

PRE-TREATMENT

How would you treat this malocclusion?

Case T. K. 12 years, 7 months

HISTORY

This 12-year, 7-month-old female presented with her parents with a chief complaint that "Several of my teeth aren't in my mouth," and "I have trouble chewing." Her medical history was non-contributory. Although she had a history of routine visits to the dentist, she had only recently been referred to the orthodontist for an evaluation. She brought a recent FMX and a panorex taken by her dentist to the consultation. A clinical TMJ evaluation displayed normal range of movement of the mandible upon opening, no pain, and no popping or clicking. The patient and parents were motivated to begin treatment.

EXTRAORAL FINDINGS

On the frontal facial photo, the patient appears symmetric, with full lips and a 1mm interlabial gap at rest. When smiling the patient displays 80% of her maxillary incisors and has a narrow maxillary arch. On the lateral photo, she displays a convex profile and a slightly long lower face height.

INTRAORAL FINDINGS

The patient presents in the late mixed dentition with multiple impacted and supernumerary teeth. Her maxillary midline is coincident with the mid-sagittal plane and the lower midline. The maxillary arch is slightly omega shaped and narrow. The upper arch has 9mm to 10mm of arch length discrepancy. The mandibular arch is "U" shaped and symmetric. There is 6mm to 7mm of arch length discrepancy. There is a left posterior openbite and

an edge-to-edge molar relationship in width. She has 3mm of overbite and 2mm of overjet. On the right and left sides she is Class I canine and Class II molar. Clinically, centric relation and centric occlusion appeared coincident. The patient exhibits generalized cant/tip of upper incisors to the left and significant tipping of #3, #14, #19 and #20 into edentulous spaces. A lateral tongue thrust into the area of the left posterior teeth/openbite was noted.

RADIOGRAPHIC FINDINGS

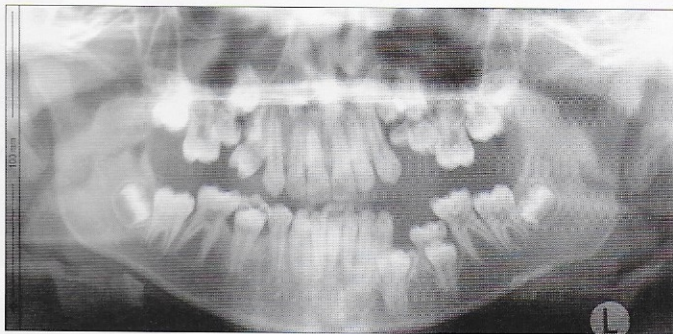
Cephalometric evaluation reveals a slightly decreased sagittal jaw relationship due to mild mandibular retrognathia. In addition, a hyperdivergent skeletal pattern with a steep mandibular plane, mildly retroclined upper incisors, and normal inclination of the lower incisors is noted.

The original panoramic radiograph, taken by the patient's general dentist, revealed general symmetry of the right and left condyles and mandible with no pathology noted and clear sinuses. The patient has ankylosed #A, #I, #J and #K and a supernumerary #9A. Root dilacerations of #4, #12 and #21 were noted as well as impacted #4, #12, #13 and #21.

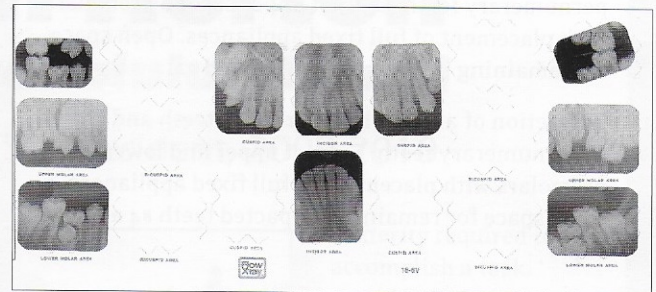
Periapical radiographs of the upper and lower left quadrants showed dilacerated roots on #12 and #21. A supernumerary #8A was also noted as was a root fragment approximating #21 which was later determined to be another supernumerary tooth (#21A). No caries were noted.

Followup full mouth radiographs and a panoramic radiograph were taken after all ankylosed and supernumerary teeth were removed.

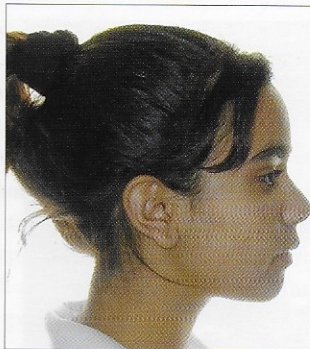
CASE REPORT



PANORAMIC XRAY FROM DENTIST



FMX FROM DENTIST



INITIAL PROFILE RELAXED



INITIAL FRONTAL RELAXED



INITIAL SMILING



INITIAL RIGHT BUCCAL



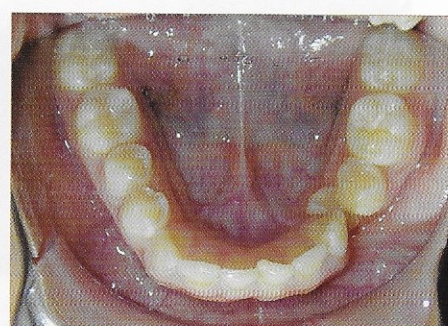
INITIAL FRONTAL INTRAORAL



INITIAL LEFT BUCCAL



INITIAL MAXILLARY OCCLUSAL



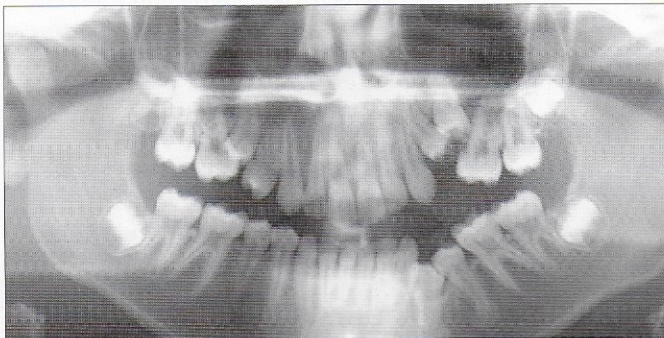
INITIAL MANDIBULAR OCCLUSAL

CASE REPORT

TREATMENT OPTIONS

1. Extraction of all ankylosed primary teeth and supernumerary teeth. Extract upper second premolars with placement of full fixed appliances. Open space for remaining impacted teeth #12 and #21.
2. Extraction of all ankylosed primary teeth and supernumerary teeth. Extract upper and lower 1st premolars with placement of full fixed appliances. Open space for remaining impacted teeth #4 and #13.
3. Extraction of all ankylosed primary teeth and supernumerary teeth. Placement of full fixed appliances and maintain all permanent teeth.

CEPH VALUE	INITIAL	MEAN
SNA (°)	79.3	82.0
SNB (°)	73.8	80.0
ANB (°)	5.5	2.0
MP-SN (°)	36.1	33.0
U1-NA (°)	1.6	22.0
U1-NA (mm)	0.8	4.0
L1-NB (mm)	5.4	4.0
IMPA [L1-MP] (°)	99.0	95



INITIAL PANORAMIC X-RAY



INITIAL CEPHALOMETRIC X-RAY



INITIAL FMX

For Post-Treatment of Case T.K., see page 35.

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PROGRESS AND POST-TREATMENT

Case T.K., 15 years, 3 months

How would you treat this malocclusion?

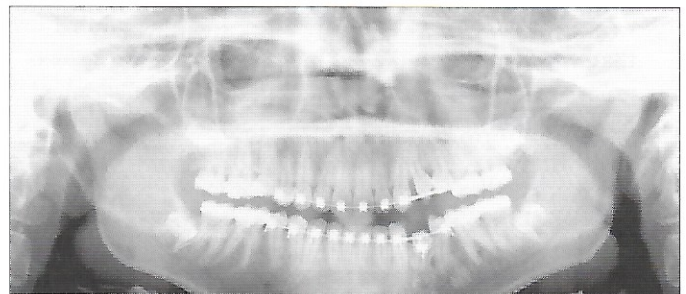
TREATMENT PLAN

The third treatment option was chosen. In this case, we opted to maintain all permanent teeth, since it couldn't be determined without initiating treatment whether some of the patient's impacted permanent teeth were ankylosed or unsalvageable. However, as we discovered towards the end of treatment, this treatment option was more challenging than originally anticipated and the root dilaceration on #12, although noted pre-treatment, was much more significant to the final outcome.

The patient was referred for extraction of #A, #I, #J and #K and removal of supernumeraries #8A, #9A and #21A. These extractions were completed in two sessions with the oral surgeon. The case was then bonded with full fixed Damon .022 appliances, with the exception of the first and second molars, which were banded and the impacted #4, #12, #13 and #21. Treatment was initiated with .014 CuNiti wires with open coil springs in the upper right, upper left and lower left quadrants. All open coil springs were .010 x .030 niti coils activated, what was estimated to be, a bracket and one-half width.

After six weeks, hygiene was checked, all coils were activated another bracket width and 3/16" 3.5oz elastics were started from the upper canine to the lower canine on both the right and left sides. She was instructed to wear her elastics full time. At her next visit, in six weeks, #4 was bonded and new upper and lower wires were placed. She was instructed to continue her elastics full time. The following visit, eight weeks later, bite closing on the left side was noted to be minimal so composite habit buttons were placed on the lingual of #14, #19 and #20 to discourage the tongue from moving in between the open space between the upper and lower left posterior teeth.

After eight more weeks, she was given upper and lower 14 x 25 CuNiti wires and the coil on the upper left was again activated one bracket width. Her elastics were maintained and compliance was noted to be fair. In eight more weeks, a 16 x 25 SS lower wire was placed, #21 was bonded and an overlay .014 CuNiti sectional wire was placed to #21 to help extrude #21 without opening the posterior occlusion. Her elastics were temporarily stopped. Following eight more weeks, a panorex was taken, the habit buttons were removed and it was noted that #12 and #13 were beginning to erupt.



PROGRESS PANO

Eight weeks later, #12 and #13 were bonded and new upper and lower .014 CuNiti continuous wires were placed. She had upper and lower .018 CuNiti wires placed eight weeks later. In six more weeks, 14 x 25 CuNiti upper and lower wires were placed and elastics 3/16" 3.5oz. were again initiated from the upper canines to the lower canines and 1st premolars on both the right and left sides. She was instructed the wear them full-time. After eight more weeks, 18 x 25 CuNiti wires were placed upper and lower and elastics were continued. The patient missed her next appointment and finally returned in 12 weeks, noting a protuberance on the upper left vestibule gingi-

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val to the upper left 1st premolar. No pain, sensitivity to hot or cold or pain to percussion were noted. A panorex was taken, and the protuberance was noted to be either a root tip or exostoses.



PROGRESS PANO

As well #5, #6, #11, #22 and #29 were repositioned. In eight more weeks, an upper 19 x 25 posted stainless steel wire and lower 16 x 25 posted stainless steel wire were placed. The elastics were changed to a posterior box with 5/16" 3.5oz. elastic worn from the upper canine and 1st molar to lower canine and first molar. Eight weeks later the wires were detailed, a power chain was placed upper canine to canine and vertical elastics in the posterior segments were continued. In eight more weeks the wires were again detailed and it was noted that the openbite on the left side, although closing, was progressing slowly. Elastic compliance was questioned. A week later the patient presented concerned again about a more pronounced protuberance in the vestibule, gingival to #12, stating "Something feels sharp in my gums." On clinical exam, a sharp point similar to a



PROGRESS PA OF #12 AND #13

blunt explorer tip was noted under unattached tissue approximating the position of the root tip of #12. Periapical radiographs were taken of #12 and #13 and a dilacerated root on #12 was noted.

The patient was then referred for a cone beam CT to evaluate the protuberance in more detail. On her next visit the diagnosis was discussed with the parents and patient after a discussion with the patient's dentist. The protuberance was noted to be the dilacerated root of #12 with the root tip projecting 90 degrees toward the buccal.



PROGRESS CONE BEAM CT CORONAL SLICE AT LEVEL OF DILACERATED TOOTH #12

Since the patient was asymptomatic, it was agreed to provide lingual root torque to #12 to bring the apex of the root into bone as much as possible. The lingual cusp of #12 was reshaped to accommodate this movement. The wires were adjusted accordingly, and Class II elastics were initiated. In the following 18 weeks, three detailing appointments were performed before impressions were taken for a lower bonded and upper removable retainer. One week later, braces were removed and an upper circumferential retainer and lower bonded .027 TMA retainer were placed. The lower retainer was bonded to the lower canines only. Full-time wear of the upper retainer was recommended for six months after treatment, at which point night-time wear was recommended.

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FINAL PROFILE RELAXED



FINAL FRONTAL RELAXED



FINAL FRONTAL SMILING



FINAL RIGHT BUCCAL



FINAL INTRAORAL FRONTAL



FINAL LEFT BUCCAL



FINAL MAXILLARY OCCLUSAL



FINAL MANDIBULAR OCCLUSAL

RESULTS ACHIEVED

DISCUSSION

The total treatment time was 32 months and 19 office visits, with three emergency appointments. Dental esthetics were improved. The maxillary and mandibular arches were broadened with improved dental alignment of the upper and lower teeth. A functional Class I canine and molar were achieved on the right side with group function on the left side due to insufficient canine guidance.

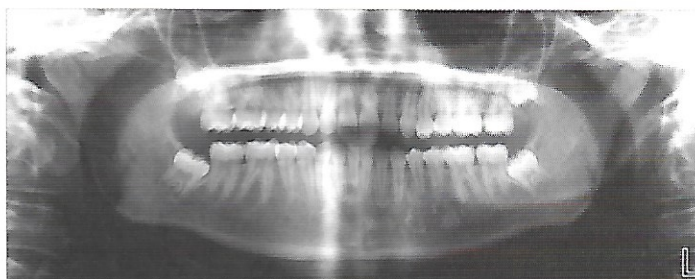
The length of treatment time, however, and canine relationship were greatly impacted by the dilaceration of #12 as seen in the cone beam CT. Although the dilaceration of the root on #12 was noted from the periapical

radiographs pre-treatment, a cone beam CT before the initiation of treatment would have provided more valuable information that the dilacerated root was actually buccal-lingual and not mesial-distal as it presented in the periapical radiographs. Understanding the actual shape of #12 before initiating treatment may not have changed the treatment plan but would have provided a better estimation of the resistance to bite closing on the left side. This would have allowed for a more realistic estimation of the length of treatment time and prognosis of salvaging #12. The cone beam CT taken helps demonstrate how roots can continue to develop while eruption is impeded by ankylosed primary teeth. In this case, while the eruption of #12 was obstructed, the root likely continued to develop into medullary bone while avoiding the maxillary sinus.

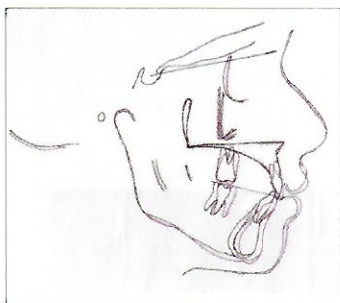
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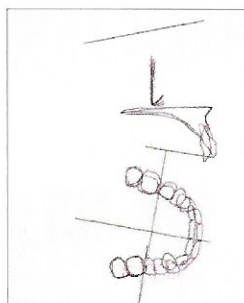
FINAL CEPHALOMETRIC X-RAY



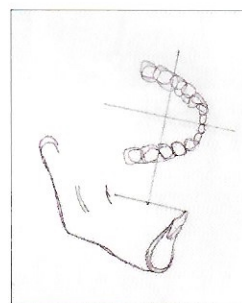
FINAL PANOREX



GENERAL
SUPERIMPOSITION



MAXILLARY
SUPERIMPOSITION



MANDIBULAR
SUPERIMPOSITION

This caused the root to develop at a near 90° angle. The cone beam CT helps reveal that the root tip of #12 was slowing the extrusion of this tooth into the archform since the root was like a “boat anchor” that needed to move through the alveolus in order to close the openbite. Although closing the openbite was possible, it was a tremendously laborious task due to the amount of bone remodeling that needed to occur. A compromise on the occlusion surrounding the upper and lower left side canines and 1st premolars was made due to the desire to keep the significantly dilacerated root of #12 in bone and the inability to further extrude #12.

EDITOR’S COMMENTS

This is quite a remarkable case. The patient’s initial presentation clearly demonstrates the sequelae of multiple, long-standing ankylosed primary teeth. Following their extraction, the impacted premolars were directed into place by re-opening the appropriate spaces and applying vertical orthodontic forces. As the authors mention, once spaces were opened, tooth #12 did not respond to vertical forces as anticipated. This fact, coupled with the clinical presentation of a sharp protuberance in the vestibular region prompted cone-beam CT imaging. This proved very useful in elucidating the complex dental

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MP-SN (°)	36.1	35.6	33.0
U1-NA (°)	1.6	22.0	22.0
U1-NA (mm)	0.8	3.7	4.0
L1-NB (mm)	5.4	6.5	4.0
IMPA [L1-MP] (°)	99.0	104.3	95

anatomy of tooth #12 and planning its final position—although compromised, necessary to ensure the tip of the root remained within the maxilla. Although the occlusion is not socked in on the left side, given the limitations, it is a very nice and esthetic result.

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For Pre-Treatment of Case T.K., see page 20.