

Management of an Impacted Canine with Autotransplantation and Clear Aligners

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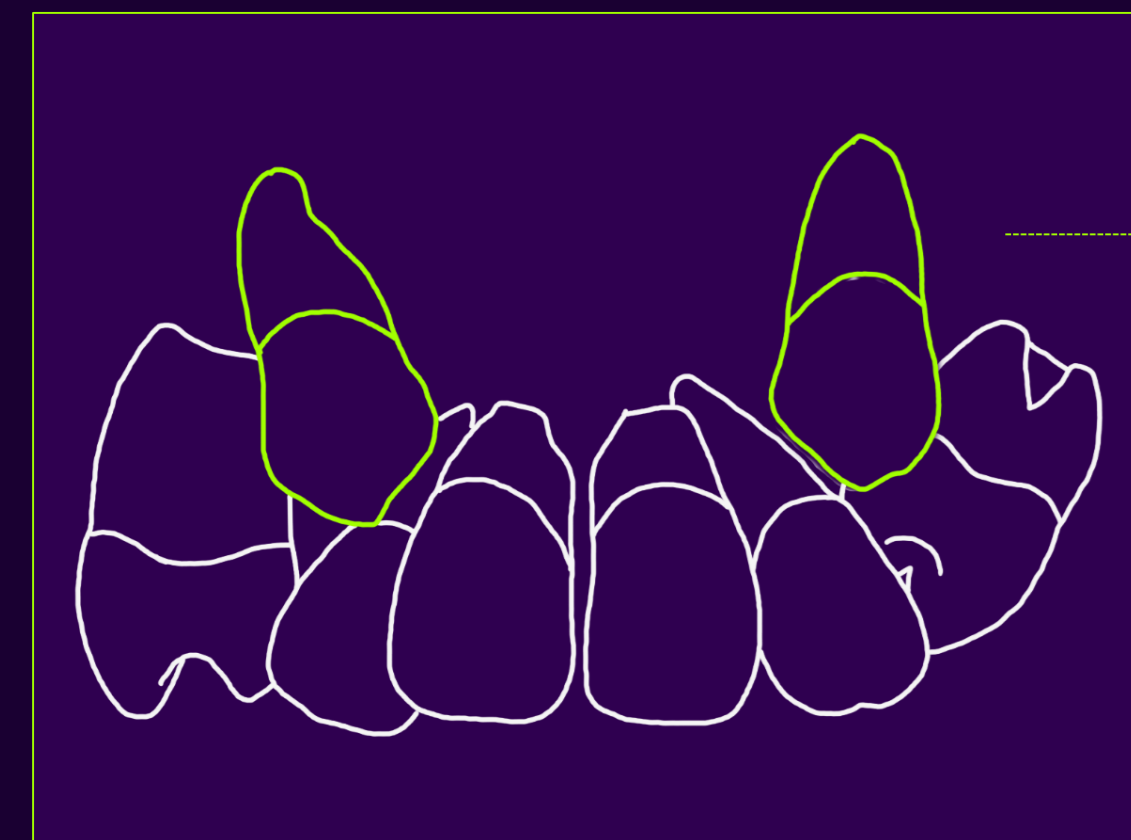


Introduction

• Impaction of Mx. canine

• Incidence :

Excluding the third molars, it is the most frequently impacted tooth.



• 1-5%
 Dalessandri D et al. (2023)

• Treatment options

- **Surgical exposure / Orthodontic traction** : If the impacted tooth is **markedly displaced** from its normal eruption path or obstructed by adjacent anatomic structures, orthodontic traction **might take longer or fail**.
- **Extraction** : Because the canine is a **functionally important tooth** in the dental arch, extraction should be considered cautiously.
- **Autotransplantation** : Autotransplantation may be attempted in relatively older patients with an **open apex**, and its prognosis has been reported to be favorable.

• CBCT & CAD/CAM



- Precise preoperative assessment of the impacted tooth is possible.
- The **width and length of the donor tooth** can be predicted.
- The **recipient site can be prepared** using a CAD/CAM-fabricated tooth replica **without using the actual impacted tooth**.

• Create recipient site with Clear aligner

- Postoperative gap retainer could be used to provide **enhanced postoperative stability**.
- Ease of **oral hygiene management** of the surgical site.
- **Orthodontic force** delivered to the autotransplanted tooth could be **easily controlled**.

Case

• Initial examination

- 9Y / F
- C.C : Impaction of Rt. Mx. canine



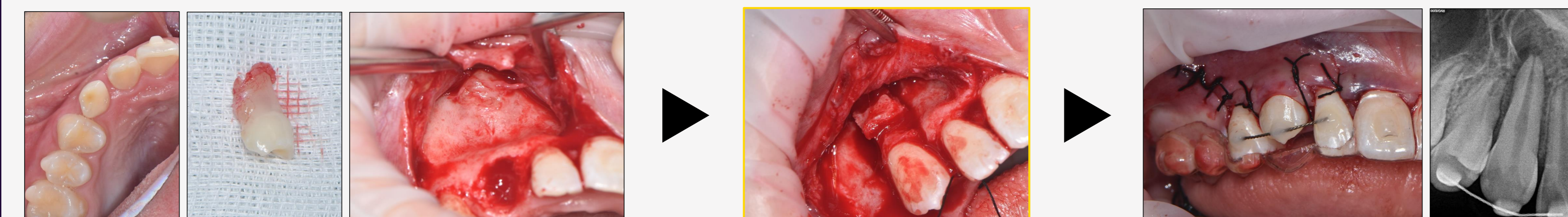
- #13 was **impacted horizontally** toward the anterior region (**between the maxillary primary canine and nasal cavity**)

• Create space for #13

- After 14 months of clear aligner treatment



• Autotransplantation of #13 under G/A



- Root resorption of #53 / **Insufficient buccal cortical bone thickness at the recipient site**
- Additional preparation of the recipient site was performed in the palatal direction.
- **Segmental Buccal Plate Repositioning** : Bone segment was obtained from the buccal aspect of the impacted #13 and transplanted to the recipient site.
- #13 was transplanted in a **slightly palatal and infraoccluded position** (approximately 0.5–1.0 mm). Buccal wire splinting was applied to stabilize the transplanted tooth.

• Establishment of a stable occlusion

- 7 months after autotransplantation of #13



- #13 was asymptomatic, with no mobility or discoloration
- Clear aligner therapy was continued to improve the deep overbite and arch form and to achieve Class I canine and molar relationships.

• Orthodontic diagnosis

Skeletal	Class I low angle (SNA 81.5 / SNB 78.0 / ANB : 3.5)
Profile	Mesocephalic / Straight
Dentition	Angle's Classification Cl.II relationship (Lt. canine & molar)
Tx. Plan	<ul style="list-style-type: none"> • Create space for #13 with Clear aligner • Autotransplantation of #13 under G/A with • Establishment of a stable occlusion (Class I canine & molar relationship) using clear aligners

- Autotransplantation was selected in consideration of the **position and angulation** of the impacted canine. (**Nolla developmental stage between 7 & 8**)
- A stable Class I occlusion is essential for post-transplant stabilization.
- In case of failure, implant replacement after growth completion is required.

• CAD/CAM-fabricated tooth replica



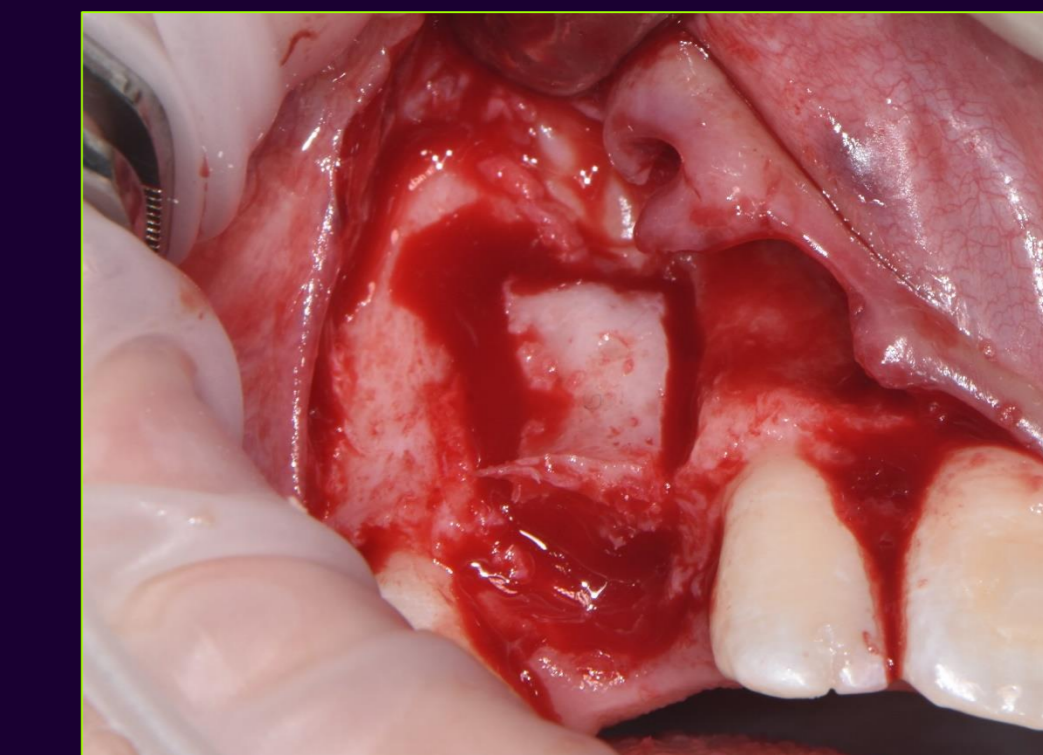
- The 3D model of #13 was fabricated approximately **0.5 mm larger in all dimensions** than the actual size measured on CBCT.
- Two **gap retainers** were fabricated to promote **periodontal healing and preserve the arch form**, with the #12–14 region designed to expose the tooth surfaces for wire splinting.

• Radiographic assessment & EPT



- Pulp canal obliteration was in progress
- No radiographic evidence suggestive of a periapical lesion
- EPT : Negative response throughout the follow-up.

Discussion



• Biological Bone Augmentation without Graft Material

- Instead of using bone substitutes, pedicled buccal bone segment was utilized to preserve the biological potential
- **The favorable blood supply and the presence of viable PDL** on the donor tooth promoted the migration of mesenchymal stem cells.
- This approach highlights **the innate regenerative capacity of young patients**, leading to successful alveolar bone remodeling and stable periodontal healing.



- CBCT-based three-dimensional planning and model fabrication reduced the extraoral time of the donor tooth, minimized periodontal ligament damage, and improved surgical accuracy and predictability.

- Clear aligners may offer clinical advantages in terms of ease of oral hygiene maintenance, protection of the surgical site, and stepwise occlusal control.



- This case report presents only short-term follow-up of less than one year; therefore, **further evaluation of long-term prognosis**, efficacy, and efficiency is required.

Summary / Conclusion

- Autotransplantation combined with digital preoperative planning and clear aligners may be a useful treatment option for managing impacted maxillary canines in pediatric patients.
- In autotransplantation in young patients, when the bone volume at the recipient site is insufficient, biological bone augmentation without graft material may be a favorable treatment option by utilizing innate regenerative capacity.



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