

CASE REPORT

Undesirable Canting of the Occlusal Plane During Orthodontic Treatment

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Vertical positioning of the anterior teeth is assessed through the clinician's initial observation of the patient's facial dynamics, facial expression, and smile, followed by a frontal examination.¹ The esthetic ideal is complex, involving the relationship of the teeth to both intraoral and extraoral tissues. In an ideal smile, according to Sarver, the curvature of the incisal edges of the upper incisors is parallel to the curvature of the lower lip.² In general, a desirable lip line is achieved when the upper lip reaches the gingival edge, showing the full length of the maxillary central incisors.

Symmetry is another essential component of an attractive smile.³ Patients with facial asym-

metry frequently exhibit improper canting of the occlusal plane, which can be caused by unilateral molar extrusion or by asymmetrical mandibular vertical development.⁴⁻⁶ The angulation of the occlusal plane affects the relationship between the arches, with both functional and esthetic consequences.

In cases where undesirable canting of the occlusal plane is caused by dental extrusion, various nonsurgical treatment options are available, including posterior bite blocks, high-pull headgear, and active magnetic vertical correctors^{7,8}—all of which require patient compliance. The surgical alternative is a Le Fort I osteotomy combined with a mandibular bilateral sagittal split osteotomy.

A less invasive option is to use miniscrews or miniplates for skeletal anchorage during dental intrusion.^{9,10} Yao and colleagues found miniplates to be an effective and predictable means of providing anchorage for fixed appliances, with an average maxillary molar intrusion of 3-4mm.¹¹ The present article reports a case in which conventional orthodontic treatment had to be modified after undesirable canting of the occlusal plane.

Diagnosis and Treatment Plan

A 35-year-old female presented with the chief complaint of spacing and protrusion of the maxillary anterior teeth. She had a convex profile and excessive

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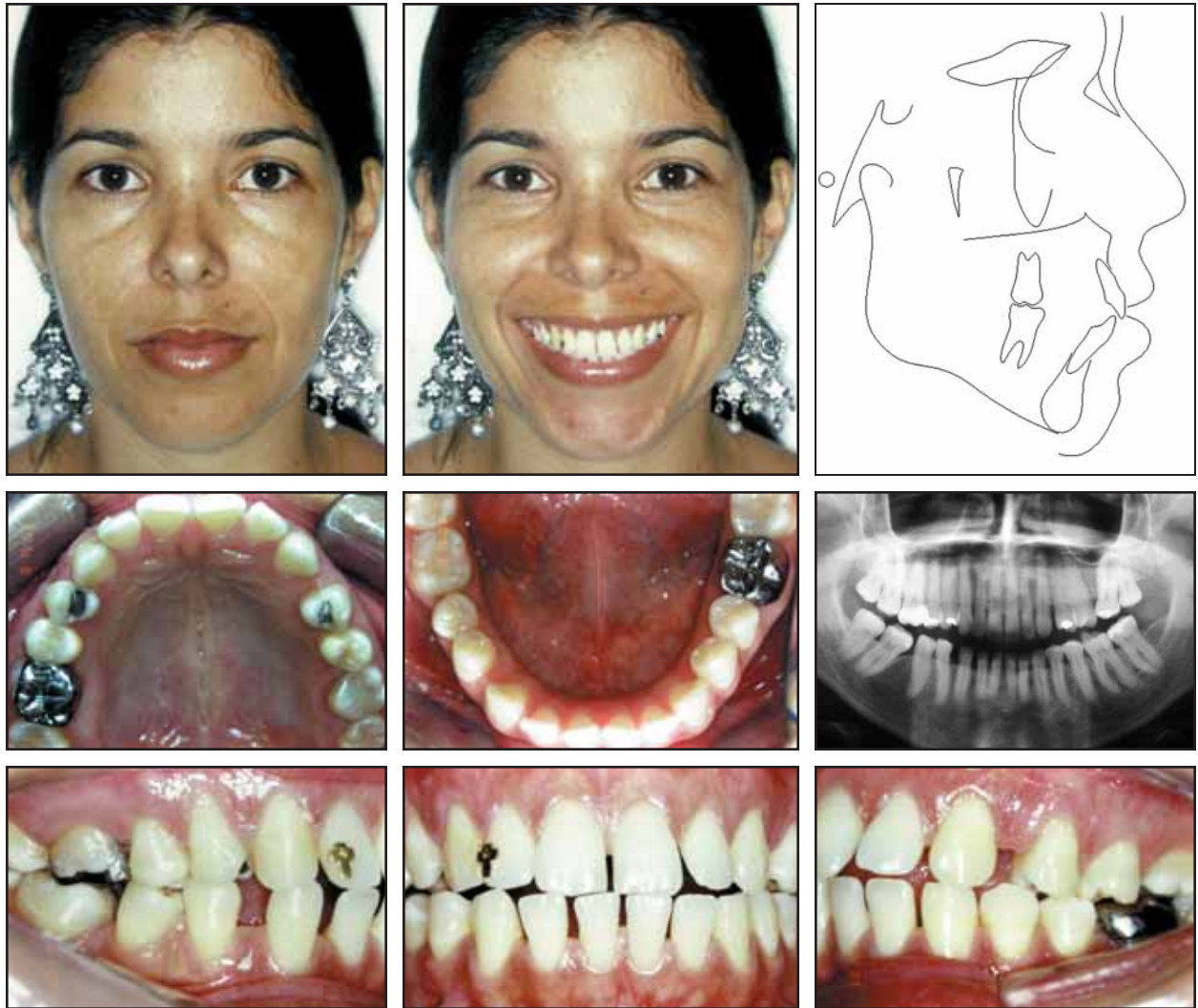


Fig. 1 35-year-old female patient with multiple diastemas and protrusion of maxillary anterior teeth before treatment.



Fig. 2 After 20 months of treatment, Class II mechanics with sliding jig initiated on right side.



Fig. 3 After 24 months of treatment, note canting of maxillary occlusal plane caused by extrusion of maxillary posterior teeth.



incisor exposure, but a symmetrical face (Fig. 1). Clinical examination revealed missing upper left and lower right first molars, an end-to-end canine relationship, multiple diastemas, and deviation of both midlines to the left of the midsagittal plane, with upper and lower shifts of 1mm and 2.5mm, respectively. The panoramic radiograph revealed generalized horizontal bone loss. Cephalometric analysis showed a skeletal Class I pattern ($ANB = 3^\circ$) with a vertical tendency and high mandibular plane (42°) and FMA (38°) angles.

The initial treatment plan involved leveling and alignment of both arches, closure of the diastemas, and correction of the upper and lower midlines to achieve a Class I canine relationship, adequate overjet and overbite, and a good interarch relationship.

*Roth Ovation prescription, Allure brackets, Dentsply GAC International Inc., 355 Knickerbocker Ave., Bohemia, NY 11716; www.gacintl.com.

Treatment Progress and Results

Full fixed appliances with ceramic brackets* and an .022" \times .028" stainless steel archwire were placed, along with intermaxillary Class II elastics. After 20 months of treatment, both arches were aligned, and no diastemas were present (Fig. 2). Because the right posterior segments were still in a Class II relationship, however, we initiated unilateral Class II mechanics with a sliding jig to promote posterior movement of the upper teeth and ante-

rior movement of the lower teeth.

After four months of sliding mechanics, we noted undesirable canting of the occlusal plane, with significant extrusion of the upper posterior segment on the right side (Fig. 3). A buccal miniplate and a palatal miniscrew were surgically inserted as anchorage for intrusion of the upper right molars, correction of the Class II canine relationship, and repositioning of the upper midline (Fig. 4).

Four weeks after placement of the miniplate, moderate forces (150-200g) were initiated with



Fig. 4 Surgical placement of miniplate.

nickel titanium springs (Fig. 5). These forces were continued for six months, until the occlusal plane had been completely leveled, a Class I canine relationship had been achieved on the right side, and other final adjustments had been made.

After three years of treatment, upper and lower fixed lingual retainers were placed (Fig. 6).

Discussion

Preventing extrusion of the adjacent teeth during the intrusion of overerupted molars is a challenge for the orthodontist. Mini-implant anchorage has become a reliable method of producing adequate intrusion with minimal side effects.¹²⁻¹⁴ Furthermore, it does not rely on patient compliance, which is especially advantageous in adult patients.

Molar intrusion with buccal force application tends to cause crown tipping. This tendency can be countered by various methods, the most common being a transpalatal arch. We achieved more controlled intrusion of the maxillary molars with an anchorage system consisting of a buccal miniplate and a palatal miniscrew. The site of miniscrew placement should be determined by such factors as root angulation and the amount of space available between the roots of the teeth to be intruded. In this case, anterior miniscrew positioning was necessary. Because the palatal application of the intrusive force would have caused buccal crown tipping, however, we applied buccal torque to the archwire.

The horizontal bone loss observed at the beginning of treatment deserves attention. Zachrisson stated that dental movement is not contraindicated in areas with bone loss, as long as gentle forces are used for as short a period as possible and proper oral hygiene is maintained.¹⁵ In the present case, the elastic force exerted by the Class II mechanics with the sliding jig may have exceeded the force limits recommended for periodontal patients, causing the extrusion of the upper right posterior segment.

Conclusion

This case shows that a combination of conventional orthodontic appliances and skeletal anchorage with mini-implants is a feasible approach to the correction of undesirable occlusal plane canting caused by molar extrusion. Not only is it a more conservative option than orthognathic surgery, but it does not rely on patient compliance, and it minimizes active treatment time.

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Fig. 5 Application of force with nickel titanium spring.

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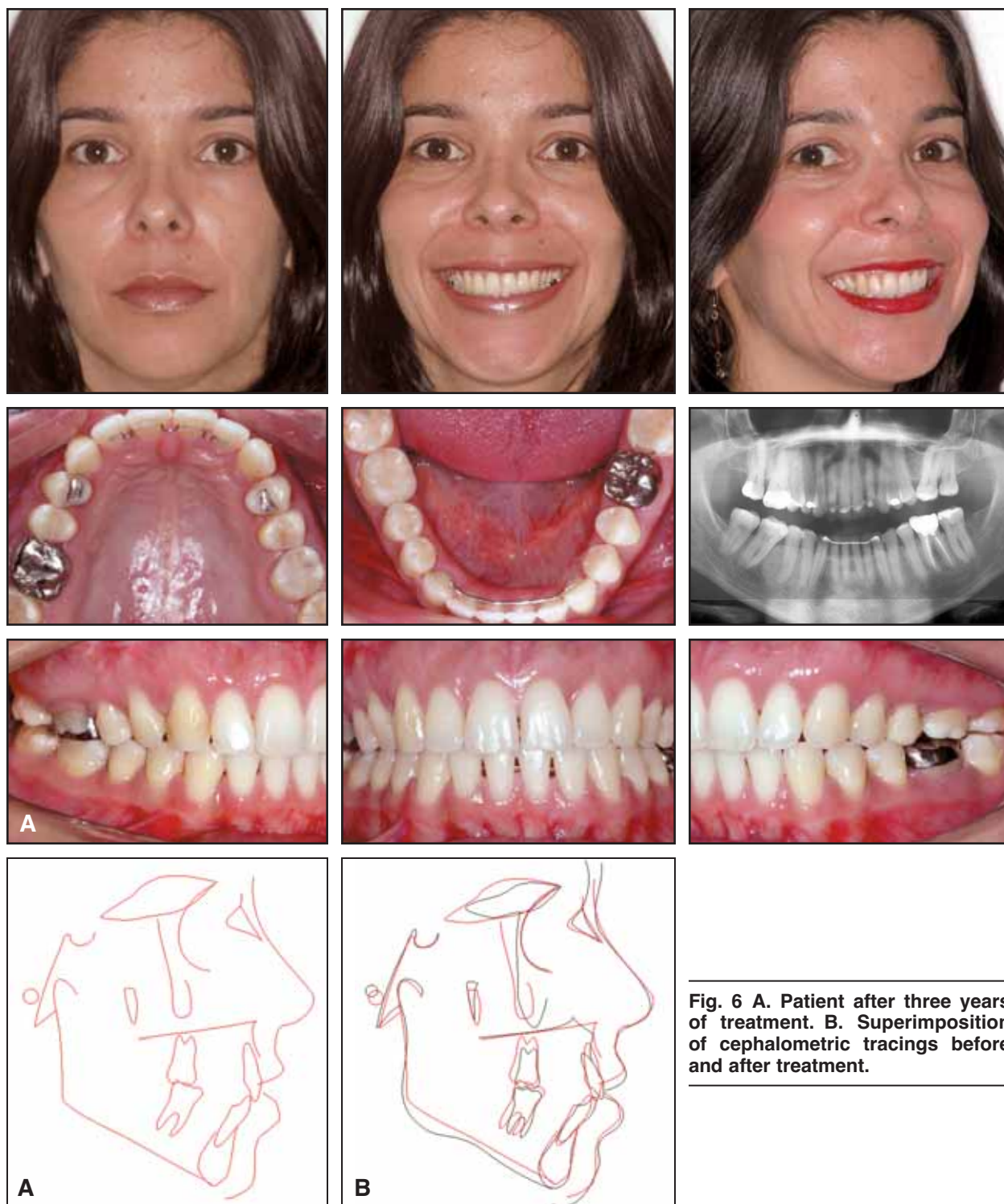


Fig. 6 A. Patient after three years of treatment. **B.** Superimposition of cephalometric tracings before and after treatment.