The era of monolithic translucent zirconia

Despoina Chatzistavrianou, Shakeel Shahdad and Philip Taylor put this modern ceramic under the microscope

Implant placement in a juvenile patient
By Amr Zahran and Basma Mostafa

Feeding the pension pot
Retirement saving for the self-employed

Hitting the target
Bringing dynamic navigation to bear on optimum implant placement
The complete picture for accurate planning and placement

David Burgess describes how he combined CBCT and intraoral scan data with computer-guided dynamic navigation to place implants in the optimum position

A 69-year-old male patient attended Carbis Bay Dental Care with concerns about the impact of recent loss of a three-unit bridge supported by two upper incisors. The patient was keen to explore the possibility of restoring his upper anterior region with individual implants, rather than adding to an existing implant-retained upper partial denture. He was a non-smoker and well motivated.

A history of pulmonary emboli necessitated the taking of warfarin, with a stable International Normalised Ratio of 2.6.

Quick and simple data import
Dental implants were planned for the upper right central and lateral incisor, and upper left central incisor sites (Figure 1).

An initial assessment was made from 2D periapical radiographs to ascertain the likelihood of adequate bone depth.

Prior to treatment planning with the Navident planning software, a 3M True Definition Scanner was used to acquire a 3D image of the upper teeth with the partial denture in place. The patient was happy with the position of the denture teeth and was keen that the planned implant-supported crowns replicated their size, shape and position.

A fiducial marker was attached to a custom-made support, known as a Navistent, on the three remaining upper left teeth.

Fabrication of the Navistent is quick, easy and takes place chairside, using a unique thermoplastic material that is moulded directly onto the patient’s existing dentition. The Navistent is designed and fabricated to ensure a high level of stability, while providing unrestricted access to the planned implant sites (Figure 2).

A CBCT scan was then taken to provide...
Bone loss that would require guided bone regeneration (GBR).

The Navident jaw tag was attached to the Navistent and fixed over the remaining upper left teeth. The drill tag was attached to the universal adaptor on the surgical handpiece. Both drill axis and tip were quickly calibrated and verified, a process that only takes a few seconds. Initial preparation of the first implant site was carried out with a 2mm pilot drill using Navident’s dynamic navigation.

Reassurance of real-time feedback

Once both drill tip location and angulation are established by the Navident camera, the position of the drill relative to the jaw is analysed by the Navident software and preparation of the implant site can begin (Figure 4). The drill appears virtually on the CBCT scan, so that its exact 3D position can be monitored throughout implant site preparation (Figure 5). The cross-hair target on the Navident screen indicates the starting point for preparation using dynamic navigation. The real-time illustration of the virtual drill and handpiece confirms the location of the drill tip and its distance from the end point of implant site preparation. It also shows any angular deviation or axial displacement from the planned alignment. Constant adjustment to depth and angulation can be made to follow the pre-planned, desired position.

In this case, preparation of each site with the pilot drill was achieved within 0.1mm of the pre-planned position, with a maximum deviation of 0.5°. The ability to watch the drill virtually on the CBCT scan, as each implant site was prepared, allowed the exact point at which to cease vertical drilling to be judged visually (Figure 6).

The procedure was then repeated using a 3mm and 3.5mm drill, following calibration and verification each time the drill was changed (Figures 7 and 8). Final site preparation was also within 0.1mm of the planned centre point, and within 0.5° angular deviation (Figure 9).

Three Dentsply Ankylos C/X implants (3.5mm diameter, 11mm length) were attached to a drill driver, calibrated on the jaw tag in the same way as a drill, and inserted (Figure 10). The placement of each implant was then monitored on the computer screen in real time, with the final 3D position represented digitally, providing reassurance that the implants were positioned as planned.

Navident was used to help accurately place the implants in the pre-determined positions without the need for a static drilling guide. This enabled placement of the implants in the optimum amount of bone and ensured that their alignment made future impression taking...
Final site preparation was also within 0.1mm of the planned centre point, and within 0.5º angular deviation.

Three Dentsply Ankylos C/X implants were inserted.

4.5mm Ankylos Balance Posterior sulcus formers were fitted and GBR carried out.

To protect the implants during the healing process, 4.5mm Ankylos Balance Posterior sulcus formers were fitted. The labial bone was augmented with a combination of bovine and human heterogeneous bone particles, stabilised with a porcine collagen membrane (Figure 11).

Following periosteal release to ensure a tension-free flap, simple sutures were used to close the incision. The denture was fitted as a temporary prosthesis. The implants are to be restored in three months, with custom-made titanium abutments and zirconia crowns.

Best restorative outcome

The clinical outcome was excellent, with well-positioned implants and good primary stability. The ability to quickly and easily import both DICOM and STL data files into the Navident software simplified the planning process.

Combined with the reassurance of computer-guided dynamic navigation, this ensured precise implant placement to provide the best restorative outcome. The patient was both impressed and reassured by the state-of-the-art technology used in his treatment.
Navident

Targeting Perfection

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See where the tip of the drill actually is, not where you think it is. Navident allows you to prepare the implant site completely freehand and with greater precision and confidence, using your CBCT data in real time as your virtual guide.

- Precision guidance for increased accuracy within 0.5mm of treatment plan*
- Easy to use, reducing time and expense with a simplified digital workflow
- Plans can be modified at any time, even during treatment
- Enables minimally invasive flapless drilling without a physical guide
- Provides even greater value from your CBCT data

“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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