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Immediate implant placement and restoration using a modeless digital workflow

Solutions featured:

3Shape TRIOS intraoral scanner
3Shape Implant Studio

3shape

Fig. 1

Case Information

This 26-year-old male patient presented with a traumatic injury to the tooth 11, sustaining a complicated crown-root fracture. The tooth was diagnosed as unrestorable and he was referred to my clinic for an assessment for an implant crown. (Fig. 1)

Treatment plan

A series of clinical photos, CBCT and IOS were taken. He had an average smile line displaying most of the central incisors and papilla, but not the gingival margin. There was a thick band of keratinised mucosa labially and the biotype was assessed to be average, with no loss of soft tissue architecture.

Fig. 2

Digital planning with Implant Studio (3Shape) was carried out. The patient was found to be a good candidate for an immediate implant placement and restoration with a temporary crown. The planning was started by importing of CBCT and IOS (3Shape TRIOS intraoral scanner) data, which was subsequently merged together.

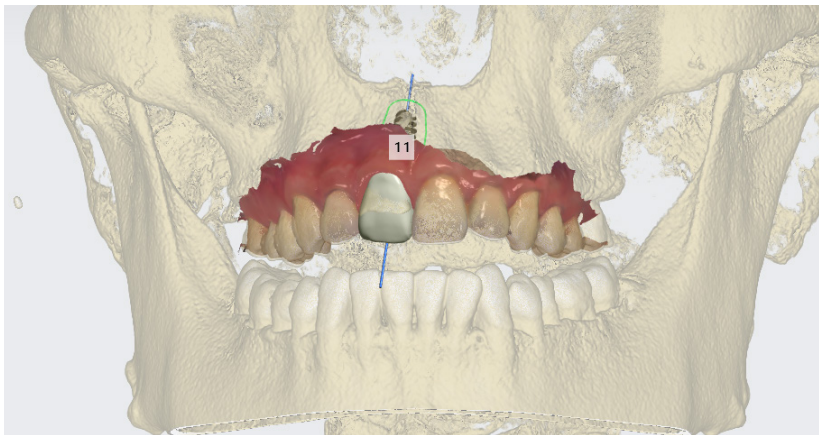

Fig. 3

The tooth 11 was then virtually extracted and a new crown was designed. The implant fixture (NobelActive, NobelBiocare) was planned so that: (Fig. 2, 3, 4)

- It engages more than 3 mm of apical bone for primary stability
- The head of the fixture to be approximately 3 mm below the gingival margin – in this position the head of the fixture was at an equicrestal level
- Approximately 2 mm palatal to the labial plate to minimize future bone loss and soft tissue recession
- The future prosthetic screw access hole to be in the cingulum of the crown

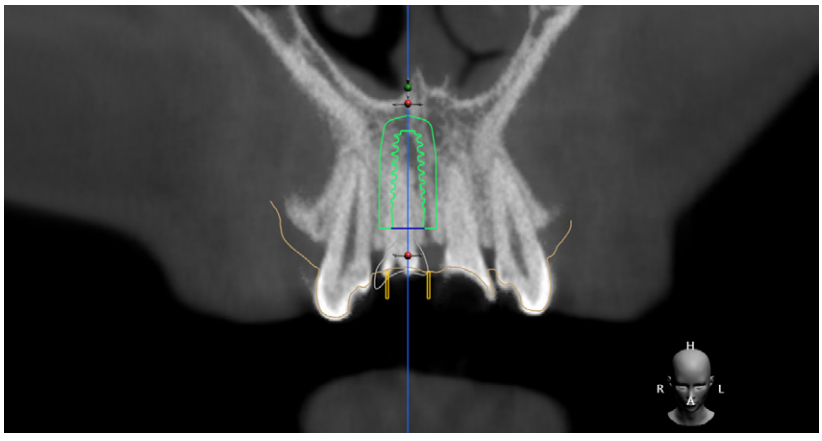

Fig. 4

The patient had a high expectations towards his treatment and requested for an immediate tooth replacement and gingival grafting, if required, to achieve the best aesthetic outcome possible.

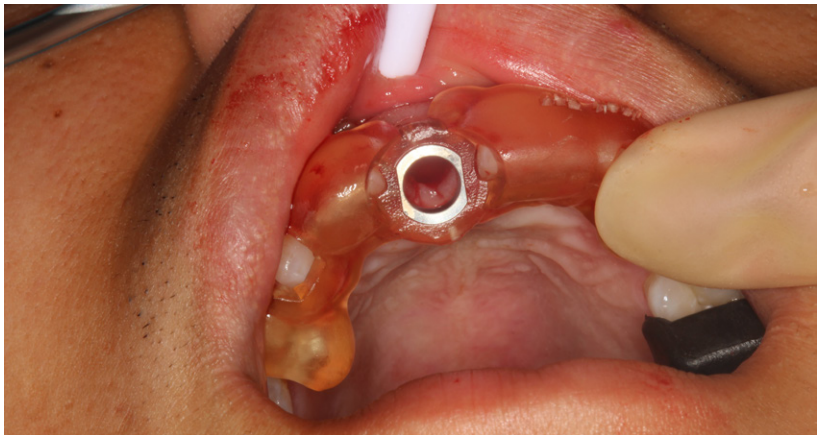

Fig. 5

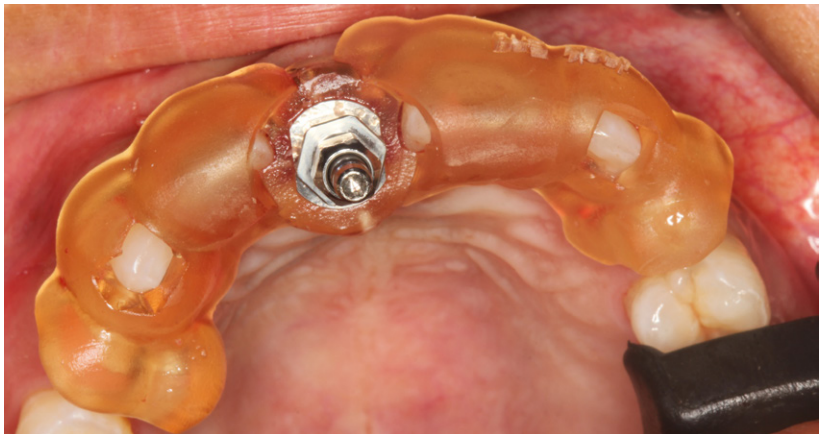

Fig. 6

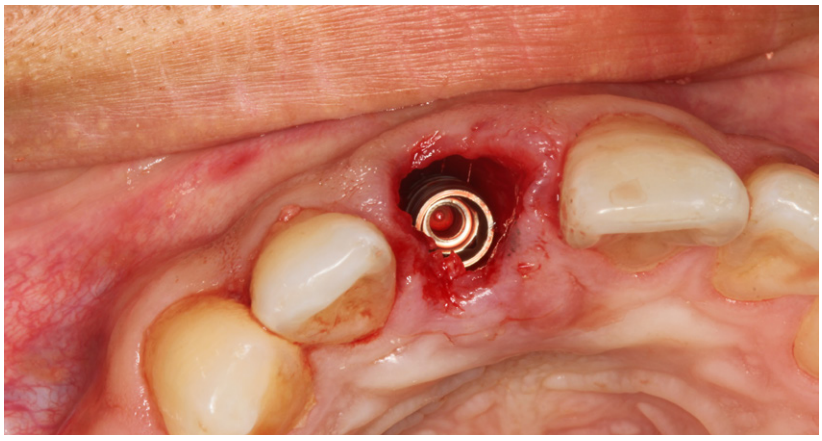

Fig. 7

Following the digital planning, a surgical guide was fabricated by our designated lab (Mr. Jerry Tang, Dental Link, Auckland, NZ). The surgery was planned to be performed in the morning followed by digital scan with a view to deliver a milled screw-retained PMMA temporary crown three hours post-surgery.

Treatment

1. Surgery

The surgery was performed under IV sedation and LA. No flap was raised and the tooth was extracted atraumatically. A fully guided osteotomy and implant placement was performed using a 3D printed surgical guide and NobelActive guide kit. The implant achieved a good primary stability (> 35Ncm) and ISQ value of 72 fulfilling the requirements for an immediate temporary crown. The gap defect was grafted with Xenograft. No membrane was used in this case in view to avoid any soft tissue manipulation as any incision or tunnelling could lead to undesirable future soft tissue loss. (Fig. 5, 6, 7)

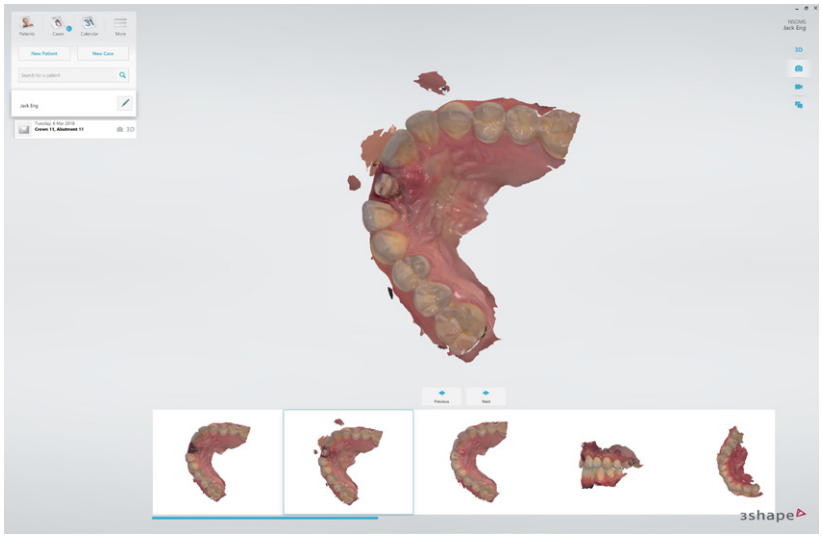

Fig. 8

2. Scanning

The scanning was carried out immediately after the procedure.

First, preoperative scans (consisting of maxillary arch, mandibular archand bite scans) were copied onto a new case. This is a very useful step as it eliminates a need for having to re-scan the opposing arch and bite. For the maxillary arch scan, the area of interest (12-21 for this case) can be easily trimmed and scanned on top of the existing scan. Finally, an emergence profile scan was performed.

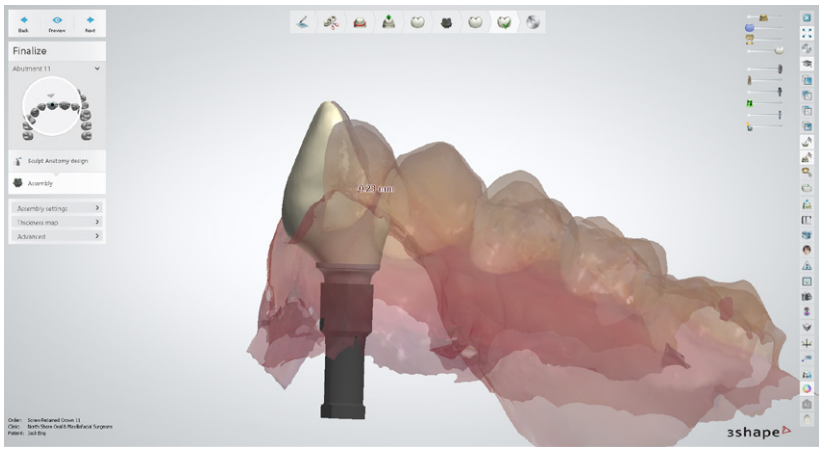

Fig. 9

For an immediate temporary crown, it is very important to slightly under contour its subgingival portion to allow a space for the gingiva to grow and become thicker. Over-contouring, in contrast, should be avoided as it would push the gingiva away and is likely to cause thinning of the gingiva and future recession. Finally, a digital scan body was placed for the final scan was performed and the case was sent to the lab via 3Shape communicate. (Fig. 8, 9)

After the scanning, a healing abutment was placed on the implant and the patient was transferred to the recovery room.

Fig. 10

Fig. 11

Fig. 12

3. Temporary crown delivery

A milled screw-retained PMMA crown was returned 2 hours post-surgery and fitted with a torque of 20 Ncm. The prosthetic screw was covered with a Teflon tape and the access hole sealed with composite.

The temporary crown was generously relieved from occlusal contact by at least 1mm, double checked with two layers of shim-stock. (Fig. 10, 11) Hence it was an immediate restoration, without any loading of the implant.

4. Permanent crown delivery

The case was referred back to the referrer three months post-surgery and the final permanent layered zirconia crown fabricated using a NobelBiocare Universal Base. There had been no peri-implant soft tissue loss and a desired aesthetic outcome was achieved. (Fig. 12)

Conclusion

In this case, I have demonstrated a simple case of immediate implant placement and immediate restoration with a temporary crown, including using a full digital workflow and hence a modeless approach. This workflow involved a precise preoperative planning, execution of the surgery using a 3D printed surgical guide, accurate scanning of the soft tissue and the implant, and a same-day delivery of an immediate temporary restoration.

The outcome of the case was excellent as the aesthetic treatment expectations of the patient being met and he did not have to leave the clinic without a tooth.

Clinical benefits include:

- Accurate preoperative planning
- Fast and precise digital impression of post-surgical soft tissue and implant
- Able to send data to lab via 3Shape communicate
- Digital design and milling of the temporary PMMA crown
- Minimum chairside handling and time compared to the traditional approach of fabricating a temporary restoration

Patient benefits include:

- Having a temporary crowns the same day as his tooth extraction and implant placement
- Minimum working time intraorally
- No need for messy analgoue impression procedures

About Dr. Han Choi

Dr. Choi completed his Bachelor of Dental Science at the University of Otago and subsequently trained as an Oral & Maxillofacial Surgeon, completing his medical degree (MBChB) and Master of Dental Surgery also at the University of Otago. The training involved intensive hospital rotations in Dunedin, NorthShore and Middlemore Hospitals in NZ.

He is currently a Director at North Shore Oral & Maxillofacial Surgeons (NSOMS). Dr. Choi has a special interest in the digital implant workflow such as immediate loading of single aesthetic implant cases as well as complex complete arch cases using a completely modeless workflow.

About 3Shape

3Shape is changing dentistry together with dental professionals across the world by developing innovations that provide superior dental care for patients. Our portfolio of 3D scanners and CAD/CAM software solutions for the dental industry includes the multiple award-winning 3Shape TRIOS® intraoral scanner, the 3Shape X1® CBCT scanner, as well as market-leading scanning and design software solutions for both dental practices and labs.

Two graduate students founded 3Shape in Denmark's capital in the year 2000. Today, 3Shape employees serve customers in over 100 countries from 3Shape offices around the world. 3Shape's products and innovations continue to challenge traditional methods, enabling dental professionals to treat more patients more effectively.

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