

Fully Digital Workflow for Fabrication of A 3D Printed Ear Stent for Auricular Keloids

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BACKGROUND

Keloids are a result of an aberration in the healing process leading to growth of the tissue beyond the normal boundaries of the wound. Keloids are more often found in the anterior chest and upper arm areas. Auricular keloids have added challenges regarding treatment and cosmetic considerations. The present report describes a fully digital workflow technique to custom fabricate an ear stent after excision of the lesion.

CLINICAL CASE

A 30-year-old female patient presented with a large recurrent keloid involving the helix, antihelix, scapha and conchal bowl of the left ear due to industrial piercing of the area (Fig 1.A). Due to the recurrent nature of the lesion, it was decided to fabricate a custom-made appliance to place pressure on the surgical site postoperatively. After 6 weeks of healing and incorporation of the skin grafts (Fig 1.B), a stent was fabricated using a digital workflow.

REFERENCES

Stashower ME: Successful treatment of earlobe keloids with imiquimod after tangential shave excision. Dermatol Surg 2006; 32: 380-6.

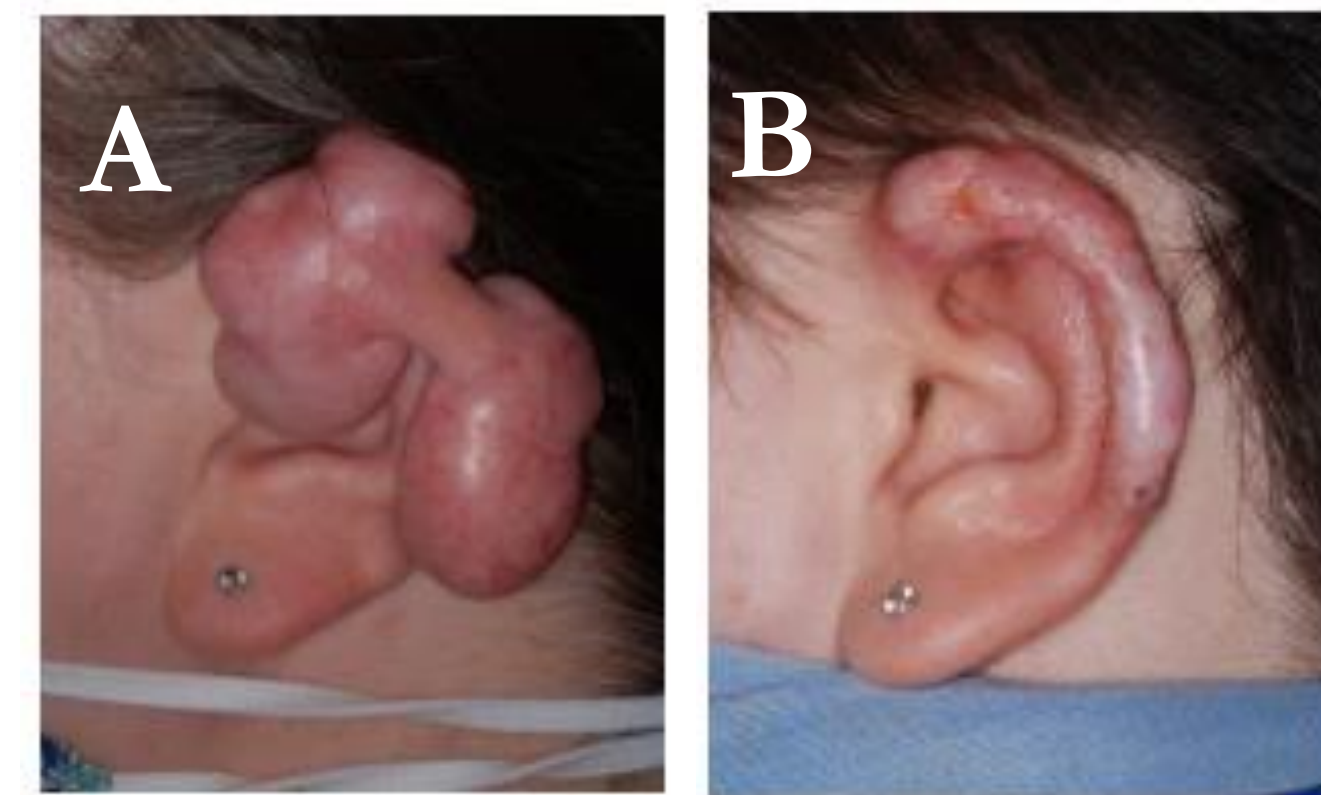


Fig.1: A) Preoperative view of the keloid of ear. B) Postoperative view of the ear

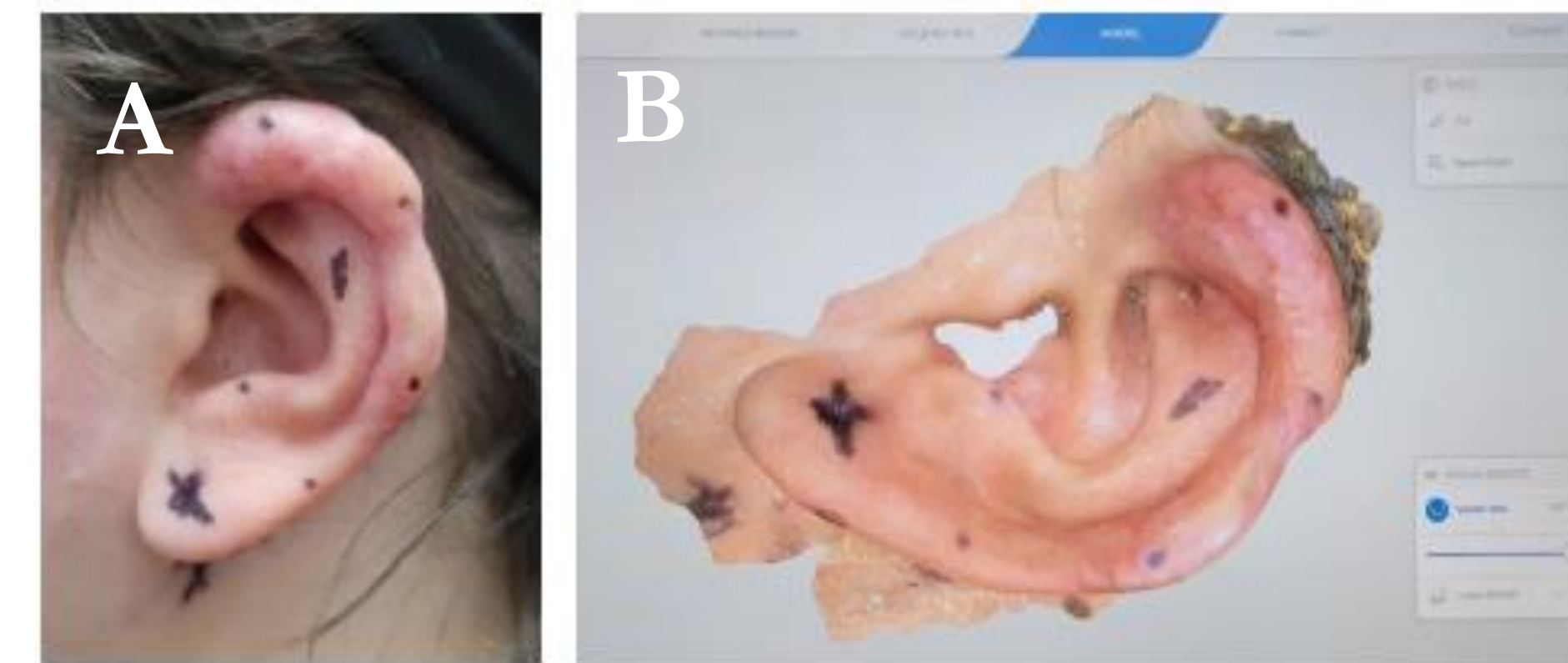


Fig.2: A) Step 1. B) Step 2

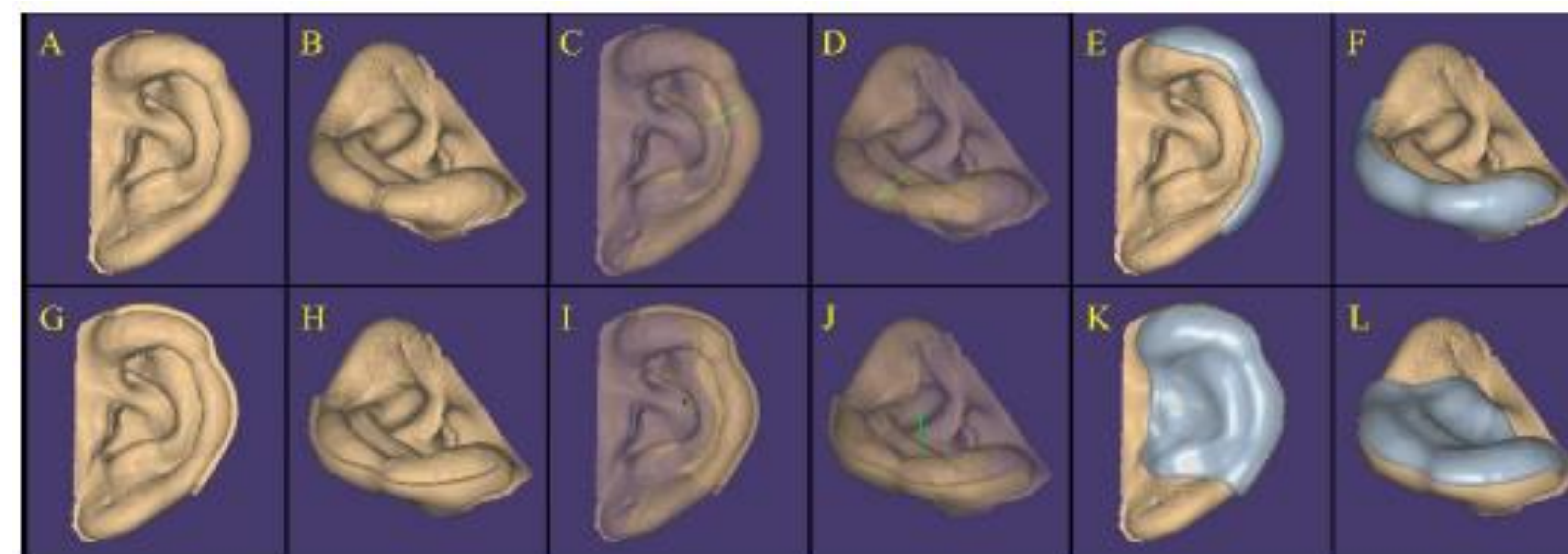


Fig.3: Step 4

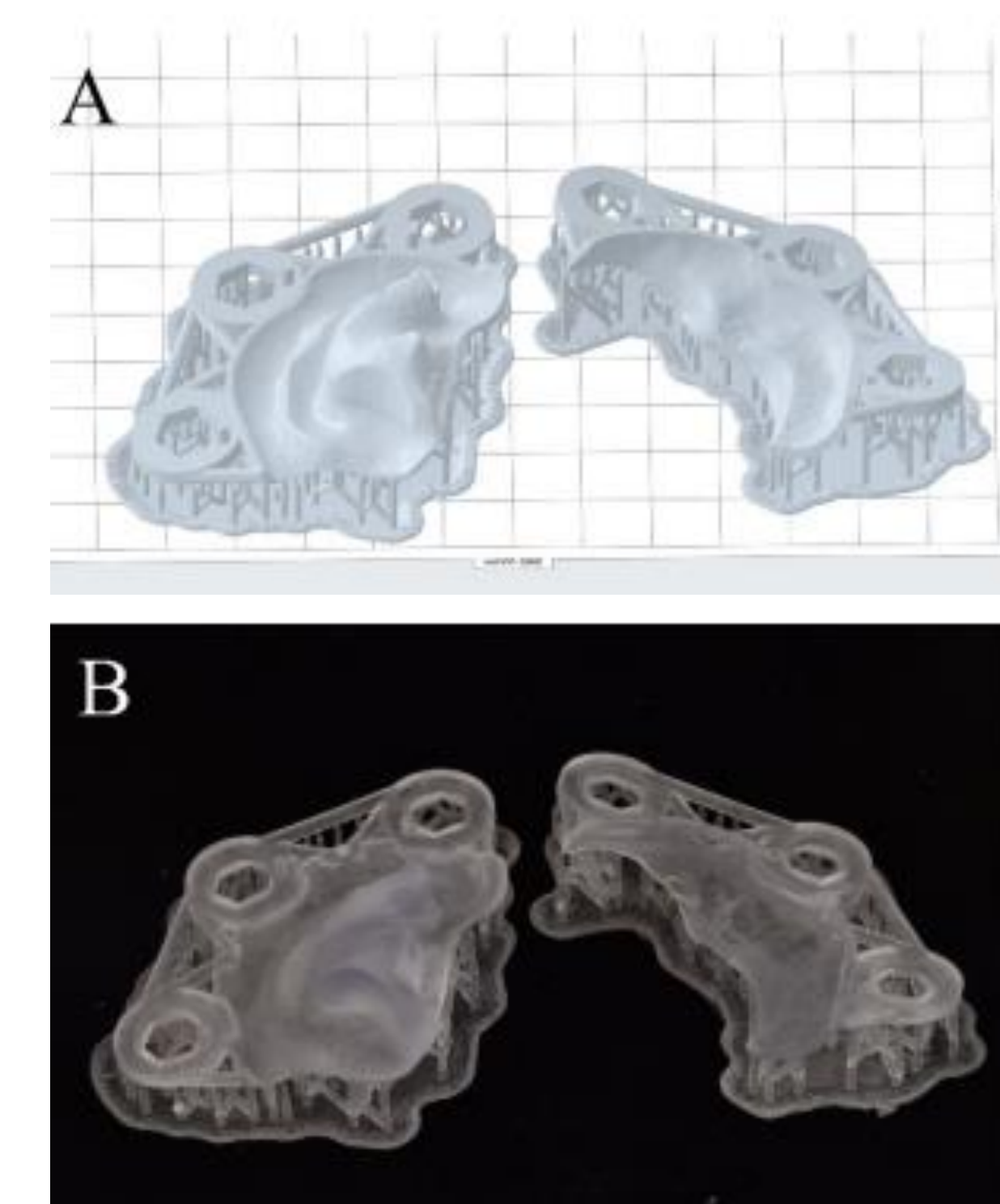


Fig.4: Step 5

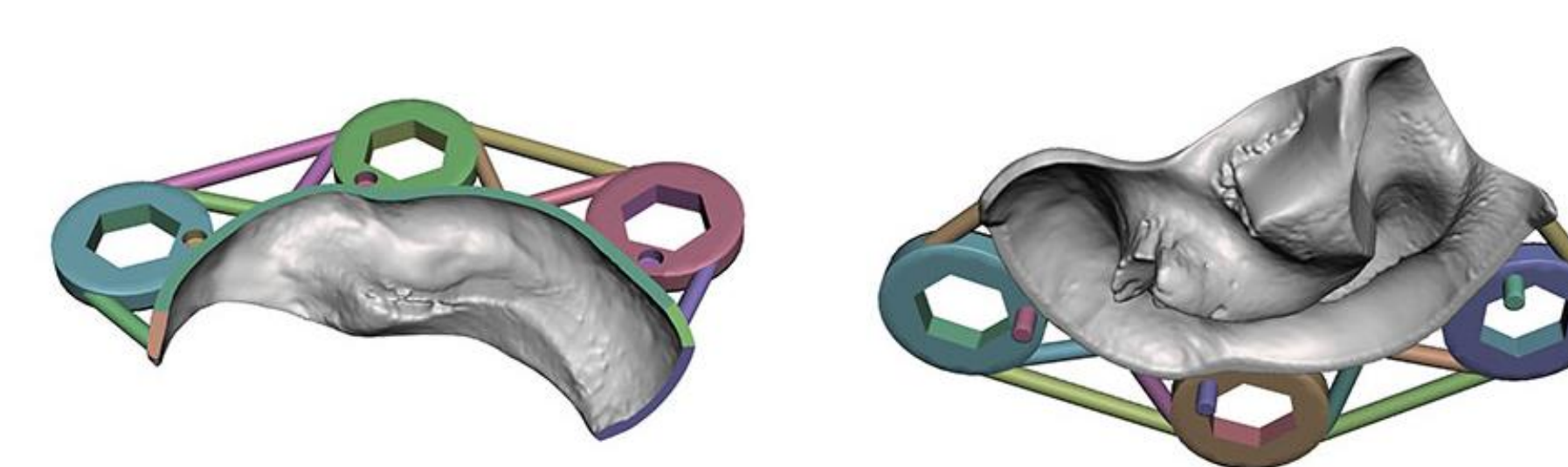


Fig.5: Step 6

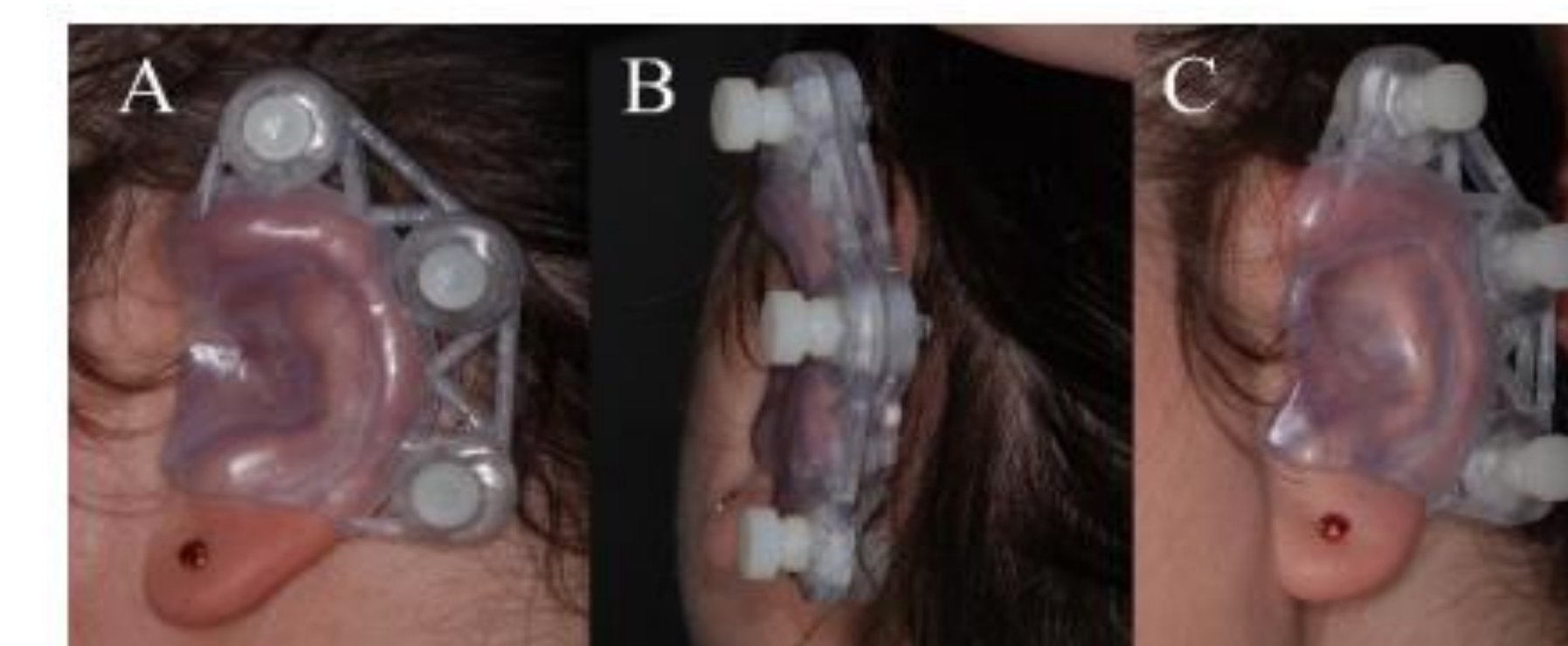


Fig.6: Step 8

TECHNIQUE

1. Created fiducial markers to enhance scanning (Fig 2.A).
2. Using an intraoral scanner, a digital scan was made (Fig 2.B).
3. The STL file was created and imported to CAD software (Exocad 3.0).
4. Using the splint module, two separate stents with different paths of insertion were created (Fig 3.A to 3.L).
5. STL files of the designed stents transferred to a 3D printer (Formlabs) and printed from a biocompatible resin (Fig 4.A and B).
6. Create parallel land areas to house the fastening screws (Fig.5)
7. Nylon screws were mounted in the housing areas using self cure acrylic.
8. After confirming the fit and retention, stent was delivered and followed up (Fig 6).

CONCLUSION

This technique article outlines a digital workflow for fabrication of an ear stent after the surgical removal of a keloid. An innovative technique is described based on digital impression making, digital design of the stent, and 3D printing of the designed stent. The appliance is designed to be passive in order to provide internal compression to prevent further re-growth of the keloid.