

ORIGINAL RESEARCH

Initial Vertical and Horizontal Position of Palatally Impacted Maxillary Canine and Effect on Periodontal Status Following Surgical-Orthodontic Treatment

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ABSTRACT

Background: The present study was conducted for evaluating initial Vertical and Horizontal Position of Palatally Impacted Maxillary Canine and Effect on Periodontal Status Following Surgical-Orthodontic Treatment. **Materials & methods:** The present study included 20 patients (10 female and 10 male) previously treated for unilateral palatally impacted maxillary canines. The impacted permanent canine could have one of two vertical positions: the canine's cusp could be above (V1) or below (V2) the horizontal reference line. The impacted permanent canine could have one of two horizontal positions: the canine's cusp could be distal (H1) or mesial (H2) to the vertical axis of the lateral incisor. Orthodontic treatment was done. The periodontal status of the first premolar, canine, and lateral incisor was evaluated by assessing periodontal pocket depth and gingival recession. All the results were recorded and analysed by SPSS software. **Results:** Following surgical-orthodontic treatment, a substantial increase in pocket depth was seen at the canine. Additionally, a link was discovered between the impacted canine's initial mesiodistal and vertical position and the periodontal health of the affected canine, the neighbouring lateral incisor, and the first premolar following therapy. **Conclusion:** Clinically acceptable periodontal conditions are achieved when impacted maxillary canines are treated using a combined surgical-orthodontic strategy.

Key words: Canine, Palatally impacted

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INTRODUCTION

The orthodontic treatment of impacted maxillary canine remains a challenge to today's clinicians. The treatment of this clinical entity usually involves surgical exposure of the impacted tooth, followed by orthodontic traction to guide and align it into the dental arch. Bone loss, root resorption, and gingival recession around the treated teeth are some of the most common complications.^{1,2}

Early diagnosis and intervention could save the time, expense, and more complex treatment in the permanent dentition. Tooth impaction can be defined as the infraosseous position of the tooth after the expected time of eruption, whereas the anomalous infraosseous position of the canine before the expected time of eruption can be defined as a displacement. Most of the time, palatal displacement of the maxillary canine results in impaction.³

⁴Correction of impacted canines requires movement in

all three directions—vertical, palatal, and buccal—which rarely occurs in orthodontic treatment of other types of malocclusion and may affect the final periodontal status of the impacted tooth. The distance and direction of movement of palatally impacted canines during treatment is determined by the canines' initial vertical and horizontal position. The effect the initial vertical and horizontal position of an impacted canine has on the canine's periodontal status after surgery with the closed-eruption eruption technique is unknown.⁵ ⁶The present study was conducted for evaluating initial Vertical and Horizontal Position of Palatally Impacted Maxillary Canine and Effect on Periodontal Status Following Surgical-Orthodontic Treatment

MATERIALS & METHODS

In the current investigation, 20 individuals with unilaterally palatally impacted maxillary canines were

included (10 female and 10 male). The average length of treatment was 15.4 months. The patients were 17.6 years old on average. On a panoramic photograph, the canine's initial position was evaluated. In respect to the nearby lateral incisor, the impacted canine's vertical and horizontal position was assessed. In order to assess the vertical location of the impacted canine, a horizontal line was drawn through the midpoint of the lateral incisor root. The vertical position of the impacted permanent canine could be either above (V1) or below (V2) the horizontal reference line. The adjacent lateral incisor's long axis served as a guide for positioning the impacted canines horizontally. The horizontal position of the impacted permanent canine could be either distal (H1) or mesial (H2) to the lateral incisor's vertical axis. There was orthodontic therapy. By measuring gingival recession and periodontal pocket depth, the first premolar, canine, and lateral incisor's periodontal health was examined. A 1 mm

accuracy was used to measure the pocket's depth from its base to the gingival margin. Mesiolabial (ML), labial (L), distolabial (DL), distopalatal (DP), palatal (P), and mesiopalatal (MP) tooth surfaces were all explored. The gingival recession of four tooth surfaces—the mesial (M), palatal (P), distal (D), and labial (L)—was measured. In the same patient, a split-mouth technique was utilised to compare the affected and unaffected sides. SPSS software was used to record and interpret each outcome.

RESULTS

Following surgical-orthodontic treatment, a substantial increase in pocket depth was seen at the canine. Additionally, a link was discovered between the impacted canine's initial mesiodistal and vertical position and the periodontal health of the affected canine, the neighbouring lateral incisor, and the first premolar following therapy.

Table 1: Periodontal pocket depth

Point of measurement		Quadrant with impacted canine (Mean)	Quadrant without impacted canine (Mean)	p-value
Lateral incisor	MPP	2.1	2.3	0.21
	PP	2.3	2.5	0.25
	DPP	2.1	2.2	0.34
	MLP	2.5	2.2	0.12
	LP	1.9	2.3	0.38
	DLP	1.8	2.1	0.44
Canine	MPP	2.4	1.9	0.46
	PP	2.3	2.2	0.35
	DPP	2.4	2.1	0.74
	MLP	2.8	2.5	0.36
	LP	1.8	2.1	0.82
	DLP	1.9	2.2	0.18
Frist premolar	MPP	1.9	2.3	0.28
	PP	2.7	2.5	0.34
	DPP	2.5	2.2	0.16
	MLP	2.6	2.3	0.28
	LP	2.5	2.2	0.39
	DLP	2.1	2.3	0.88

MPP, mesiopalatal point; PP, palatal point; DPP, distopalatal point; MLP, mesiolabial point; LP, labial point; DLP, distal labial point

Table 2: Influence of the Initial Vertical Position of the Impacted Canine on Periodontal Pocket Depth (mm) After Surgical-Orthodontic Treatment

Point of measurement		p-value: Vertical sector V1 Versus Vertical sector V2
Lateral incisor	MPP	0.45
	PP	0.84
	DPP	0.64
	MLP	0.33
	LP	0.16
	DLP	0.33
Canine	MPP	0.28
	PP	0.46
	DPP	0.39
	MLP	0.91
	LP	0.76

	DLP	0.88
Frist premolar	MPP	0.72
	PP	0.34
	DPP	0.16
	MLP	0.28
	LP	0.43
	DLP	0.29

Table 2: Influence of the Initial Vertical Position of the Impacted Canine on Periodontal Pocket Depth (mm) After Surgical-Orthodontic Treatment

Point of measurement		p-value: Horizontal sector V1 Versus Horizontal sector V2
Lateral incisor	MPP	0.16
	PP	0.74
	DPP	0.13
	MLP	0.00 (Significant)
	LP	0.25
	DLP	0.46
Canine	MPP	0.00 (Significant)
	PP	0.75
	DPP	0.46
	MLP	0.38
	LP	0.00 (Significant)
	DLP	0.00 (Significant)
Frist premolar	MPP	0.45
	PP	0.28
	DPP	0.12
	MLP	0.00 (Significant)
	LP	0.00 (Significant)
	DLP	0.00 (Significant)

DISCUSSION

The indication for the orthodontic traction of the impacted canine is more appropriate for cases with better prognosis, such as those of growing patients, without severe arch space deficiencies. Treatment involves the surgical exposure of the impacted tooth, followed or not by orthodontic traction, which will guide and align the tooth in the arch. Bone loss, root resorption and gingival recession around the pulled tooth are the most common complications of this type of procedure. In cases of surgical exposure aimed at triggering impacted canine displacement, good communication between the orthodontist and the surgeon is of the essence as to adopt the most appropriate technique. In order to choose the type of surgical exposure (open or closed) elements like impaction depth, anatomy of the edentulous area and the type of orthodontic force to be employed are some of the factors to be considered. The closed approach is strongly recommended as a treatment of choice when the tooth is impacted around the middle third of the alveolus or higher, in the vicinity of the anterior nasal spine. Since this approach replicates the natural tooth eruption, it is likely to provide the best aesthetic and periodontal results.^{7- 9}The present study was conducted for evaluating initial Vertical and Horizontal Position of Palatally Impacted Maxillary

Canine and Effect on Periodontal Status Following Surgical-Orthodontic Treatment.

Following surgical-orthodontic treatment, a substantial increase in pocket depth was seen at the canine. Additionally, a link was discovered between the impacted canine's initial mesiodistal and vertical position and the periodontal health of the affected canine, the neighbouring lateral incisor, and the first premolar following therapy. Zasciurinskiene, E et al evaluated the impact of surgical-orthodontic treatment and the initial vertical and mesiodistal position of palatally impacted maxillary canines on the periodontal health of impacted canines and adjacent teeth. The study group consisted of 32 patients with unilateral palatally impacted maxillary canines. The initial position of the impacted canines was assessed on panoramic images. The treatment protocol of the impacted canines included surgical exposure with the closed-eruption technique and fixed orthodontic appliances. A significant increase in pocket depth was found at the canine mesiopalatal point after surgical-orthodontic treatment. Also, a correlation was found between the initial mesiodistal and vertical position of the impacted canine and the posttreatment periodontal status of the impacted canine, the adjacent lateral incisor, and the first premolar. A combined surgical-orthodontic approach in the treatment of impacted maxillary canines produces clinically acceptable

periodontal conditions. The average increase in pocket depth was less than 4 mm and clinically unimportant for most patients.¹⁰ Crescini, A., et al evaluated the periodontal variables of impacted maxillary canines that were treated with a combined surgical and orthodontic approach aimed at reproducing the physiologic eruption pattern of canines. Twenty-five patients who presented with unilateral impacted maxillary canines were consecutively enrolled (age range, 13.2 to 23.2 years). They were treated with a surgical flap and orthodontic traction directed to the center of the crest and were evaluated periodontally at the end of treatment and again at a follow-up visit (2 to 5 years posttreatment). Pocket depth, keratinized tissue width, and gingival recession were recorded. At the end of orthodontic treatment, all 25 treated canines presented with normal pocket depth (2.0 +/- 0.3 mm) and a normal amount of keratinized tissue (5.0 +/- 1.2 mm). No sites showed gingival recession. At the follow-up visit, both pocket depths and keratinized tissues were slightly reduced. The combined technique permits traction of the impacted canines to the center of the crest, simulating the physiologic eruption pattern and resulting in correct alignment and good periodontal status.¹¹

CONCLUSION

Clinically acceptable periodontal conditions are achieved when impacted maxillary canines are treated using a combined surgical-orthodontic strategy.

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