Platelet-rich fibrin: a clinical review

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“What makes Navident stand out is it precisely guides the surgeon to prepare and place the implant. The software shows the drill position on the scan in real time, as it enters the jaw.”

David Burgess BDS DPDS MScConSed
Carbis Bay Dental Care, St Ives, Cornwall

*Average error of 0.4mm in internal bench tests with a range of operating conditions.

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A 61-year-old female presented with lower teeth that were failing due to periodontal disease (Figure 1).

Only the second premolars and the six anterior teeth remained in the lower jaw. The anterior teeth were being stabilised with a lingually cemented, resin-retained splint, with considerable mobility in all six teeth.

The lower second premolars were firmer but had a poor long-term prognosis caused by significant surrounding bone loss.

In the upper jaw there was a satisfactory six-unit bridge from canine to canine (Figure 2), and a worn partial acrylic denture.

Following a detailed clinical examination and radiographic assessment with a dental panoramic tomograph (DPT), it was clear that the lower anterior teeth were failing and would require extraction in the near future (Figure 3).

The DPT confirmed the poor prognosis for the lower second premolars. There was insufficient bone distal to these teeth to consider safe placement of dental implants, without the added complexity of horizontal ridge augmentation.

Cost-effective, stable treatment

The patient had a limited budget but did not wish to be without teeth at any time. The treatment options available were a partial acrylic denture retained by the remaining two premolars (until they failed), a conventional full denture or an implant-supported denture.

The patient wished to have a cost-effective, stable alternative to her failing teeth. She elected for treatment with an immediate full acrylic removable lower denture, supported by four dental implants, and a new upper partial acrylic denture.

The implants would be placed immediately after extraction of the remaining lower teeth. Zest Anchor abutments would then be placed on to the implants and Zest Anchor denture caps secured into the denture at the same visit.

Impressions of the remaining upper and lower teeth were taken for the manufacture of a new upper partial acrylic denture and an immediate full lower acrylic denture (Figure 4).

Due to the presence of extensive toothbrush abrasion cavities on the buccal surfaces of both lower second premolars, there were repeated breakages of these teeth in plaster models. Consequently, a digital impression was provided to the technician using the 3M True Definition intraoral scanner, so that acrylic models could also be fabricated (Figure 5).

These models then formed the foundation for the construction of a radiopaque polymethyl methacrylate (PMMA) duplicate of the planned lower denture, with the lower second premolars acting as bilateral supports.

Edentulous treatment planning protocol

In order to place the dental implants in the optimum position to provide immediate stability to the denture, dynamic navigation was employed using the Navident edentulous kit.
A fiducial marker was supported by a temporary small diameter implant (SDI), which was placed in the midline of the mandible immediately after the six lower anterior teeth were extracted.

The lower second premolars were retained for CBCT scan acquisition only, in order to support a radiopaque PMMA replica of the new denture. This fitted over the retained lower second premolars and acted as a radiographic guide to the position of the planned denture teeth.

The six splinted lower anterior teeth were extracted asatraumatically as possible. The SDI provided with the Navident edentulous kit was then placed vertically in the midline of the mandible, a little labial to the sockets.

Once good stability of the SDI had been achieved, the full arch bilateral fiducial marker was secured to the head of the SDI with the supporting arm. The radiopaque PMMA replica was inserted over the retained lower second premolars (Figure 6).

A scan was taken with a Morita 3D CBCT system (Figure 7). The scan was checked before the fiducial marker was removed from the supporting arm fixed to the head of the SDI. Once the CBCT scan was uploaded into the Navident planning software, it was possible to simply outline the position of the planned denture teeth.

**Precise planning and placement**

The optimum position for each of the four dental implants, in the lower first premolar and lateral incisor sites, was easily plotted with the software to ensure the proposed placement allowed precise insertion of the planned Zest Anchor abutments (Figure 8).

The abutments would extend from the implants into the central arch of the undersurface of the lower denture and, in turn, would facilitate placement of the Zest Anchor denture caps within the denture acrylic. Ideally, the denture caps should be surrounded by a substantial layer of acrylic.

The Navident jaw tag was attached to the supporting arm, which was still firmly fixed on to the head of the SDI. A Navident drill tag was attached to the surgical handpiece, using Navident’s universal adapter, to enable the drill tip to be tracked by the Navident system.

Four Dentsply Ankylos C/X implants were then placed in the lower first premolar and lateral incisor sites, using dynamic navigation to guide preparation and placement in to the planned positions (Figures 9 and 10).

The Navident protocol was followed to ensure each drill was calibrated prior to use. Accuracy was then checked prior to surgery using the retained lower second premolars as verification landmarks.

Once the four implants were placed, the lower second premolars were extracted and the SDI supporting the jaw tag was removed. Zest Anchor abutments were then fitted on to each of the implants. Sutures were used to close any open wounds (Figure 11).

Some acrylic was removed from the fitting surface of the lower full denture, so that the denture fitted easily over the top of the abutments. Zest Anchor denture caps were fitted over each abutment and picked up inside the denture using Tokuyama Rebase II cold cure acrylic.

The patient was given postoperative instructions and advised to have a liquid diet only for the first two weeks following implant placement.

After socket healing has occurred and implant integration has been established, the denture will be relined to maintain a good fit with the underlying tissues. The patient will also have the option, if she should wish, to have the removable denture replaced with an implant-retained fixed prosthesis.

**Accurate and predictable alignment**

The single SDI provided effective support for both the fiducial marker during the planning stage of treatment, and the jaw tag during the surgical phase.

The additional information imparted in the CBCT scan, by including a radiopaque replica of the planned denture, allowed the optimum position of the dental implants to be established.

Precise placement of the implants was facilitated by the use of dynamic navigation. Superimposing the virtual drill on the preoperative CBCT scan in real time provided reassurance during planning and surgery that the implants were being positioned within bone in all planes.

This ensured the alignment of the abutments and denture caps was predictable and accurate, providing stability to the denture from the outset.

**Figure 7:** A scan was taken with a Morita 3D CBCT system, with the fiducial marker in place

**Figure 8:** The optimum position for each of the four implants in the lower first premolar and lateral incisor sites was easily plotted with the Navident software

**Figures 9 and 10:** Four Dentsply Ankylos C/X implants were then placed in the lower first premolar and lateral incisor sites, using dynamic navigation to guide preparation and placement in to the planned positions

**Figure 11:** Zest Anchor abutments were then fitted on to each of the implants and denture caps secured into the denture using cold cure acrylic. Sutures were used to close any open wounds