Objective: Digital workflows for implant placement and rehabilitation have gained popularity over the years due to improved accuracy, reduced surgical time, better communication, and improved prosthetic outcomes. Currently, there are multiple stackable guide designs for alveoloplasty and guided implant placement. This case report will describe a novel technique that utilizes a stackable 3-piece digital printed guide that is magnetically connected.

Case History: A 62-year-old healthy female patient presented to the University of East Carolina School of Dental Medicine clinic for comprehensive treatment. She had a history of periodontal disease and demonstrated excellent compliance. Following full-mouth extractions due to extensive attachment loss and esthetics, she received complete dentures. To improve function, a mandibular hybrid denture was planned. A CBCT was exposed using a dual-scan protocol. After image superimposition, 4 implants and respective abutments were planned using CoDiagnostix® software. A 3-piece magnetic guide was designed using several software and 3D printed. Following local anesthesia and flap reflection, the base of the guide was magnetically connected to the verification guide to ensure the correct position and fixed using pins. The verification guide was removed and alveoloplasty was completed up to the level of the base using a piezotome. The implant placement guide was magnetically connected to the base and 4 Straumann® bone level tapered implants were placed using a guided protocol.

Results: The 3-piece magnetically connected surgical guide for alveoloplasty, and implant placement was successfully used to obtain the required restorative space and allowed an exact restoratively driven implant placement and position for a full-arch mandibular hybrid complete denture.

Conclusion: The described fully digital technique allows for a precise alveoloplasty and guided implant placement using a stable guide that could be easily fixed and assembled during the surgical procedure without losing the planned implant position. Using local anesthesia, a full thickness flap was elevated. The guide transfer piece with verification windows was magnetically connected to the base of the guide and the connected pieces were positioned in the mandible until it was fully seated (Figure 3). The guide was fixed into the mandible using template fixation pins (Straumann®) and the transfer piece was removed (Figure 4). Alveoloplasty was completed with a piezotome (Satelec Acteon) to the level of the base in order to obtain the planned restorative space for the final restoration (Figures 5 and 6). Once the alveoloplasty was completed, the implant placement guide was magnetically connected to the base (Figure 7). Four bone level tapered implants (Straumann®) were placed with a guided surgery approach using the drilling sequence planned in the software (Figure 8) to a torque of 35Ncm. The patient healed uneventfully and was satisfied with the treatment. The final panoramic x-ray shows four mandibular implants placed according to the digital plan in order to deliver an implant-supported mandibular denture.

Discussion

Digital planning and guide design using a dual scan approach is a widely used technique when placing dental implants in fully edentulous arches. In addition, bone supported guides with fixation pins have demonstrated high accuracy between the planned implant position and the final implant position.1 There have been many designs of stackable guides using different methods of connection. The displacement deviation of virtual osteotomy design and the actual osteotomy one under the guidance of digital osteotomy template in the digital stackable template are highly consistent with the original planned position.2 Nevertheless, there is scarcity of literature regarding the use of magnets to connect guides and their accuracy. To the best of our knowledge, there is only one case report by Costa and co-workers in which they utilized a magnetically connect guide for full-arch maxillary implant placement with immediate loading.3

As shown in the current case report, the use of magnetic attachments to connect the guides allowed for rapid and easy positioning due to the high force of attraction between the magnets. This type of guide allowed to have stable alveoloplasty and implant placement guides, which is fundamental to achieve success in full-arch guided surgery. In addition, virtually guided alveolar ridge reduction has been recently described as a safe and precise procedure to obtain the planned restorative space.4

This novel type of stackable guide requires thorough planning and design for precise execution. Further clinical studies regarding the accuracy of magnetically-connected implant placement guides are required.

Conclusions

The use of a magnetically connected stackable 3D printed guide for guided implant placement and alveoloplasty is an alternative option for fully digital protocols involving full-arch implant restorations. This type of guide is advantageous since it is easily assembled and fixed. In addition, it offers great stability while performing alveoloplasty and implant placement.

References