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Chen-Jung Chang

Graduate Student, Institute of Oral Medicine, College of Medicine, National Cheng Kung University

Jia-Kuang Liu

Institute of Oral Medicine, College of Medicine, National Cheng Kung University; Department of Stomatology, National Cheng Kung University Hospital

Shih-Chung Liao

Department of Stomatology, National Cheng Kung University Hospital

Chuan-Yang Chang

Institute of Oral Medicine, College of Medicine, National Cheng Kung University; Department of Stomatology, National Cheng Kung University Hospital

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Abstract

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Keywords

palatally impacted canine, orthodontic traction, surgical exposure

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COMBINED SURGICAL AND ORTHODONTIC TREATMENT OF PALATALLY IMPACTED CANINES – A CASE REPORT

Chen-Jung Chang¹, Jia-Kuang Liu^{2,3}, Shih-Chung Liao³, Chuan-Yang Chang^{2,3}

Graduate Student, Institute of Oral Medicine, College of Medicine, National Cheng Kung University¹

Institute of Oral Medicine, College of Medicine, National Cheng Kung University²

Department of Stomatology, National Cheng Kung University Hospital³

Maxillary canines are essential for function and esthetics. Patients with impacted maxillary canine are considered to be more difficult to treat than the average orthodontic patients because successful treatment requires proper surgical technique and orthodontic mechanisms. This case report describes the treatment of a 10-year-old boy with a palatally impacted canine and rotated premolar. Using closed exposure with placement of an attachment, following by distal orthodontic force to bring the canine crown away from the root of lateral incisor, then buccal traction into normal occlusion. Total treatment time was 2 years and six months. We obtained favorable esthetics and stable occlusion. (*J. Taiwan Assoc. Orthod.* 23(1): 30-38, 2011)

Key words: palatally impacted canine, orthodontic traction, surgical exposure

INTRODUCTION

Maxillary canine are essential for the functional occlusion and esthetic smile. However, the maxillary canine is second to the third molar in the frequency of impaction with an incidence of about 2%.¹ Previous studies have showed that 50% to 85% of impacted

canines were palatally displaced.² The impacted maxillary canine is often not noticed by the patient until the rest of the permanent dentition has fully erupted, or somehow diagnosed by the general dentist through routine X-ray examination. Combined surgical exposure and orthodontic

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Reprints and correspondence to: Dr. Chuan-Yang Chang, Institute of Oral Medicine, College of Medicine, National Cheng Kung University
No. 1 University Road, Tainan City, Taiwan.

Tel: 06-2353535 ext. 2970 Fax: 06-2766626 E-mail: changcy@mail.ncku.edu.tw

traction is the common approach for management of palatally impacted canines. Several studies have suggested that the initial vertical and horizontal position of palatally impacted canines may affect the treatment success and posttreatment periodontal status.^{3,4}

This case report describes the treatment procedures and results of a 10-year-old boy with a palatally impacted canine and rotated premolar. Through the cooperation of periodontist and orthodontist, we achieve an esthetic and functional outcome.

CASE REPORT

This patient was a 10-year 3-month-old boy when he first presented for an orthodontic consultation with chief complaint of impacted canine and rotated premolar on his upper left side. After review of past medical history, no drug allergies or medical problem was found. There was also no history of trauma to the teeth and no sign and symptom of TMD.

Clinical Findings:

1. Extraoral: (Fig 1)
 - I. Frontal view: Facial symmetry
 - II. Smile view: no gummy smile or lip incompetence
 - III. Lateral view: convex profile with normal nasolabial angle
2. Intraoral: (Fig 2)
 - I. Frontal view: overjet 4 mm, overbite 4.5 mm, upper dental midline deviation to the right 1 mm and lower midline shift to left 1.5 mm when compare to facial midline
 - II. Upper occlusal view: tapered arch form with 3 mm space deficiency, #24 rotated and #55 retained.
 - III. Lower occlusal view: ovoid arch form with 4 mm space deficiency.
 - IV. Buccal view: molar Class III relationship on right side and Class I relationship on left side. #24 buccal crossbite.

X-ray Findings:

- I. Panoramic X-ray finding: (Fig 3)
 - I. #23 impacted with crown tip mesial to the root of lateral incisor.
- II. Tomoperiapical X-ray finding: (Fig 4)
 - I. #23 impacted palatally.
- III. Cephalometric findings: (Fig 5 and Table I)
 - I. SNA, SNB, ANB and mandibular plane angle were within the normal range.
 - II. U1- SN, L1-MP were within the norms

Diagnosis:

- I. Skeletal Class I with ortho-divergent.
- II. Molar Class I subdivision with moderate overjet and overbite, #23 palatal impaction, #24 rotation and buccal crossbite.

Treatment plan:

- I. Upper fixed appliance for #24 de-rotation and space creation for #23.
- II. #23 Surgical exposure and orthodontic traction
- III. Full mouth fixed appliance until fully eruption of permanent dentition.

Treatment progress:

- 96.2.14** Upper fixed appliance banding and bonding
96.3.19~96.10.19 #24 de-rotation
96.10.26 full mouth banding and bonding
96.12.5 ~97.1.29 initial alignment and leveling
97.2.22 #23 surgical exposure (Fig 6)
97.3.26~97.7.17 #23 orthodontic traction (Fig 7)
97.8.18~98.2.25 correct molar and canine relationship
98.3.25~98.8.5 final finishing and detailing
98.8.19 de-banding and de-bonding
98.8.26 retainers delivery

Treatment results:

1. Extra-oral: (Fig 8)
 - I. Frontal view: no facial asymmetry
 - II. Smile view: no gummy smile or lip incompetence
 - III. Lateral view: straight profile with normal naso-labial angle

- 2. Intra-oral: (Fig 9)
 - I. Frontal view: normal overjet and overbite
 - II. Occlusal view: ovoid arch form and well-aligned teeth on both arch
 - III. Buccal view: bilateral Class I molar and canine relationship
- 3. Panoramic X-ray (Fig 10): roots were well angulated
- 4. Cephalometric analysis: (Fig 11 and Table I)
 - I. Favorable growth pattern: ANB decrease 1.5°, SNB increase 1.5°, Ar-Gn increase 4.5 mm, mandible growth more than maxilla
 - II. Mandibular plane counterclockwise rotation: SN-Mp decrease 2°, ANB decrease 1.5°
 - III. Axis of upper and lower incisors increased.
- 5. Cephalometric superimposition: (Fig 12)
 - I. Maxilla growth downward more than forward direction
 - II. Maxillary incisors were proclined and mandibular molars maintain in the same occlusal level.
 - III. Mandible growth downward and forward.
 - IV. Mandibular incisors were proclined and extruded, mandibular molars were extruded.

Table 1. Cephalometric measurements

measurements	Pre-Tx	Norms	Post-Tx	Norms
SNA	84.5°	82.1°±3.3°	85.5°	83.1°±3.9°
SNB	79.5°	78.2°±2.9°	82°	79.6°±3.9°
ANB	5.0°	3.9°±1.8°	3.5°	3.5°±2.0°
NAPg	10.5°	8.2°±4.4°	8.0°	7.3°±5.2°
SN-FH	5.0°	7.3°±2.4°	6.0°	6.5°±2.8°
SN-Mp	34.0°	33.2°±4.1°	32.0°	31.4°±5.2°
A-Nv	-0.5 mm	-0.6±2.7 mm	1.5 mm	-0.4±3.0 mm
Pg-Nv	-10 mm	-8.5±4.8 mm	-4.5 mm	-7.8±5.8 mm
UI-SN	102.0°	106.2°±5.6°	112.5°	107.3°±7.2°
UI-LI	126.5°	121.9°±8.0°	111.5°	121.4°±8.9°
UI-NP	1.0 mm	6.4±2.7 mm	12.5 mm	6.4±2.7 mm
LI-OP	71.5°	61.8°±2.7°	64.5°	61.8°±5.4°
LI-MP	97.5°	98.8°±6.1°	104.0°	99.8°±5.6°
Ar-A	87.0 mm	82.6±3.4 mm	90.5 mm	88.0±4.6 mm
Ar-Gn	108.0 mm	101.6±3.9 mm	112.5 mm	109.9±6.3 mm
A-Gn	58.0 mm	55.6±3.7 mm	60.0 mm	60.2±4.0 mm
A-Ar-Gn	32.5°	33.1±2.3°	32.0°	33.1±2.4°
Ar-A-Gn	94.0°	92.6±3.8°	94.5°	93.8±4.3°
Ar-Gn-A	54.0°	54.2±3.0°	53.5°	53.1±3.3°



Fig 1. Pre-treatment facial photographs



Fig 2. Pre-treatment intraoral photographs



Fig 3. Pre-treatment panoramic X-ray

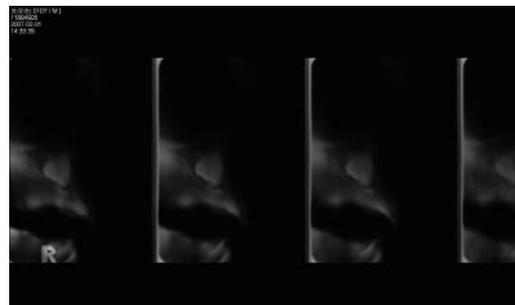


Fig 4. Pre-treatment tomography



Fig 5. Pre-treatment lateral cephalometric X-ray and tracing



Fig 6. Surgical exposure and bonding attachment



Fig 7. Orthodontic traction



Fig 8. Post-treatment extraoral photographs



Fig 9. Post-treatment intraoral photographs



Fig 10. Post-treatment panoramic X-ray

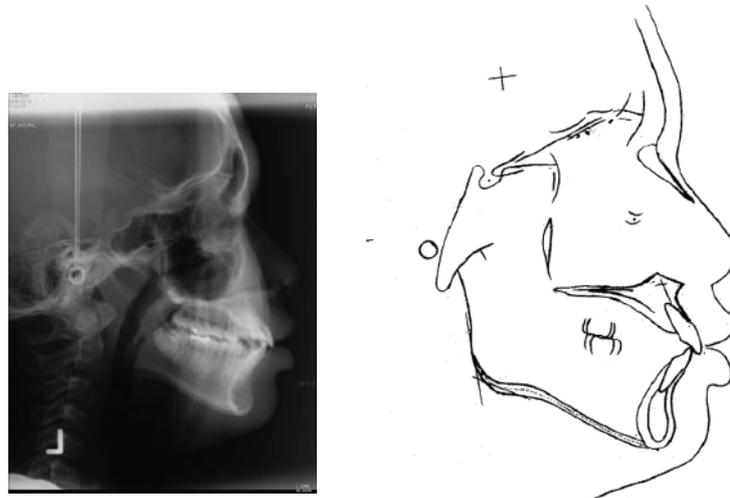
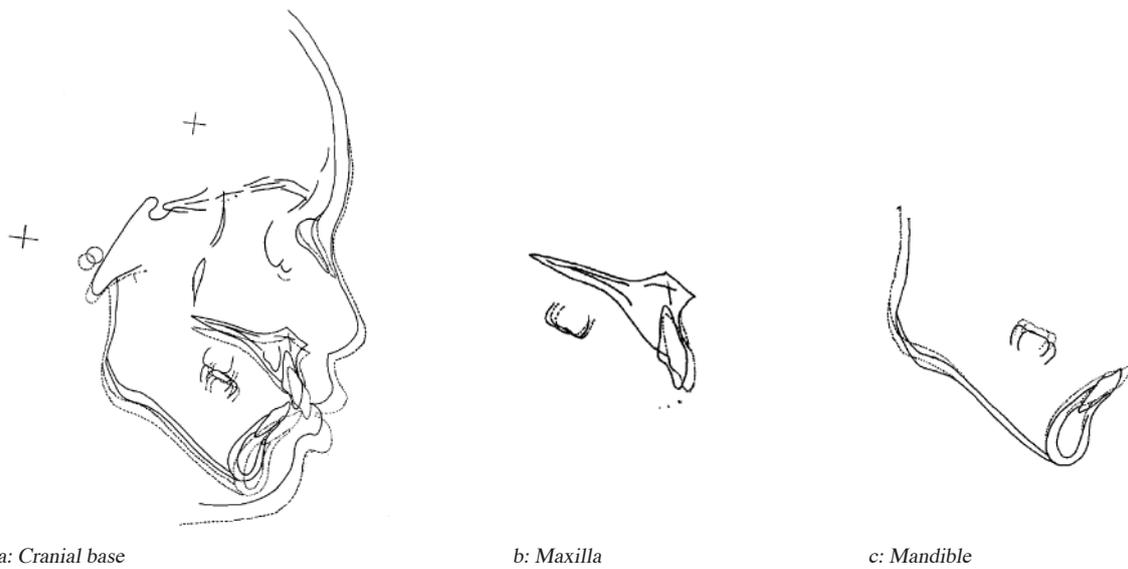


Fig 11. Post-treatment lateral cephalometric X-ray and tracing



a: Cranial base

b: Maxilla

c: Mandible

Fig 12. Superimposition of pre-treatment and post-treatment cephalometric tracing

DISCUSSION

The etiology of impacted canine could be local factors, including prolonged retention of the deciduous canine, disturbances in tooth eruption sequence, abnormal position of tooth buds, dilaceration of the root, maxillary width deficiency.^{6,7} alveolar cleft and localized pathological lesions such as dentigerous cysts or odontomas.⁵ Moreover, general factors, such as endocrine disturbance, vitamin D deficiency and genetic factors, may also play a role in canine impaction.^{5,8} Patients with impacted canine have 2.4 times higher incidence of absent lateral incisors, small or peg-shaped lateral incisors.^{9,10} Woloshyn et al found that high percentage of root resorption or root shortening of the adjacent lateral incisor and premolar on the impacted site.¹¹ In our case, we also found the roots of adjacent lateral incisor and premolar were slightly shorter than those of contralateral teeth.

There are three diagnostic methods for impacted canine: inspection, palpation, and radiography.¹² Orthodontist could early detect the impacted canine by observation of adjacent lateral incisor and premolar. Abnormal labial or palatal inclination of lateral incisor could result from the impacted canine displaced on the labial or palatal aspect of lateral incisor root. Clinical palpation of the canine bulge is also a useful method to localize the impacted canine. Several radiographic techniques have been used to assess the position of impacted canine; They are two-dimensional techniques: periapical film, occlusal film, panoramic and lateral cephalometric radiographs; or three-dimensional technique : cone-beam computed tomography. Three-dimensional image can accurately locate the position of the impacted canine and provide the information about the proximity between the crown of impacted canine and the root of adjacent lateral incisor or premolar.¹⁴

Two common methods of surgical exposure for palatally impacted canine: open exposure with free

eruption and closed exposure with bonding attachment. Zasciurinskiene et al evaluated the impact of close-eruption technique on the posttreatment periodontal health of the palatally impacted canine, and indicated that combined close-eruption technique and orthodontic traction produced clinically acceptable periodontal condition.⁴ This result agrees with the findings by Crescini et al.¹⁵ However, Kokich et al compared closed exposure and open exposure technique and suggested that open exposure with free eruption had better overall results.¹¹ According to Ericson et al, if the impacted canine crown is mesial to the midline of the lateral incisor root, there is only 64 percent of success rate for canine to normalize the erupting path after extraction of primary canine.¹⁶ In our case, considering the initial high vertical position of the impacted canine and the crown of impacted canine is mesial to the root of lateral incisor, the percentage of failure to erupt may increase and the total treatment time may be extended. Thus, we selected closed exposure technique. After treatment, the difference in the heights of gingival margin and gingival contour between the impacted canine and contralateral tooth were clinically not significant.

CONCLUSION

With proper clinical and radiographic diagnosis, careful selection of surgical technique and orthodontic mechanism, the treatment of palatally impacted canine can be an esthetic and functional result.

REFERENCE

1. Cooke J, Wang HL. Canine impactions: incidence and management. *Int J Periodontics Restorative Dent* 2006;26(5):483-491.
2. Jacoby H. The etiology of maxillary canine impactions. *Am J Orthod* 1983;84(2):125-132.
3. Kohavi D, Becker A, Ziberman Y. surgical exposure,

- orthodontic movement, and final tooth position as factors in periodontal breakdown of treated palatally impacted canines. *Am J Orthod Dentofacial Orthop.* 1984;85(1):72-77
4. Zasciurinskiene E, Bjerklin K, Smailiene D, Sidlauskas A, Puisys A. Initial vertical and horizontal position of palatally impacted maxillary canine and effect on periodontal status following surgical-orthodontic treatment. *Angle Orthod* 2008;78(2):275-280.
 5. Bishara SE. Impacted maxillary canines: a review. *Am J Orthod Dentofacial Orthop* 1992;101(2):159-171
 6. McConnell T L, Hoffman D L, Forbes D P, Jensen E K , Wientraub N H. Maxillary canine impaction in patients with transverse maxillary deficiency. *Journal of Dentistry for Children* 1996;63:190 – 195
 7. Schindel RH, Duffy SL. Maxillary transverse discrepancies and potentially impacted maxillary canines in mixed-dentition patients. *Angle Orthod* 2007;77(3):430-435
 8. Peck S, Peck L, Kataja M. The palatally displaced canine as a dental anomaly of genetic origin . *Angle Orthod* 1994; 64:249 – 256
 9. Becker A, Smith P, Behar R. The incidence of anomalous maxillary lateral incisors in relation to palatally displaced cuspids. *Angle Orthod* 1981;51:24-9.
 10. Anic-Milosevic S. Varga S, Mestrovic S. Dental and occlusal features in patients with palatally displaced maxillary canines. *Eur J orthod* 2009;31:367-373
 11. Woloshyn H, Artum J, Kennedy DB, Joondeph DR. Pulpal and periodontal reactions to orthodontic alignment of palatally impacted canines. *Angle Orthod* 1994;64:257-64
 12. Jacobs SG. Localization of the unerupted maxillary canine: How to and when to. *Am J Orthod Dentofacial Orthop* 1999;115:314-22
 13. Schmidt AD, Kokich VG. Periodontal response to early uncovering, autonomous eruption, and orthodontic alignment of palatally impacted maxillary canines. *Am J Orthod Dentofacial Orthop* 2007;131:449-55
 14. Walker L, Enciso R, Mah J. Three-dimensional localization of maxillary canines with cone-beam computed tomography. *Am J Orthod Dentofacial Orthop* 2005;128(4):418-423.
 15. Crescini A, Nieri M, Buti J, Baccetti T, Mauro S, Prato GP. Short and long-term periodontal evaluation of impacted canines treated with a closed surgical-orthodontic approach. *J Clin Periodontol* 2007;34(3):232-242.
 16. Ericson S, Kurol J. Early treatment of palatally erupting maxillary canines by extraction of the primary canines. *Eur J Orthod* 1988;10(4):283-295

矯正合併手術治療齶側阻生犬齒 - 病例報告

張禎容¹ · 劉佳觀^{1,2} · 廖世忠² · 張川陽^{1,2}

國立成功大學醫學院口腔醫學研究所¹

成大醫院口腔醫學部²

上顎犬齒在美觀及咬合功能上都佔有重要地位。治療上顎阻生犬齒的臨床病例通常需要選擇適合的手術方式將埋伏齒露出，然後利用適當矯正裝置及施力方向以避免破壞鄰近牙齒的牙根。本病例報告為一名十歲男性患者，臨床及X光檢查發現上顎左側有腭側阻生犬齒及第一小白齒旋轉現象。經牙周手術將犬齒露出並黏附矯正器，然後利用遠心方向矯正力先將阻生犬齒牙冠拉離側門齒牙根後再向頰側施力將其帶入正常咬合位置。經兩年六個月矯正治療，成功地拉出上顎腭側阻生犬齒，並且獲得良好的牙周狀況及穩定的咬合。 (*J. Taiwan Assoc. Orthod.* 23(1): 30-38, 2011)

關鍵詞：齶側阻生犬齒、矯正牽引、牙周曝露手術

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聯絡及抽印本索取地址：國立成功大學醫學院口腔醫學研究所 台南市大學路1號 張川陽

電話：06-2353535 轉2970

傳真：06-2766626

電子信箱：changcy@mail.ncku.edu.tw