bonding with preadjusted edgewise appliances followed by molar banding for anchorage and alignment with NiTi wires progressing from 0.014″ to 0.019″ × 0.025″ for leveling. Transition to rigid 0.019″ × 0.025″ stainless steel arch wire for stability, space creation for 11 using an open coil spring between 12 and 21, eruption guidance of 11 with a piggyback 0.012″ NiTi auxiliary over the Stainless Steel (SS) base wire and final alignment of 11 with continuous 0.014″ NiTi wire. The retained 53 can be preserved during this stage to function as a natural space maintainer, preventing mesial drift of adjacent teeth.

In Phase 2 the surgical exposure and canine alignment can be done by extraction of 53 and the premolar region supernumerary after complete alignment of 11 followed by space creation for 13 using an open coil spring and surgical exposure of 13 under minimal trauma protocol.

If the canine is found to be buccally impacted K9 loop for controlled directional force can be used. Whereas, if it is palatally impacted Ballista Spring can be help in vertical and labial traction. Biomechanics should be designed to minimize root interference and control axial inclination of adjacent teeth.

Phase 3 involves finishing and detailing by progressive alignment of 13 using NiTi wires, followed by stainless steel rectangular wires for torque control space consolidation and intercuspation adjustments on 0.017″ and 0.019″ × 0.025″ SS wires.

From the surgical perspective, conservative exposure of 13 with extraction of retained 53 and the supernumerary tooth minimized trauma and supported periodontal health.

4. Discussion

Maxillary canine transposition, particularly to the central incisor site, is exceptionally rare [3,7]. The coexistence of anomalies in this case likely stemmed from multiple etiological factors. The retained deciduous canine and presence of a supernumerary tooth disrupted the eruption path, causing mesial displacement of 13. Simultaneously, dilaceration of 11 compounded the orthodontic complexity [4,5,9].

Dilacerated incisors carry an increased risk of pulpal necrosis or external root resorption when subjected to excessive forces [5,9]. Therefore, staged orthodontic traction using light continuous forces was critical for safe alignment.

Several treatment alternatives were considered. Acceptance of transposition has been described [1,2], but this compromises esthetics and occlusion. Extraction of the impacted canine is occasionally indicated when prognosis is poor; however, given the importance of canines in function and esthetics, this was not ideal. Repositioning to the anatomical site was possible here since the case represented incomplete transposition with a relatively favorable root position [3,10].

Alternative strategies for canine-incisor transposition include: extracting the impacted canine for prosthetic

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replacement, keeping teeth in the transposed position, or correcting alignment without extraction.[13]

Phase-wise treatment planning ensures sequential correction with minimal complications. In Phase 1, alignment and space management using NiTi wires and coil springs can guide the eruption of 11 while retaining 53 maintained space and arch integrity. Phase 2 focuses on surgical exposure of 13 and extraction of 53 and the supernumerary tooth, ensuring proper eruption and periodontal preservation. Biomechanical control using K9 loop or Ballista spring aided safe tooth movement. Phase 3 involves finishing and detailing with stainless steel wires, achieving optimal torque, intercuspation, and stable occlusion with improved esthetics and function.

Here is a table summarizing key literature on maxillary canine transposition and its clinical relevance to the present case involving maxillary canine–central incisor transposition with root dilaceration and a supernumerary tooth. The final row highlights the current case and its phase-wise interdisciplinary management, emphasizing the significance of controlled biomechanics, early diagnosis, and coordinated orthodontic–surgical planning in complex anomaly presentations.

Citation	Study type & sample	Aim / Methods (brief)	Key findings	Relevance to our case
Shapira Y, et al 1989[1]	Case report (single case of complete maxillary canine–lateral incisor transposition).	Describes clinical/orthodontic approach used to move fully transposed teeth into their normal positions; detailed biomechanics and sequencing are presented.	Demonstrates that when anatomy and root positions allow orthodontic correction to normal positions is possible but technically demanding and requires careful biomechanics to avoid root damage.	Useful precedent for attempting orthodontic correction rather than accepting transposition; emphasizes careful force control and staged mechanics important when considering correction of a transposed canine near an incisor with root dilaceration.
Peck S, et al 1995[2]	Observational/ descriptive study: review and classification using collected cases.	Analysed case series/literature to propose a classification system for maxillary transpositions (type and frequency by tooth pairs).	Identified common transposition patterns (canine–first premolar and canine–lateral incisor among most frequent), provided a clear classification helpful for treatment planning and prognosis. The paper gives frequencies and guidance on decision-making.	Provides a classification framework you can apply to your case (canine–central incisor transposition is rarer than canine–lateral). Useful when justifying chosen treatment strategy and comparing with published patterns.
Ely NJ, et al 2006[7]	Case-series / etiologic review with clinical data (investigated features associated with transposition).	Examined clinical features across cases and discussed etiology (genetic vs. local factors) with comparison of associated dental anomalies.	Concludes that genetic factors likely play an important role; transposition often co-exists with other anomalies (supernumeraries, peg laterals, dilacerations) and shows characteristic patterns.	Supports the idea that your patient's combination (transposed canine + dilacerated incisor + supernumerary) is not random consistent with studies that link transposition to broader developmental disturbances; strengthens rationale for multidisciplinary management.
Papadopoulos MA, et al 2010[9]	Systematic review / meta-analysis (pooled prevalence from primary studies).	Meta-analysis of available prevalence studies to estimate overall prevalence and distribution by jaw, side, and gender.	Pooled prevalence ≈ 0.2–0.33% (varies by population), more frequent in maxilla than mandible, more often unilateral; no strong gender predilection.	Gives epidemiologic context confirms rarity of canine → central incisor transposition and supports including prevalence data in your introduction/discussion to highlight case uniqueness.
Pinho T, et al , 2025[15]	Narrative review + clinical case (48 reported cases + one Mx.C.I1 case).	PRISMA-guided review (2014–2024) to determine when MCT should be corrected or maintained; illustrated by a CBCT-based canine–central incisor case.	68.7 % of cases corrected (mainly Mx.C.I2 & Mx.C.P1); 31.3 % maintained (complex Mx.C.I1 & palatal impactions). All Mx.C.I1 cases were maintained. Clinical example used digital planning and TADs for aesthetic success	Provides current evidence-based guidance for Mx.C.I1 management supports maintenance strategy with multidisciplinary and digital approach, mirroring your case's protocol
Present Case	Single clinical case report	Single clinical case report involving Mx.C.I1 transposition with root dilaceration and supernumerary tooth	Sequential phase-wise orthodontic-surgical management: Phase 1includes alignment of dilacerated 11, space creation, retention of 53 as natural anchorage, Phase 2 includes surgical exposure of 13, controlled biomechanics (NiTi, SS wires, piggyback mechanics, K9 loop/Ballista spring).Phase 3 involves finishing and detailing with stainless steel wires	

Table 1. Literature review summarizing six key publications on maxillary canine transposition , outlining study type, methods, major outcomes, and clinical significance relative to the present case.

Clinical significance of phase wise treatment plan includes collaborative interdisciplinary effort for our case which ensures that anchorage control, force application, and space distribution respected biological limits, preserving long-term periodontal health.

Maxillary canine transposition is a rare anomaly with no standardized treatment protocol. Clinical decisions depend on anatomical factors, eruption pattern, malocclusion type, and the feasibility of safe, controlled tooth movement.[14]

Multidisciplinary collaboration was key to our treatment plan. Coordinated surgical and orthodontic approaches enabled functional occlusion and esthetic outcomes, while avoiding complications such as root resorption and bone loss [6,7,10].

5. Conclusion

Such complex cases demand individualized strategies prioritizing esthetics, occlusion, and periodontal health. In this case, a conservative, phased orthodontic approach supported by minimally invasive surgery and careful biomechanics allowed successful correction of a dilacerated central incisor and realignment of a transposed canine. With precise diagnosis, early intervention, and interdisciplinary collaboration, even rare anomalies can be managed predictably for stable esthetic and functional outcomes.

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