Digital dentistry 'at its best'

Nilesh Parmar analyses how guided surgery can be used to meet a patient's expectations

Introduction

As an implant dentist, patient expectations can sometimes be unreasonable. In fact, as any dentist, we have to defend ourselves from patients who appear to want the world for nothing. Once a tooth is lost, it is impossible to replicate it in every way; we simply do not possess the technology yet. Implants are as close as we can get to replace a missing incisor or molar tooth but even they have their limitations. The original work by Branemark required a period of time before implants could be loaded and restored, usually in the region of 3-5 months. However, recent developments have led to the possibility of implant placement and immediate restoration.

Patient's main complaint

This man came to see me having recently had his UR1 extracted (Figure 1). He was a

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Education aims and objectives
To understand how advances in digital imaging and the adaption of conventional techniques are making implant therapy more predictable, affordable and efficient.

Expected outcomes
To grasp the process of placing an implant using digital guided surgery in the UR1 site, and immediately restoring the implant with a provisional restoration and using a screw-retained crown for a long-term prosthesis. Subscribers can answer the CPD questions on page 82.

Figure 1: The patient presented with a recently extracted UR1. His overall dental condition was poor and he needed some periodontal treatment and some fillings

busy businessman and was not happy with the partial denture that he was currently wearing. He had to go away in a few weeks to an important business trip and did not want to wear the denture for the entire period. The patient had other problems, and needed some basic dental care along with the provision of some form of posterior support. The patient was not against having this treatment, but his main focus was having his front tooth replaced.

An ambitious plan to place a guided implant with an immediate provisional restoration was formulated.

Presenting symptoms

The patient had recently had his UR1 extracted and was wearing an upper partial denture

replacing on the UR1. The patient was not in any pain but was finding it difficult to speak or eat with the denture in place.

Medical history

The patient was a non-smoker and a diet controlled Type 2 diabetic. Dental history: regular attender.

Intra oral examination, clinical findings

Intra-orally the patient presented with plaque around the gingival margins of the lower teeth. There was evidence of root caries developing around the LR45 with no posterior support. The patient had been proposed dentures previously but had declined them. There was
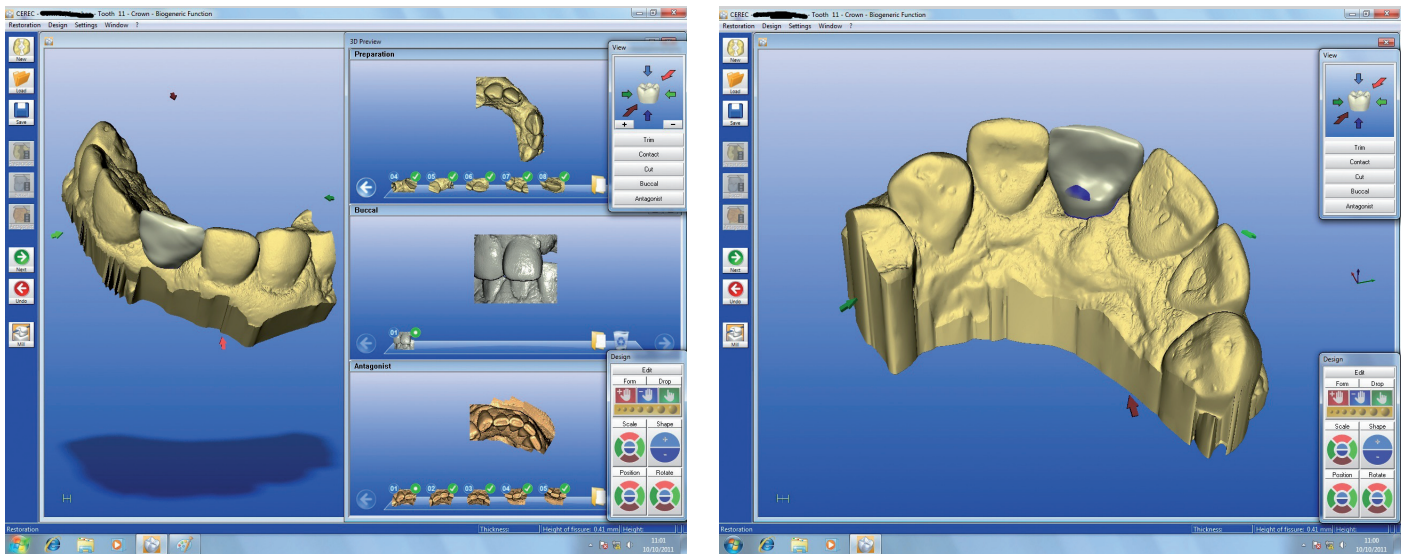
Figures 2-3: The Cerec proposal for the final crown is imported directly into the CBCT scan. This allows for visualisation of the final crown with reference to the bone in the CBCT slices. This greatly aids virtual placement of the implant, to help facilitate a screw-retained restoration

some pocketing around the mesially angled UL4, which had a guarded long-term prognosis. The patient was fully aware of the dental issues which need addressing and an implant solution was offered for the missing posterior teeth.

The aim of my treatment was to:

1. Place an implant using a surgical guide in the UR1 site.

2. Immediately restore the implant with a provisional restoration.

3. Restore the implant with a screw-retained crown as a long-term prosthesis.

4. Begin treatment to provide posterior support and treat root surface caries.

Treatment carried out

1. Oral hygiene advice and full-mouth scaling.
2. Study model fabrication.
3. CBCT scan.
4. Fabrication of a SiCat Surgical Guide.
5. Implant placement.
6. Immediate provisionlisation.
7. A healing period of three months
8. Fabrication of a final crown.

It was decided that a Cerec/Galileos/Astra Facilitate treatment plan would be best suited. Periodontal treatment was started immediately with oral hygiene instruction and scaling. The long-term plan was to provide him with some posterior support and replace the composite filling on the UL1.

The Cerec Galileos concept is where the patient's upper and lower jaws are acquired as a digital scan using the Cerec AC Blucam. Then the area of interest, in this case the UR1, has a Cerec crown designed to fit on top of it. The patient then has a Galileos CBCT scan
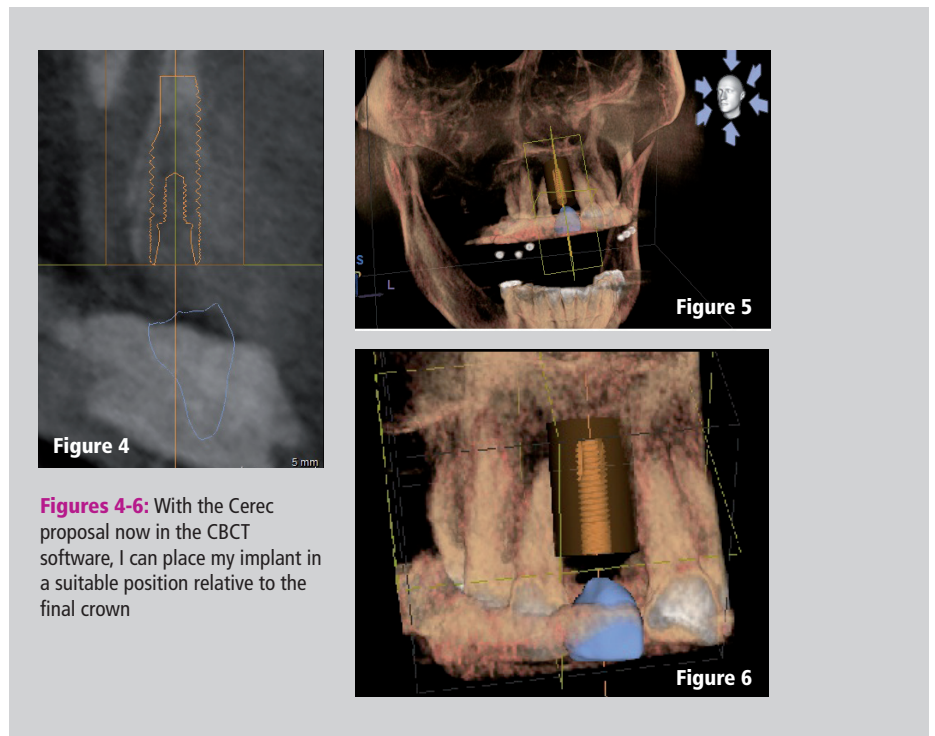
Figures 4-6: With the Cerec proposal now in the CBCT software, I can place my implant in a suitable position relative to the final crown

taken with a SiCat radiographic template in the mouth. This stent is an acrylic baseplate with radio-opaque sections embedded into it. A bite registration material that is visible to the CBCT, known as Futar Scan, is used to connect the template to the mouth.

Now once this is done, the Cerec proposal is imported *directly* into the CBCT scan. This lets you see your final crown in the CBCT slices, allowing you to virtually place your implant for the correct depth, emergence etc (Figures 2-3).

As you can see from Figures 4-6, the Cerec

proposal is now in the CBCT software allowing me to place my implant in a suitable position relative to the final crown. This is a true restoratively driven implant placement. In other words, we are working back from the desired final restoration.

Now that the implant has been placed virtually, how do we relay this information into the patients' mouth? Placing implants in radiographs has been around for years, transferring this information accurately into the mouth is the tricky bit. An Astra Tech Facilitate
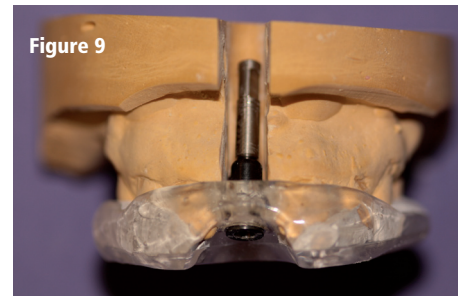
Figure 7

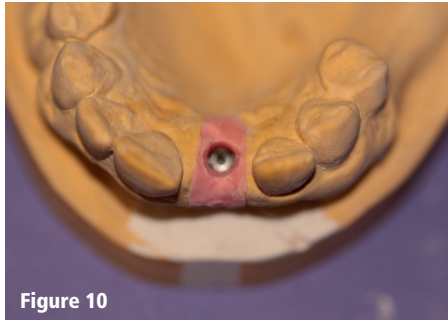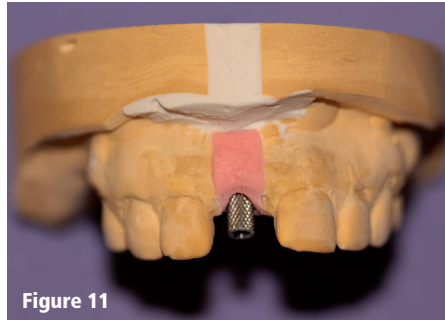
Figure 8

Figure 9

Figure 10

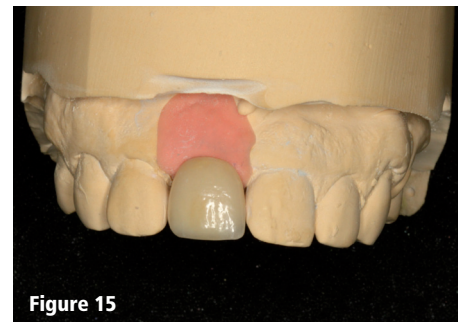Figure 11

Figure 12

Figure 13

Figure 14

Figure 15

Figures 7-15: Using an implant replica attached to the implant driver and the stent, a temporary crown can be made before the implant is actually placed in the patient

guided surgery stent was ordered from within the Galileos software from a company called SiCat in Germany. This will allow precise implant placement based upon the CBCT scan.

So now that I know where the implant is going to be placed, how deep it will be and the size of implant, along with the size of the final crown, can I make a temporary restoration to fit all of the above? Yes I can :)

Using an implant replica attached to the implant driver and the stent, a temporary crown can be made *before* the implant is actually placed in the patient (I know this may sound a bit confusing, have a look at Figures 7-15).

Figures 16-19 show the surgical procedure; only a crestal incision was made, the implant was placed within five minutes using the Astra Facilitate system and the temporary crown screwed directly into the implant. Primary stability was recorded at 35Ncm. Please note the incisal edge of the crown was trimmed so the temp crown was free of the occlusion at all excursive movements.
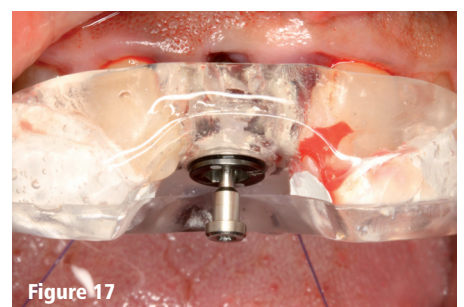

Figure 16

Figure 17

Figure 18

Figure 19

Figures 16-19: The surgical procedure; only a crestal incision was made, the implant was placed within five minutes using the Astra Facilitate system and the temporary crown screwed directly into the implant

After three months healing, a conventional restorative protocol was followed and the implant restored with an Astra Tech Atlantis Zirconia one-piece abutment.

This is digital dentistry at its best. Please bear in mind that as far as I know this is the first time this has been done in the UK, linking the Cerec meets Galileos software with a guided surgical procedure. The Americans have been doing it for some time; we seem to be lagging behind in the UK.

The patient was able to leave the surgery with no temporary denture, with an atraumatic implant placement, no large flap, minimal suturing and a cosmetically acceptable crown within 30 minutes of walking in.

Long-term outlook

The patient has since been seen for two reviews, and has been problem-free for over a year. He has not had any screw loosening issues, and is now able to confidently eat his food. The patient has been given a treatment plan to restore the posterior dentition, and we are due to being treatment soon.

Discussion

This case was a good example of how guided surgery can be used to meet a patient's expectations. By knowing the exact position of the implant before it is placed, we are able to fabricate a temporary restoration that can be fitted chairside, at the time of surgery. This restoration was a one-piece solution with no cement, reducing the risk of any material becoming imbedded in the peri-implant tissues. The advances in digital imaging and the adaption of conventional techniques are making implant therapy more predictable, affordable and efficient.

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Figure 20: A screw-retained Atlantis Zirconia abutment with direct layering of Ivoclar E-max porcelain

Figure 21

Figures 21-22: Final images post treatment

Figure 22