

Creating low cost, functional dentures using a digital workflow and in-house printer



Solutions featured:

3Shape TRIOS intraoral scanner
3Shape Dental System

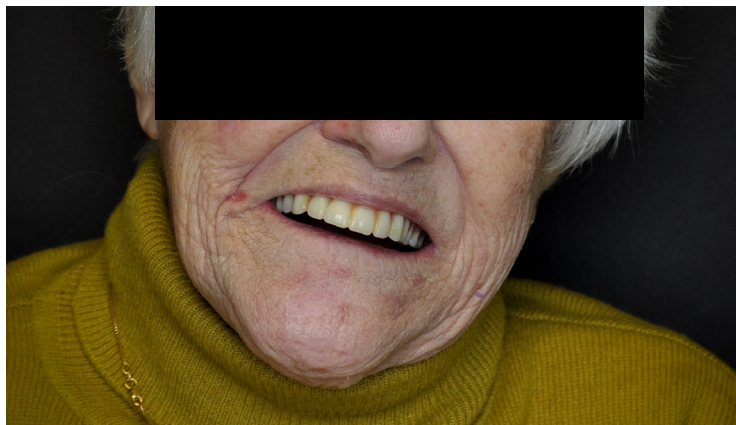


Fig. 1

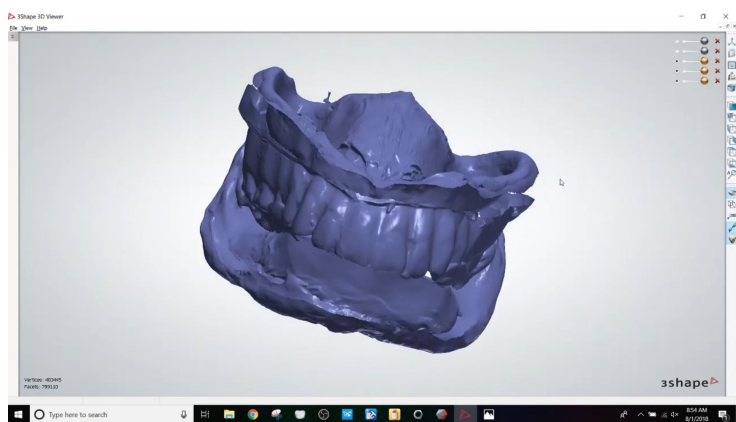


Fig. 2

Treatment plan

The existing maxillary denture was used to make reline impressions using PVS (Aquasil Ultra Rigid and Aquasil Ultra LV), preliminary alginate made of the mandibular arch (Cavex Cream). A custom tray was fabricated (Triad).

The custom tray was used to make an impression of the mandibular arch (Aquasil Ultra Rigid and Aquasil Ultra LV), the tray handle was shortened until the patient could close into correct vertical dimension. Then Aluwax was used to make registration.

Both records were sprayed with scan spray (Optispray by Cerec) then scanned with 3Shape TRIOS intraoral scanner under study model setting.

Capturing upper and lower tissue surfaces, teeth for the maxillary arch, and bite registration. (Fig. 2)

Case Information

Patient is 79 year- old female with a medical history of high blood pressure, asthma, allergies, sinus problems, previous cancer of breast, colon, and uterus, and arthritis. The patient has never had success with wearing a complete mandibular denture. She has had several made and could not tolerate them.

At present, the patient cannot arrange for costly treatment and is unwilling to consider treatment such as implants without some assurance first that she can tolerate a mandibular denture. (Fig. 1)

She would like a complete mandibular denture as soon as possible to help her chew and to help stabilize her maxillary denture as it does not work as well without a mandibular.

Her mandibular arch was severely resorbed with poor prognosis for a complete denture. Her existing maxillary denture was found to have poor tooth position and required replacement. Her maxillary arch shows signs of tuberosity overgrowth and anterior flabby ridge which complicates denture fabrication. Her risk of failure for complete denture treatment was deemed somewhat high, therefore low-cost interim dentures were offered as a treatment option.

The patient accepted treatment of printed interim dentures as a low cost means to help her have immediate function and improve the stability of the maxillary denture. Additionally, another goal was to test her ability to tolerate a mandibular prosthesis.

The intended final-outcome was to provide a low-cost denture for patient trial use.

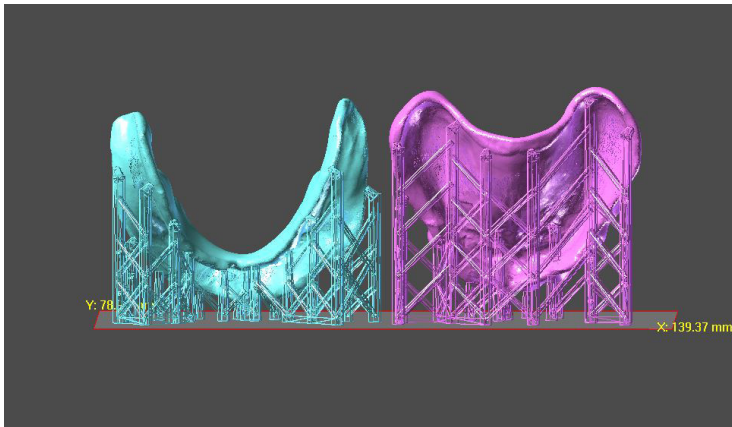


Fig. 3

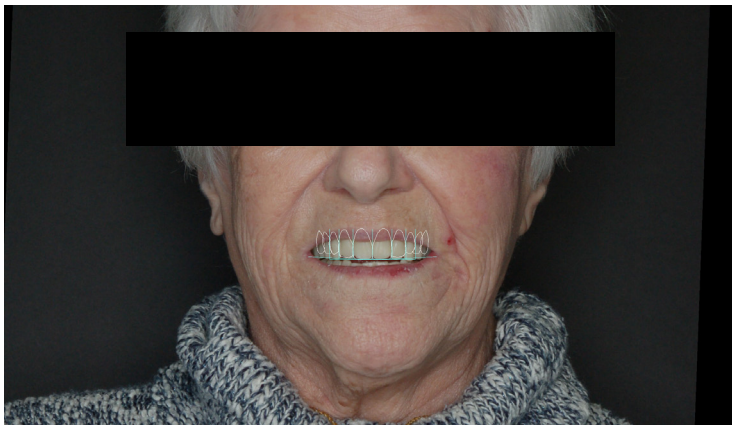


Fig. 4

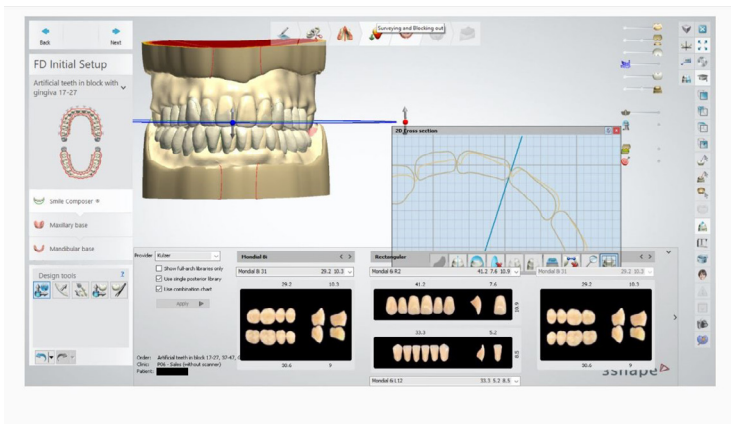


Fig. 5

Full face photographs were taken with the impression records in the patient's mouth.

A checklist was completed to document desired changes from current tooth position, vertical dimension etc.

Scan files were oriented in Meshmixer to rotate x y and z axes into same orientation that 3Shape Dental Design expects from a laboratory scanner. Scan files were then sent to a design service company (FullContour) for design. Solid denture try ins were requested. These try ins were approved, and printed in my office (Envision Tec Vida, Next Dent MFH). (Fig. 3)

The try ins were placed and PIP used to mark pressure areas. Both required adjustments. The tooth position, size, and the occlusion were incorrect.

Full face photos were taken to communicate the needed tooth changes. (Fig. 4)

A new bite registration was made. The adjusted try ins were rescanned using the above technique with 3Shape TRIOS.

The scan files axes were reoriented in Meshmixer, and files sent to design service. (Fig. 5)

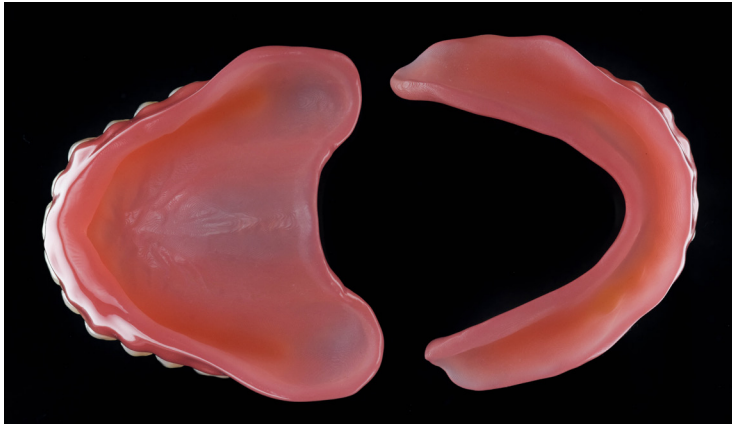


Fig. 6 (i)

Final denture files (Denture base, and teeth in arch separately) were requested. The dentures were printed in office using Envision Tec Vida and Next Dent Denture Base and MFH for trial placement (an additional step was not necessary). (Fig. 6 i-iii)



Fig. 6 (ii)

After approval they were sent to a manufacturer (Core3D) for definitive manufacture. Dentca tooth material A1 and denture base material (original pink) were used on a Carbon printer.



Fig. 6 (iii)



Fig. 7

The dentures were placed and adjusted with PIP to mark areas of pressure. After several follow up visits for adjustments the patient has had mixed reviews. On some days she is comfortable and others, she has a hard time. All of her concerns are with the mandibular prosthesis. Overall, she is happy with the way the teeth look, and is able to eat with them most of the time. (Fig. 7)

Benefits according to Dr. Cooper

Clinical benefits - Using in office scanning saves time and makes communicating with the lab easier. 3Shape design software allows printed dentures to be fabricated which are a lower cost easy-to-fabricate method of denture making.

Because of this, the patient can expect fewer visits and easier appointments. They can have an in-between option when considering dentures. Difficult denture cases can be tested with designs digitally archived and easily referenced or duplicated.

In terms of the workflow, it benefits from the precision of digital denture design, exact changes can be requested and completed. Also, the ability to overlay the designs is invaluable, the previous position of the try in can be viewed while comparing to the new design. Archiving of this data is critical for the patient who may need replacement dentures.

Comments

As a dental professional, the digital workflow reduces the duration of the treatment, number of visits, and time spent working with patient. In addition, it makes collaboration with your partner lab, dentists, orthodontist etc. more efficient and predictable.

Digital dentures completed this way allow for the clinician to test dentures with lower risk in patients who may have difficulty.

When working with tough denture patients you often find that the patient is dissatisfied no matter what. Because of this, a digitally printed treatment is a much more cost-efficient solution and in the case of a possible refund to a patient, a small dollar amount to return rather than a large amount with a large laboratory fee.

If the patient accepts the denture design, a definitive treatment can be more safely approached.

Discussion

In this case, patient management was a challenge. The patient suffered from her oral condition and multiple health conditions and seemed to have a poor outlook on her situation. Often patients seeking dentures repeatedly have multiple medical and psychological comorbidities.

In many areas, these patients are sent to a prosthodontist. The doctor is faced with the decision of trying to help a patient who may not be treatable. In this case, a low cost and easy way to provide care is helpful.

With the help of technology, a patient who ordinarily may not receive care is able to. By using this technology combined with an attitude of service and compassion we were able to meet her needs and provide a much-needed functional prosthesis at a low cost.

About Dr. Valerie Cooper

Dr. Cooper is a private practice prosthodontist with a passion for dentures.

Dr. Cooper's prosthodontics training and Master of Science in Dentistry was completed at The Ohio State University in 2009. She received her Doctor of Dental Surgery degree at The Ohio State University in 2006. Dr. Cooper is a member of the American College of Prosthodontics, American Dental Association, and serves on the board of directors for the Dayton Dental Society.

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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