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CLINICAL SECTION

Clinical management in extraction cases using palatal implant for anchorage

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This case report presents a Class I extraction treatment in an adult patient with bimaxillary crowding using a palatal implant for anchorage control. The implant (pure titanium 6 mm SLA) is inserted in the middle of the palate, after a careful radiological assessment on a lateral cephalogram. At the end of the healing period (13 weeks), an anchorage device, such as a squared trans-palatal bar connecting the maxillary molars to the palatal implant, is projected and placed in order to obtain the posterior anchorage control. The orthodontic treatment was performed according to the bidimensional technique.

Key words: Orthodontic treatment, case report, palatal anchorage

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Introduction

The introduction of titanium mini-implants, inserted in the mid-sagittal area of the palate to increase anchorage, is a relatively new technique in orthodontics and the aim of this case report is to illustrate the use of the Straumann-Orthosystem palatal implant to reinforce anchorage.[1–4,9]

Design of the implant system

The Straumann-Orthosystem comprises a pure titanium implant, a healing cap with screw, and a set of burs and instruments for the insertion and removal of the implant.[5–8]

The implant consists of an intra-osseous screw, a transmucosal smooth neck in contact with soft tissues (thickness 2.5 or 4.5 mm) and an exposed part of 2 mm on which the healing cap is fixed.

The screw is made of pure titanium (grade 4), is 3.3 mm diameter and one of two possible lengths (4 or 6 mm). In order to improve the primary stability, the self-tapping thread structure is sand-blasted and acid etched. (Figure 1)

The diagnostic planning

To prevent any perforation of the nasal cavity, the first step of treatment planning is based upon careful assessment of the bone height on a lateral cephalogram following three radiological parameters:

- the position of the implant;
- the angle between the implant axis and the palatal plane;
- the distance between the superior border of implant and the superior border of palatal complex.

The surgical phase

The surgical insertion of the implant in the middle area of the palate is carried out under local anesthesia and

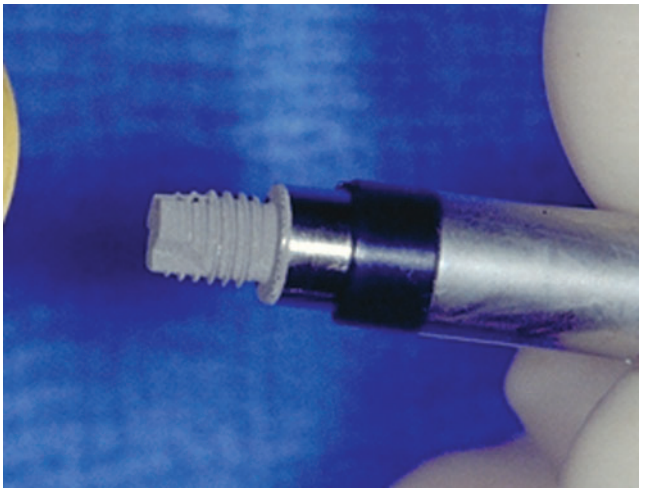

Figure 1 Self-thread intra-osseous screw (SLA), L. 6 mm

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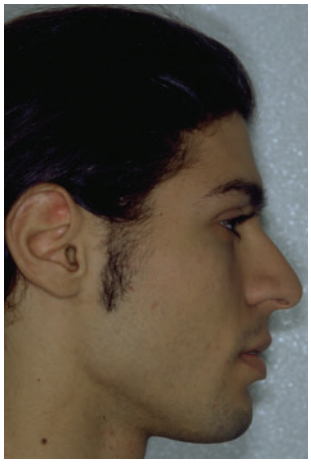

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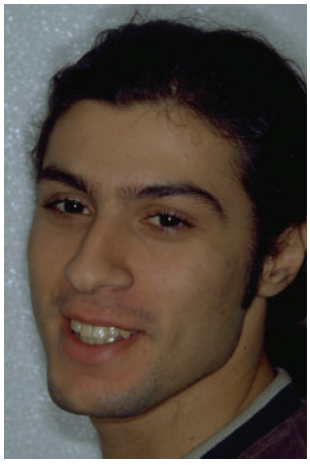

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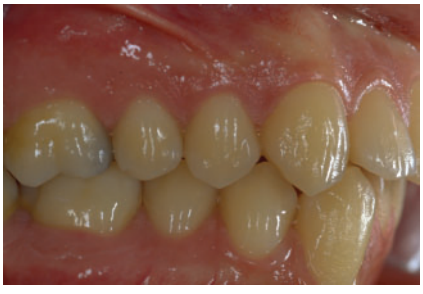

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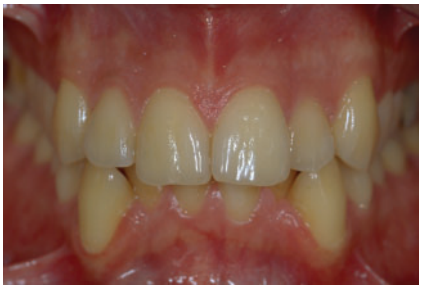

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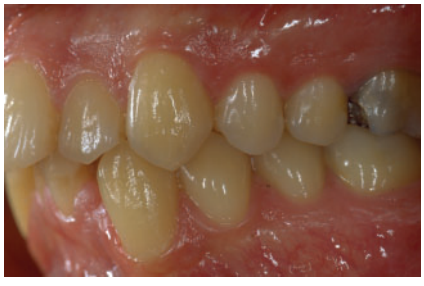

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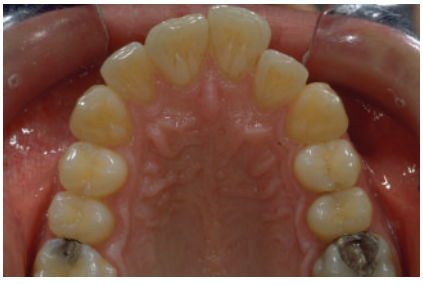

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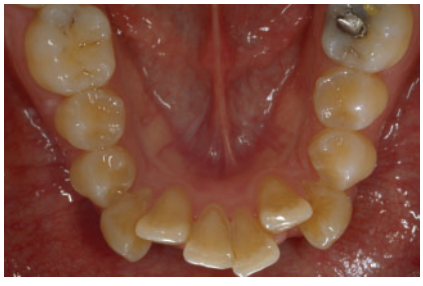

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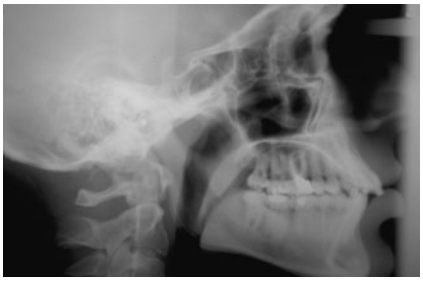

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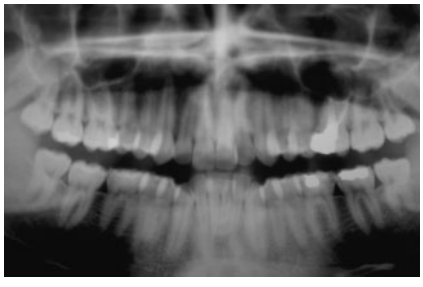

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Figure 2 (a–j) Pretreatment records

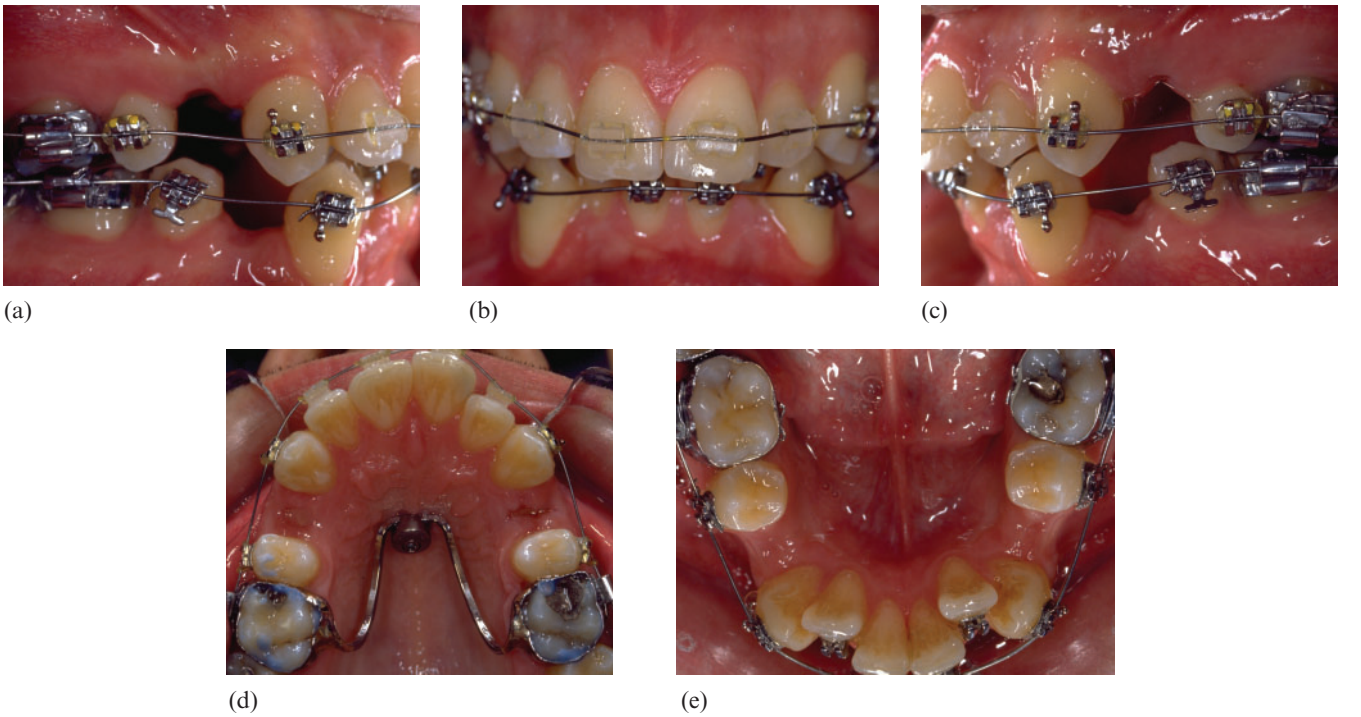


Figure 3 (a–e) First alignment phase after the bicuspids extraction. The transpalatal bar connecting first maxillary molars to the palatal implant

irrigation with physiological solution. The palatal mucosa is removed with a mucosa trephine (diameter 4.2 mm). The preparation of the implant bed is done with a standardized round burr and profile drill, and intra-operative probing of the implant bed is followed by the insertion of the fixture at an angle of about 60° to the occlusal plane.

The implant is connected to the insertion device and placed in the surgical site by hand or using a torque wrench. The last surgical phase consists of the connection of the healing cap to the implant by an occlusal screw.

After the implant has been inserted, a 13 week healing period is necessary. In order to prevent infection, antibiotic therapy and dental hygiene instruction are suggested, and the construction of a protective resin splint is planned in the same surgical insertion. Postoperative checks are planned for 7–10 days and 10 weeks following the date of insertion.

The laboratory phase

The laboratory phase starts when the osseointegration period is completed and the implant is stable. After 10 weeks the healing cap connected to the implant is exchanged for an impression cap.

An accurate polyvinyl silicon impression is taken and sent to the laboratory for fabrication of the relevant orthodontic appliance construction. In extraction cases we have used a trans-palatal bar (1.2×1.2 mm) to connect the implant to first molars in order to provide orthodontic posterior anchorage.

Clinical management

We would like to illustrate this technique with a case report of a patient with Class I bimaxillary crowding, using a palatal implant for anchorage.

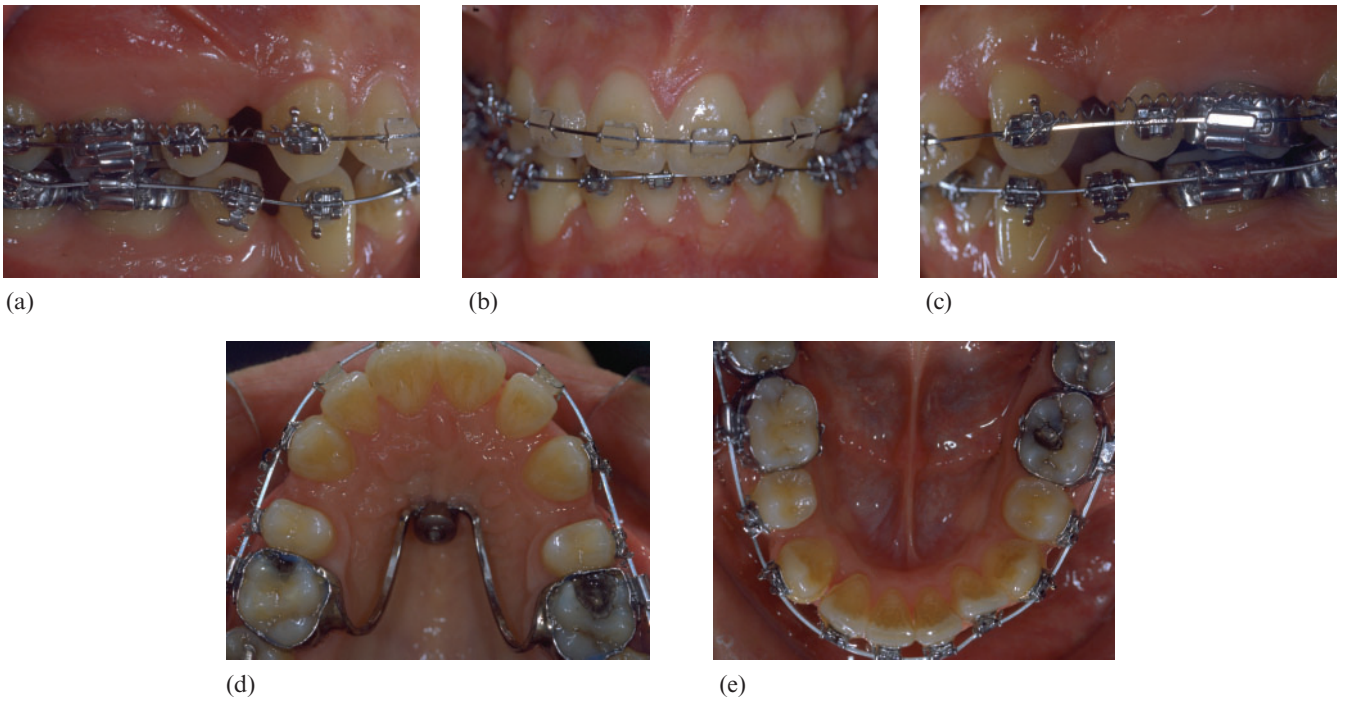
Case report

The patient, a 23-year-old man presented a Class I malocclusion with approximately 8 mm crowding in the mandibular arch and 3 mm in the maxillary arch. A harmonious profile with competent lips and a 3 mm deep bite were also present (Figure 2).

Four first premolars were extracted to gain space in both arches, and the insertion of a Straumann Orthosystem palatal implant (L 6 mm) was planned to achieve absolute control of the posterior anchorage.

Treatment followed the typical three phases of the bidimensional technique:[10]

- Dental arch alignment using 0.016 inch NiTi archwire (Figure 3).



(a) (b) (c)

(d) (e)

Figure 4 (a–e) Second phase of treatment: canines retraction with sliding mechanics

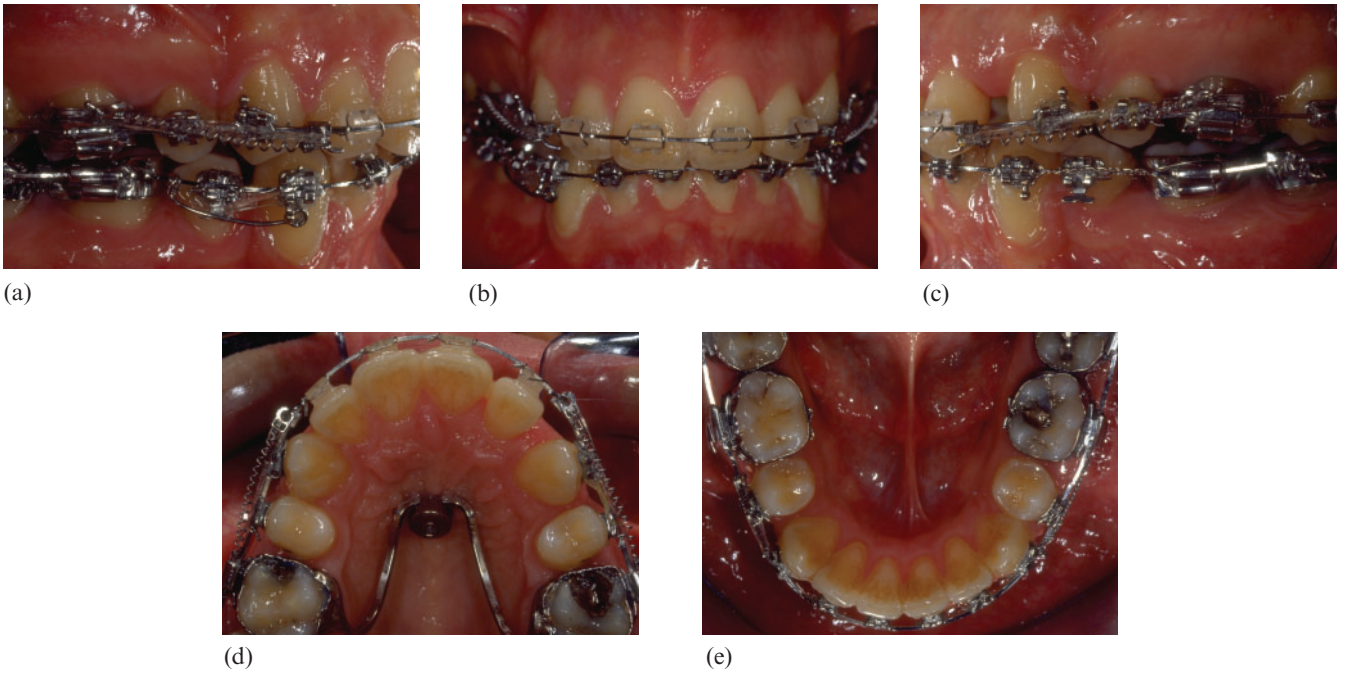


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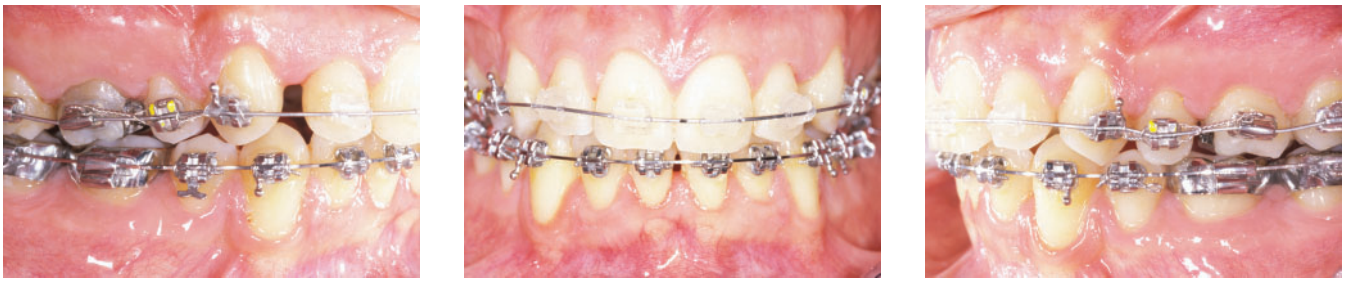
Figure 5 (a–e) Third phase of treatment: front teeth retraction



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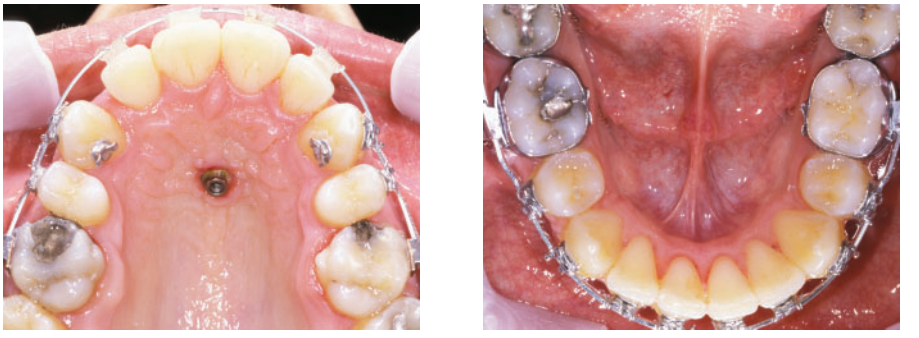

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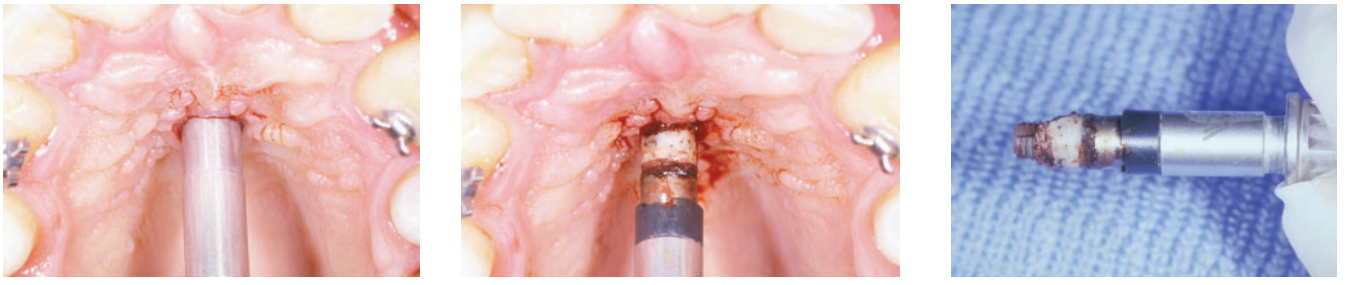
Figure 6 (a–e) Finishing phase

- Cuspid retraction was accomplished using 0.016 × 022 inch stainless steel (SS) wire in the maxillary arch and 0.016 × 022 inch SS wire in the mandibular arch with a reverse curve of Spee.

Ni-Ti 150 g coil spring from the molars hooks to the canines, provided the closing forces required for canine distalization (Figure 4).

- Retraction of the front teeth was accomplished by means of sliding mechanics on an 0.018 × 022 inch SS wire with an accentuated curve of Spee. Ni-Ti coils, exerting 300 g of force were extended from the hooks on the molar tubes to the hooks on the arch wire distal to the lateral incisors (Figure 5). Finishing was performed using light wires (Figure 6).



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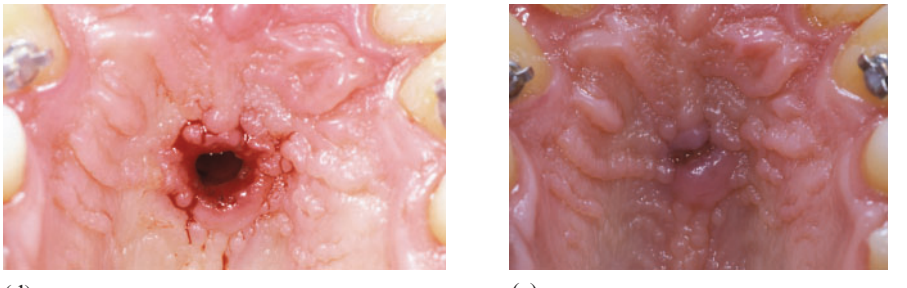
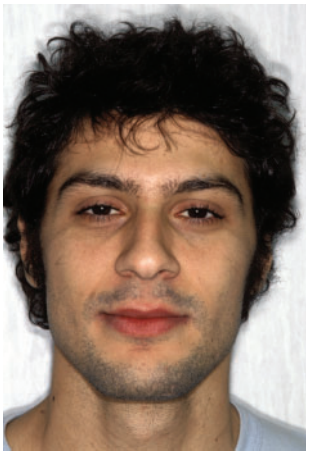


(d) (e)

Figure 7 (a–e) Implant removal and healing after 3 weeks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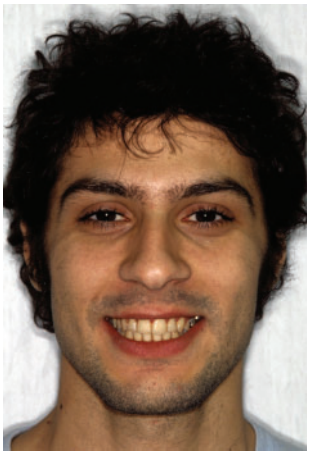
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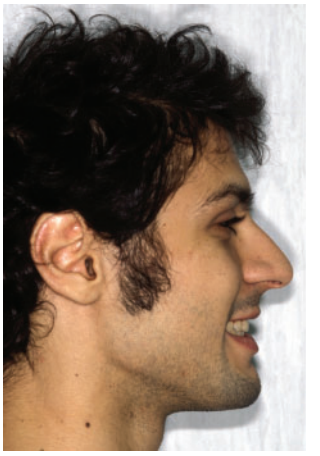
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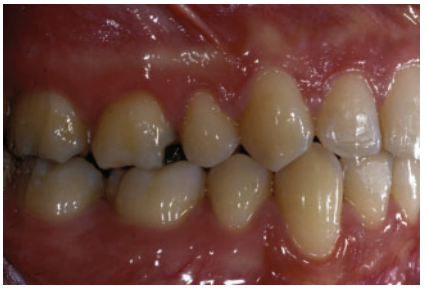
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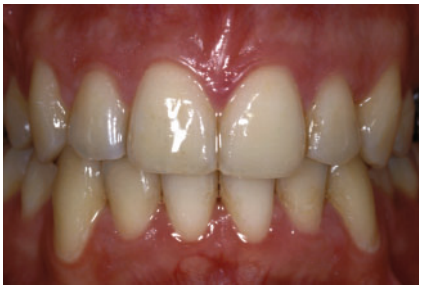
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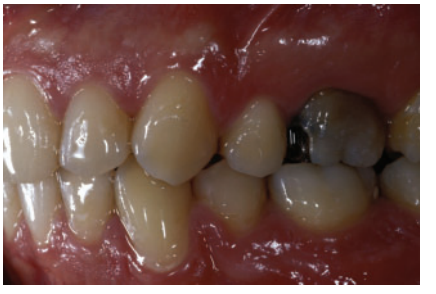
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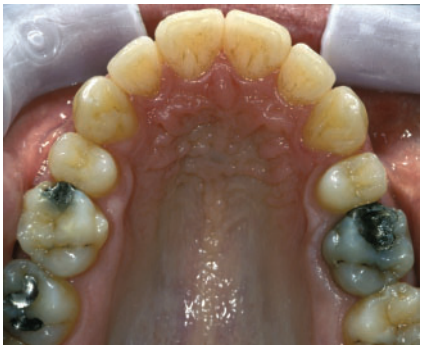
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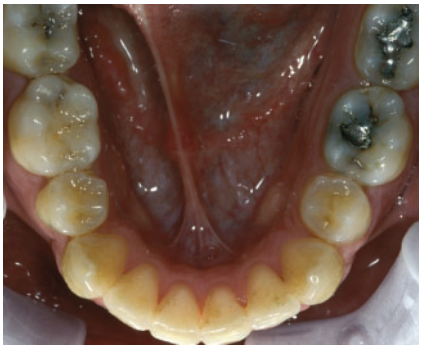
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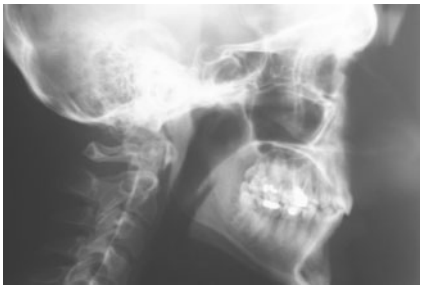
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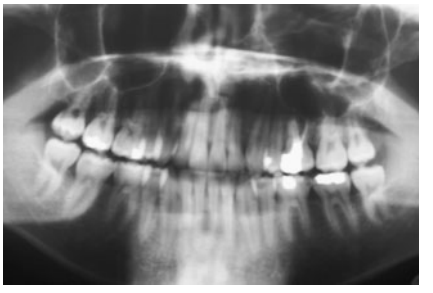
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Figure 8 (a–j) Post-treatment records

The therapy lasted 24 months. Figure 8 illustrates the post-treatment records.

The final step included surgical removal of the palatal implant followed by healing of palatal mucosa. Timing for implant removal usually coincides with the orthodontic finishing phase when maximum anchorage is not required. Usually the transpalatal bar is removed before surgery and the implant is covered with a healing screw.

The palatal implant is surgically removed under local anesthesia.

The surgical kit needed for implant removal includes:

- trephine with markings at 4–6 mm;
- insertion device used anti-clockwise.

The surgical technique is schematically reproduced in the illustrations (Figure 7).

Conclusions

Straumann-Orthosystem may be an effective and flexible method enhancing more traditional orthodontic anchorage techniques, particularly in extraction cases.

Our clinical experience has also shown it is well tolerated by patients, and that surgical implant insertion and removal is relatively simple and without serious risks for the patients.

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