

Immediate loading and implant surgery with digital workflow



Solutions featured:

- 3Shape TRIOS
- 3Shape Dental System
- 3Shape Implant Studio

Case information

Patient, 32-year old male, was suffering from multiple loss of teeth due to severe dental caries. Exposed root rests were all unusable as abutment teeth and remaining teeth were erupted and not in their own occlusal position.

The vertical dimension of the patient was preserved by the occlusion between #17 and 47 and anterior teeth. This helped to determine occlusal position. Though the lower jaw looked as if it had moved a little bit from right to left, I thought that this CR and VD could be used as a permanent one. As a result, the treatment plan called for #17 and 47 to remain as they were. By using them, the treatment could hopefully, be simpler than originally thought.



Fig. 1. Post op panoramic X-ray view

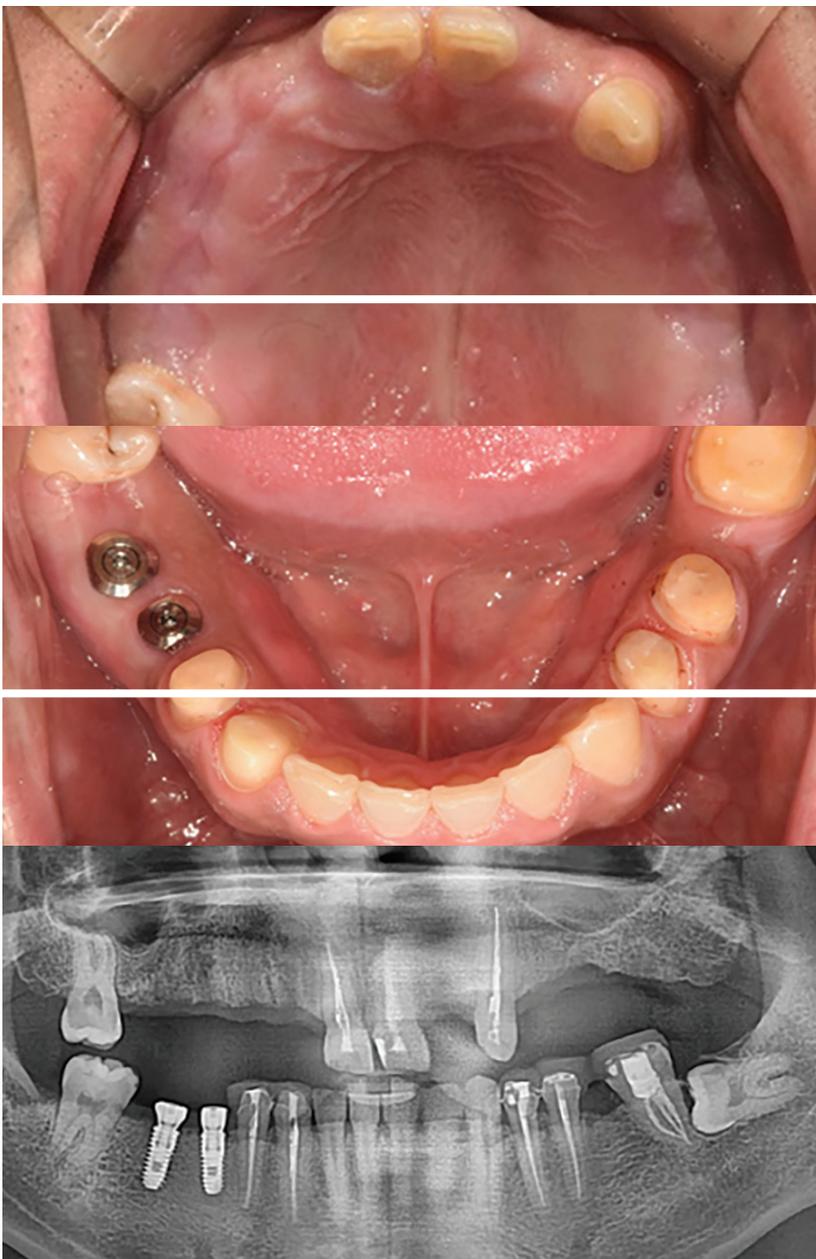


Fig. 2. After root canal treatments and initial preparations on the abutment teeth

Treatment plan

As the upper alveolar bone, around the root rests was damaged by the periapical lesions, immediate post-extraction implant surgery was excluded from the treatment plan for the upper side. On the other hand, the lower alveolar bone around #45, #46 was suitable for immediate post-extraction implant placement. Regarding the temporary prosthesis, the patient approved that his #17 #47 would remain. For that, after 2 to 3 months of healing period, we decided to go for an immediate loading implant surgery with Implant Studio and Dio-navi guide, without using a temporary denture on his upper jaw.

Treatment divided into five phases

- 1st implant surgery – Extraction of all root rests. Implant surgery on right lower molar site right after the extraction of #45, #46.
2. Interim between surgery on the upper and lower side – Endodontic treatment on #11, #21, #23, #34, #35, #37, #43, #44.
3. 2 months after the first surgery – preparation on #34, #35, #37, #43, #44. Oral scan and design and fabrication of PMMA provisional crowns. Implant surgery planned with Implant Studio.
4. Implant surgery with Dio-navi guide system – Guided surgery and placing implants and provisional implant prosthesis on the upper teeth. Setting provisional prosthesis on the lower abutment teeth (#34–37 bridge, #43–44 bridge). Preparation on #11, #21, #23 for #11–23 full contour zirconia bridged crowns. Setting FCZ bridged crowns on #11, #21, #23.
5. 2 months after implant surgery – Oral scan, Design and manufacture final prosthesis on both sides of the jaw. Final prosthesis finished.

Treatment description

On the first day of treatment, all the root rests were extracted, and implant surgery on #45 and #46 performed.

While waiting for the extraction to heal, root canal treatments were done on the subjected teeth. After 2 months of waiting, preparations for provisional crowns and surgical plan was started.

As planned, #34, #35, #37, #43, #45 were prepared for provisional crowns. #11, #21, #23 were excluded from preparation to keep the occlusal relationship. After preparation, intraoral scan was done with TRIOS to design the customized abutments, and PMMA provisional crowns. Using the intraoral and CBCT scans, implant surgery was planned with Implant Studio and Dio implant system.

As the patient lived very far from my office, one hour drive, we had to reduce the number of visits. We decided to install provisional crowns on the lower jaw on the same day with provisional implant prosthesis on the upper jaw.

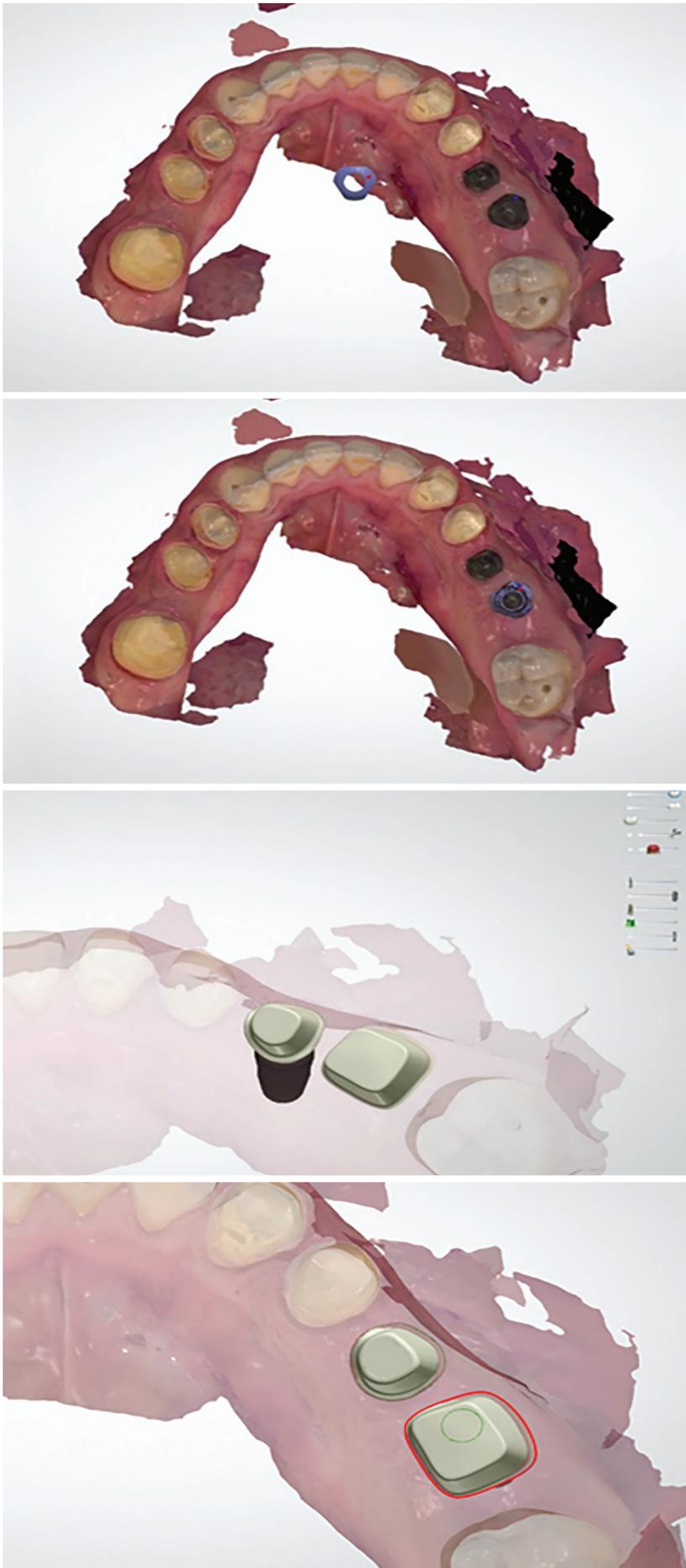


Fig. 3. H-Scanbody was used for scanning implants

Designing provisional prosthesis and Planning Guided surgery

First, we designed the lower provisional prosthesis. To scan the implants, H-scanbody was installed on the fixtures. Unlike the other plastic pillar shaped scanbodies, H-scanbody is more like a healing abutment in appearance and it acts like a healing abutment. As seen on the upper right picture of fig. 2, H-scanbody can remain in the patient's oral cavity attached to the implant fixtures. While remaining in the mouth, it can also be used to form the emergence profile around its gingiva. This scanbody is very compatible with TRIOS, as it can remain in the mouth before and after the intraoral scan. After the 1st surgery and 2nd surgery is completed, the H-scanbodies can be placed on the fixtures and left there until the abutments are connected to the fixtures.

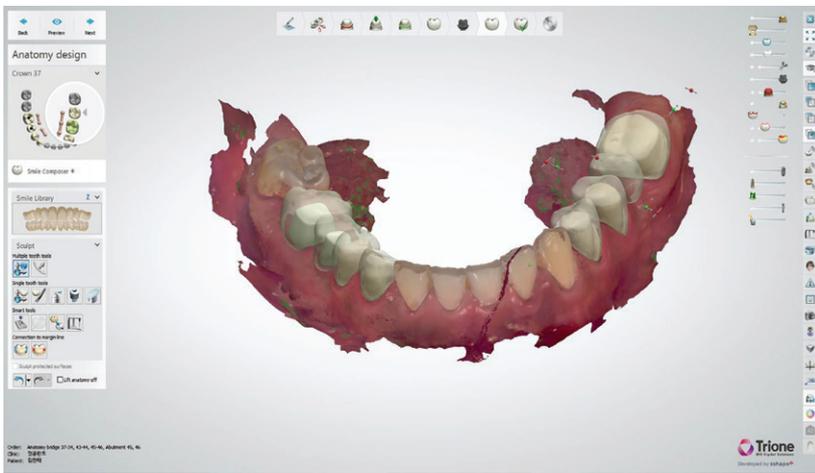


Fig. 4. After the design of lower provisional prosthesis was finished

When the designing of the lower prosthesis was completed, the lower provisional crowns were not seated on the patient’s oral cavity. A virtual model to use as an antagonist was created in Implant Studio.

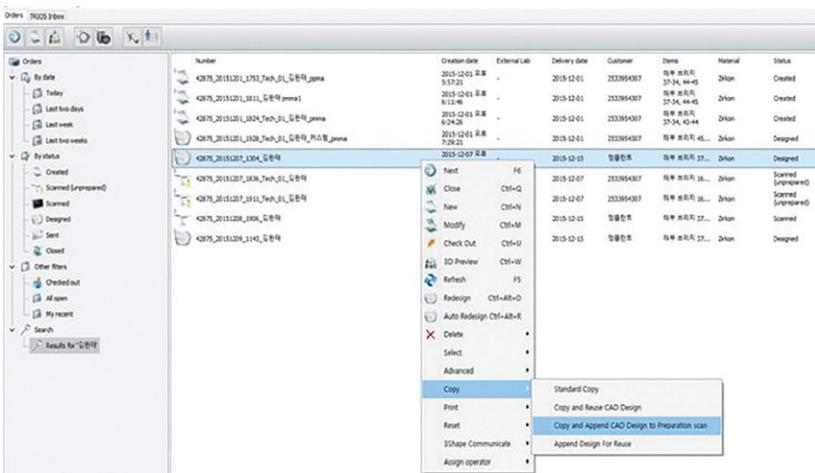


Fig. 5. Exporting lower jaw scan with virtual crowns

When the design of the lower prosthesis was completed, I right clicked on the subjected order file in 3Shape’s Dental Manager. In the pop up box, you can see “Copy” menu. When the cursor is on “Copy” menu, another box will pop up. I then right clicked on “Copy and Append CAD Design to Preparation scan”. Now the exporting procedure is completed.

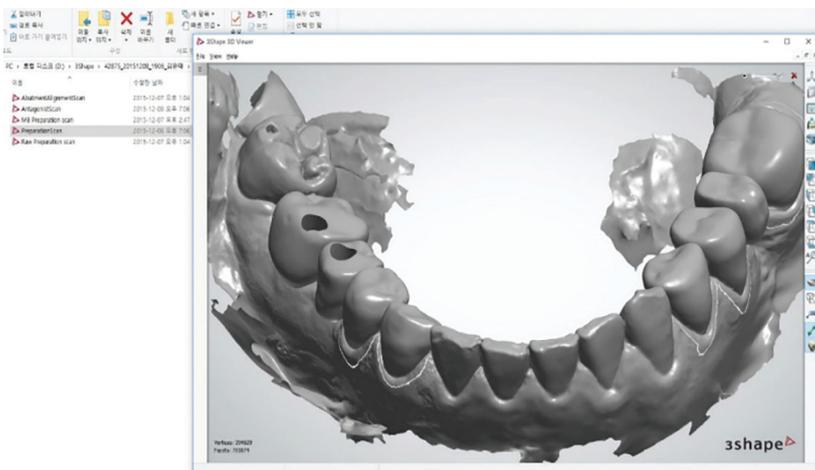


Fig. 6. Exported virtual antagonist scan file

The “PreparationScan.dcm” file was made. This file was used as an antagonist scan for Implant Studio. This integrated the designing of the provisional prosthesis and the planning of the surgery into one workflow.

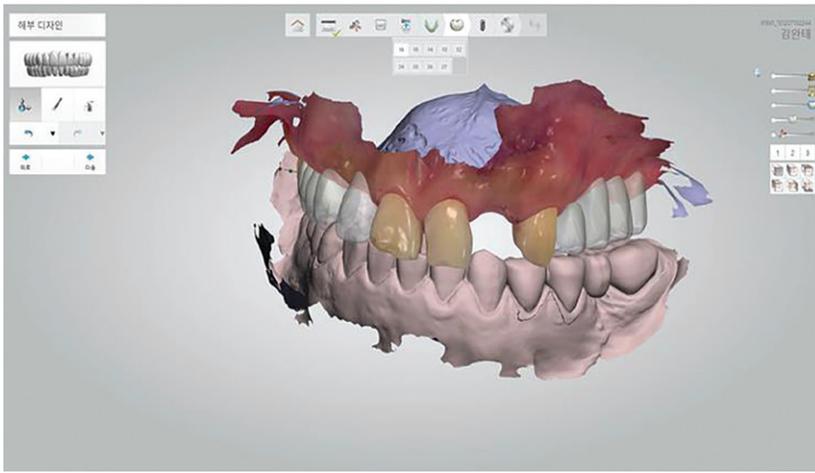


Fig. 7. Designing Provisional Crowns in Implant Studio

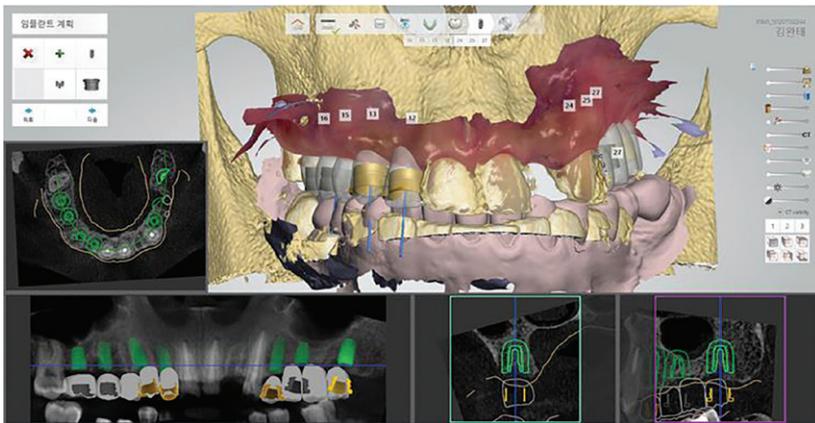


Fig. 8. Planning surgery with virtually made lower scan data

As seen in fig. 8, temporary crowns are designed virtually using the lower scan data. In this way, the provisional prosthesis, which would come with the surgical guide, is matched to the lower prosthesis.

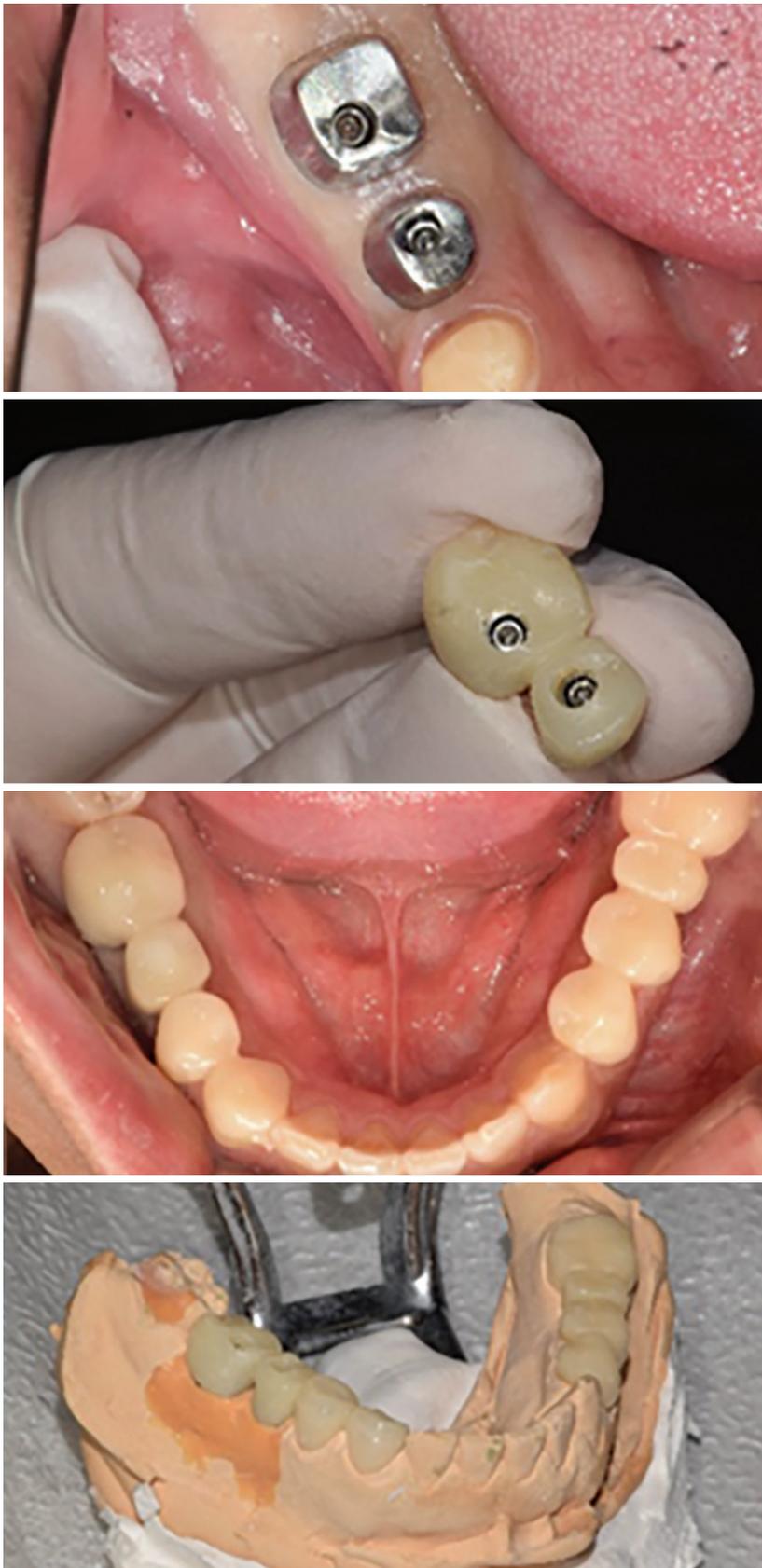
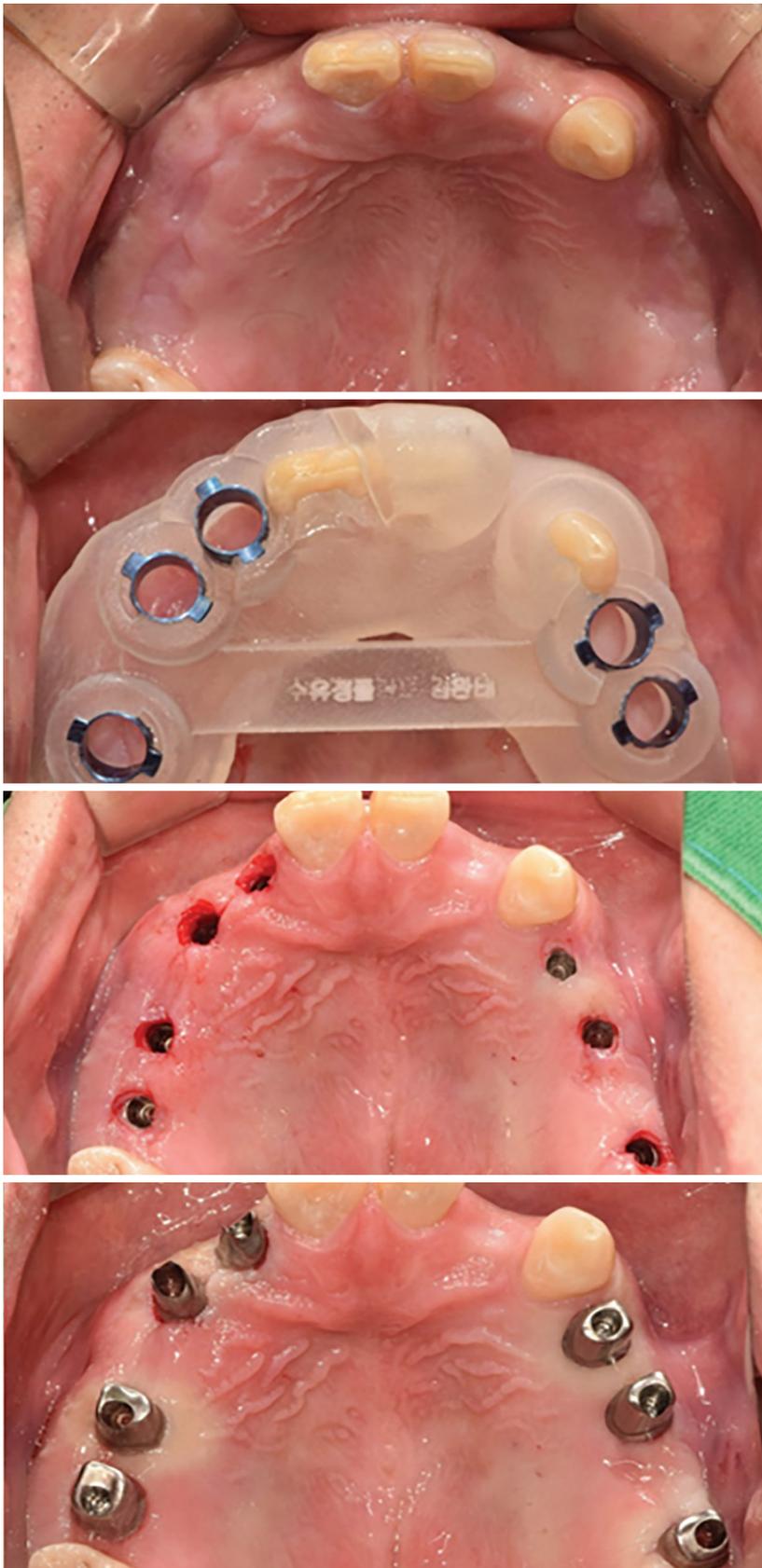


Fig. 9. Seating provisional prosthesis on the lower jaw prior to surgery

Surgery and Placing the provisional prosthesis

Before the surgery, the provisional prosthesis on the lower jaw was placed. With screw holes on PMMA crowns, crowns can be used as a jig to help in placing the Ti customized abutments in the proper position. To verify the marginal and internal adaptation of the provisional prosthesis on the lower jaw, we took a rubber impression along with the digital scan. The crown fit was good on the stone cast as well as when seated in the oral cavity.



As seen in fig. 10, all surgical procedures were flapless and as a result, blood from tissue damage was limited. The patient also felt less pain as compared with surgery when flaps are reflected. Customized titanium abutments were installed to place the temporary crowns right after the surgery was done.

Fig. 10. Surgical procedures with guides on, all surgery went flapless so that tissue damage was minimal



Fig. 11. Post op panoramic X-ray view and CBCT shots, clockwise #7, #6, #4, #3, #12, #13, #15



The preparation for #8, #10, #11 was done after seating of the pre-fabricated provisional crowns. The prepared anterior abutment teeth were scanned using TRIOS.

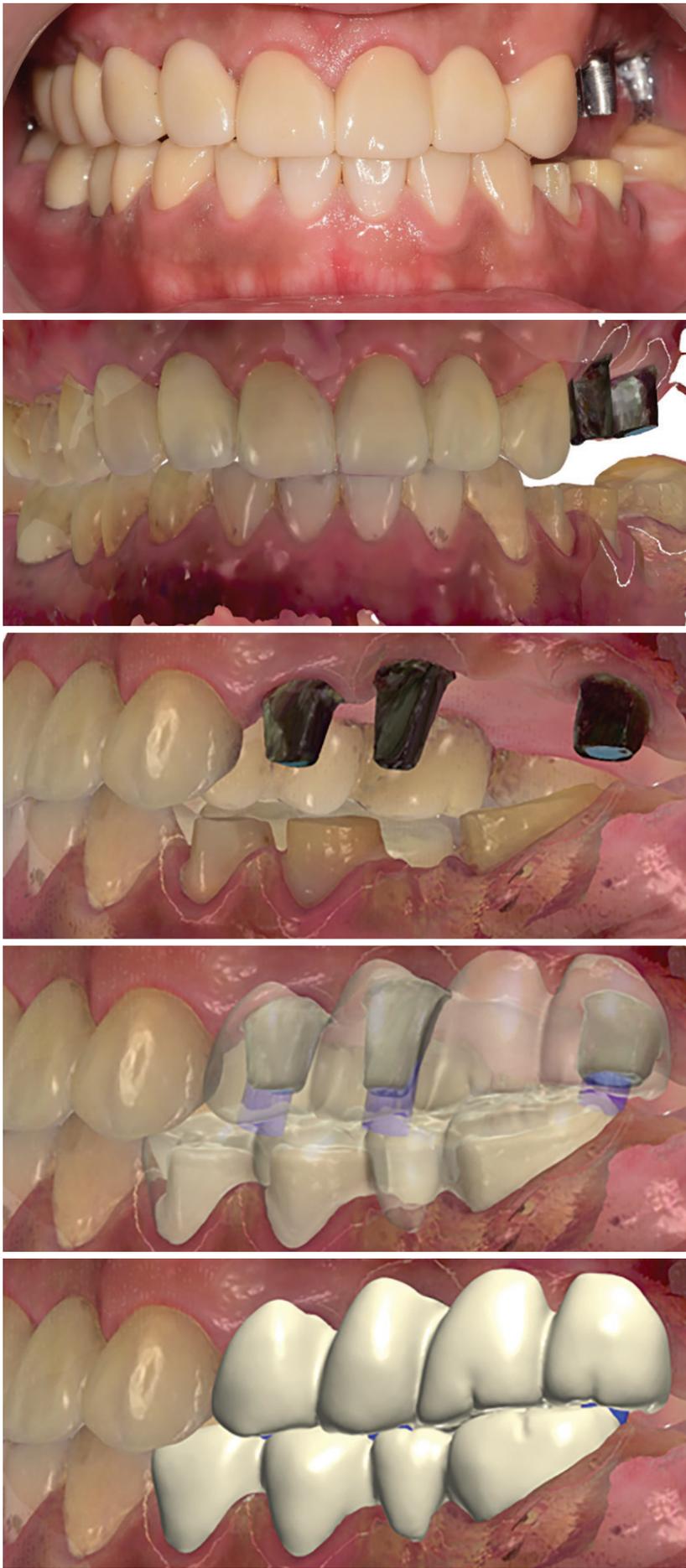
Fig. 12. After seating the pre-fabricated provisional crowns



After a week, a fully contoured zirconia 3-unit bridge on #8, #9, #11 was seated. After 2 months of healing period, the procedures for making the final prosthesis were begun. During that period, the jaw relations of the patient could be assured with the provisional crowns and the anterior 3-unit bridge.

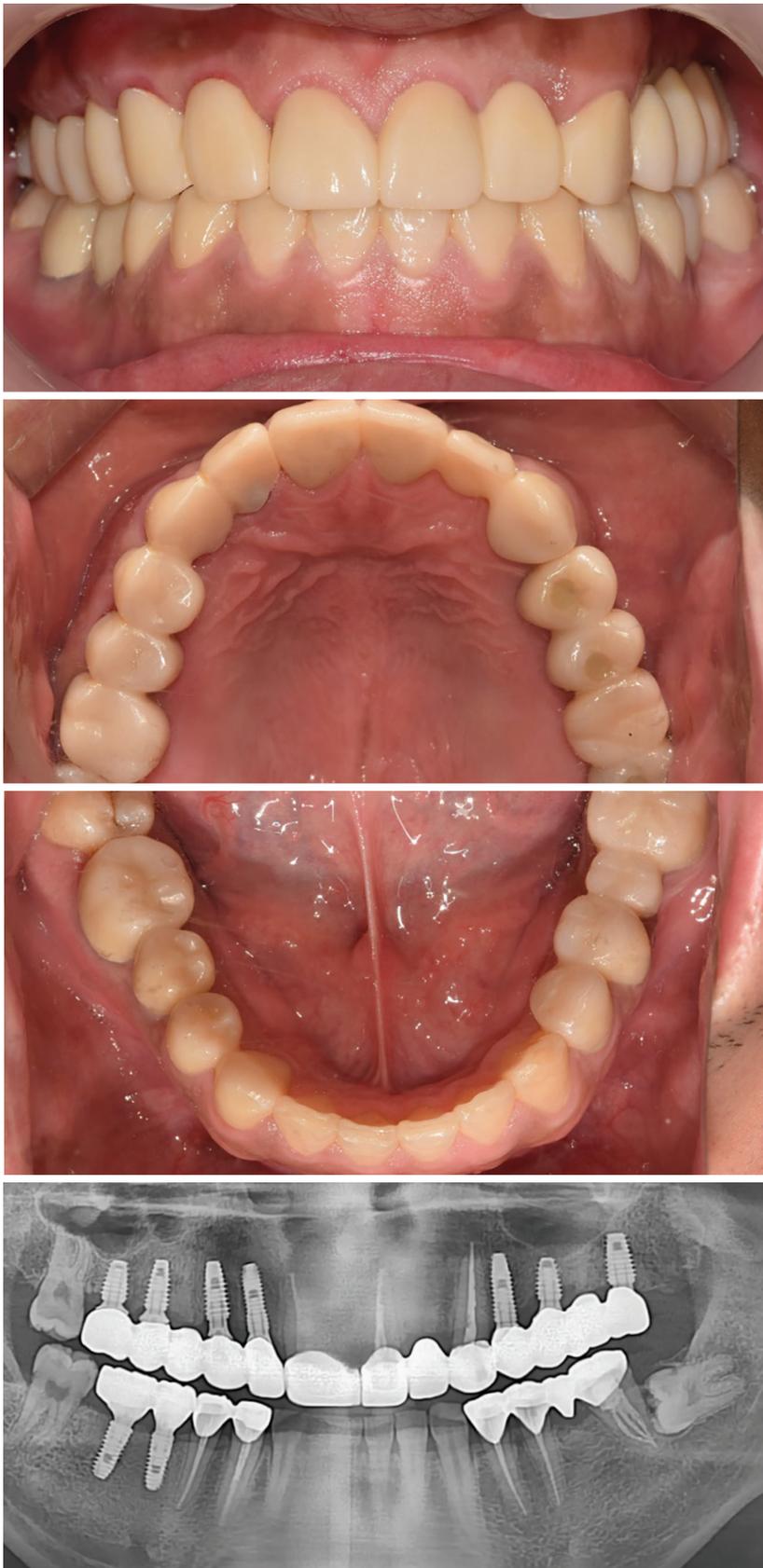


Fig. 13. Full contoured zirconia 3 unit bridge on upper anterior area



The procedures were fully digital without the use of any gypsum models. And as the provisional crowns preserved the jaw relationships, the final crowns could be produced. The left side was created first followed by the right side.

Fig. 14. Designing the final prosthesis on the right side of the upper and lower jaws



Final prosthesis was completed after 6 months from the beginning of the treatment. Final crowns were all made with 98 mm zirconia disc which were dry milled and sintered at 1560°C. They were stained and glazed after sintered. RMGI cement was used for cementation of the prosthesis.

Fig. 15. Panoramic X-ray view and intraoral photos of the patient after final prosthesis

About Dr. Jaemin Lee

Dr. Jae-min Lee opened the Mirero Dental Clinic in 2010. Since beginning his journey with digital dentistry in 2015, he has focused on optimizing the digital workflow. He currently uses 3Shape TRIOS® for intraoral scanning as well as the 3Shape D2000 lab scanner for model scanning at his laboratory. Lee designs and produces restorations using 3Shape CAD/CAM software, Dental System, Implant Studio, and OrthoAnalyzer for his practice. At present, he also works with 3Shape to further develop integrated chairside workflows.

Implant Studio benefits according to Dr. Lee

1. Real prosthetic driven surgery, assuring exact placement and path of implants for final prosthesis
2. Save time by placing provisional prosthesis along with the placement of implants
3. Avoid the damage of important anatomic features, like Inferior Alveolar Nerve, Sinus Cavity
4. Minimally invasive surgery with flapless reflection

Dr. Lee talks about Implant Studio

"Implant Studio enables me to intuitively plan a surgery based on the prosthetic considerations. As this case illustrates, being able to virtually place and verify the implant position for the final prosthesis prior to surgery is extremely valuable.

The ability to fabricate and immediately load a provisional prosthesis because I have a practice lab solution is also very beneficial to my patients. As illustrated in this case, I was able to quickly provide a provisional for my patient even when it was not originally planned for.

For restorative design, I use Dental Designer in combination with Implant Studio. The consistent data sets between the two software enable me to work confidently. Consistent data also means that I am able to send my designs to dental labs when relevant, for larger cases, and know that the data will not be distorted.

Being able to design and manufacture a provisional at my practice is also an enormous benefit for my fully or partially edentulous patients who are unable to eat without having a temporary prosthesis. Because of CAD/CAM, they are able to leave my office with a prosthesis.

Besides the prosthetic advantage, Implant Studio also enables me to create a planned surgical strategy. For example, using drill protocols created in Implant Studio, I can avoid damaging important anatomical features like, the sinus cavity, nasal cavity and inferior alveolar nerve during surgery.

There are many dentists who believe that they do not need guides for their surgeries. Of course, this is true. However, I believe that if a skilled oral surgeon uses Implant Studio, he or she will improve the quality of treatment in both the surgical and prosthetic respect.

For dentists unfamiliar with implant surgery, Implant Studio can serve as your guide to performing implant procedures. It takes you step-by-step through the procedure.

Additionally, with Implant Studio, the entire surgery can be finished without flap reflection. This means patients incur less damage during surgery and from what I have experienced, patients truly appreciate this, because there is less pain and discomfort post-surgery."

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.

Let's change dentistry together

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