PROMOTING THE DEVELOPMENT OF IMPLANTS IN GENERAL PRACTICE

**The taming of the screw**
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**Unrestricted views for precise placement**
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A 21-year-old male was referred to Carisbrooke Dental Practice by his general dental practitioner to explore the possibility of having the spaces at the upper right lateral incisor (UR2) and first premolar (UR4) sites restored with implant treatment.

The patient had a history of ectopic canines, microdontia and hypodontia. He had recently completed a course of orthodontic treatment at Peterborough Hospital to concentrate the spacing at the UR2 and UR4 positions (Figure 1). He was wearing a removable retainer full-time.

Initial examination
The patient’s teeth were generally conical in shape, with thin enamel, and areas of hypoplastic enamel buccal to the upper anterior teeth. Enamel erosion was evident, particularly on the palatal aspect of the upper anterior teeth.

The edentulous spaces at UR2 and UR4 demonstrated good attached gingiva, and appeared to have sufficient vertical bone height, but there was significant buccal bone loss. Following a discussion about dietary factors relevant to enamel erosion, treatment options for the edentulous spaces were explained.

Considerations for treatment
The options included provision of a removable partial denture. Resin-retained bridges were another possibility, using a metal or zirconia wing attached to the second premolar (UR5) to replace the UR4, and to the canine (UR3) to replace the UR2. Conventional cantilever bridges, attached to the UR5 and UR3, or the placement of two implants into the UR2 and UR4 spaces were also considered.

As the patient had a reduced amount of enamel, and erosion was also present, the long-term prognosis for resin-bonded bridges could be uncertain. However, the risk with dental implant treatment at the age of 21 is that continued alveolar growth may well result in the need to replace implant restorations in future, due to developing disparity in incisal or occlusal levels, relative to adjacent teeth.

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Neil Millington describes how dynamic navigation enabled him to accurately place two implants in narrow spaces using a flapless approach.

Unrestricted view aids precise flapless implant placement
Diagnostic scan results
Following a detailed discussion regarding the pros and cons of the different treatment options, the patient was keen to investigate the possibility of implant treatment and proceeded with cone beam computed tomography (CBCT) assessment. The scan confirmed the presence of reduced enamel thickness and large pulp chambers were evident in many of the teeth.

Conventional crown and bridge work would not be recommended for such a young patient with unrestored teeth
As expected, the vertical bone heights at the UR2 and UR4 sites were good. Although the ridge width at both sites was reduced, there was sufficient width for 3mm diameter implants, without having to resort to further procedures such as ridge splitting. The width in a mesiodistal direction of the edentulous space, especially at the UR2 site, was also reduced but enough space was present for a 3mm diameter implant.

Flapless approach
The gingival architecture was scalloped, and the tissues were relatively thin. As a result, a flapless approach was favoured, in order to reduce the risk of recession against the adjacent teeth. Additionally, this normally results in significantly less postoperative discomfort than a flapped technique.

One of the main issues with choosing to use a flapless approach in a situation where there is limited space, in both buccolingual and mesiodistal planes, concerns the accurate preparation of the osteotomy site. Previously, in similar cases, conventional printed drilling guides have been used. However, it is not easy to confirm the accuracy of these guides at the time of surgery and, with the guide in position, it is difficult to visualise the exact entry point through the mucosa.

Targeting perfection
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Completely unimpeded vision
Using dynamic navigation with Navident allows completely unimpeded vision of the surgical site, and the accuracy of the system can be easily verified at the time of surgery. With a conventional drill guide, guidance is provided by the metal sleeve through which the shank of the drill passes.

In a case such as this, with adjacent teeth and a drill guide in position, the drill bits would be unavoidably long. As the distance from the cutting drill tip to the guiding metal collar increases, the accuracy of guidance decreases. However, with dynamic navigation, the system guides the actual cutting tip and, therefore, the accuracy achieved is not affected by the drill length.

Excellent implant positioning
The planning and placement was carried out using Navident with the Trace and Place protocol. The scan data was loaded into the Navident software and the ideal implant positions plotted (Figure 2). An optical marker was attached between the UL1 and UL2 using Voco blue flowable composite, without bonding, to provide a constant reference to the teeth in the maxilla (Figure 3).

To establish the relationship between the CBCT image and the outline of the teeth, reference areas on five existing teeth were mapped with a tracing tool. Accuracy was ensured by correlation of the tracing tip placed against a reference point on a tooth, with the virtual location shown on the CBCT scan before treatment commenced. The drill tip location was verified in a similar process, prior to each implant site preparation.

The osteotomies were prepared directly through the mucosa (Figure 4) and Dentsply Sirona Astra Tech Osseospeed EV 3.0S implants (11mm length for UR2 and 8mm length for UR4) were placed to the planned depth, with dynamic navigation providing real-time feedback for both phases (Figure 5).

Healing abutments were fitted (Figure 6) and the partial upper orthodontic retainer was adjusted to avoid contact against them. The procedure went smoothly, from both the clinical and patient's perspectives. Post-placement periapical radiographs confirmed excellent positioning of the implants in relation to the mesiodistal positions and in correlation with the original plan (Figures 7a and 7b). Postoperative healing was uneventful, with little or no discomfort.

The final restorations, Dentsply Sirona Atlantis gold-shaded titanium custom abutments with cemented zirconia-layered crowns (Figure 8), were fitted 15 weeks post-placement (Figure 9).

Confidence and accuracy
The patient was delighted with his newly fitted crowns and found the whole treatment process straightforward. Dynamic navigation with Navident has given the author the confidence to carry out implant placement in relatively narrow ridges using a flapless approach, which results in reduced morbidity and less postoperative discomfort.

Without the use of dynamic navigation, the proximity of the adjacent roots would have been of particular concern. It is doubtful the degree of correlation between the planned and final implant positions would have been achieved had any other technique been used, whether guided or not.

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