

Background

A higher prevalence of peri-implantitis has been reported, and many clinicians have encountered the lower predictability of successful peri-implantitis treatment. Additionally, mechanical complications, such as implant fixture fractures that necessitate implant removal, have been observed. Traditionally, surgical implant removal has relied on trephine drills and high-speed rotary burs; however, these techniques have raised concerns regarding procedural invasiveness and the potential dissemination of titanium particles. The addition of a piezoelectric device has proven beneficial for the safety profile of these procedures, reducing the risk of damage to surrounding vital structures and minimizing metal particle dispersion during corticotomy. Although reverse torque implant removal kits have been utilized, the application of extremely high torque can raise concerns for clinicians during the procedure. This report presents two cases that illustrate predictable and minimally invasive implant removal methods by combining traditional implant removal modalities with piezoelectric technology.

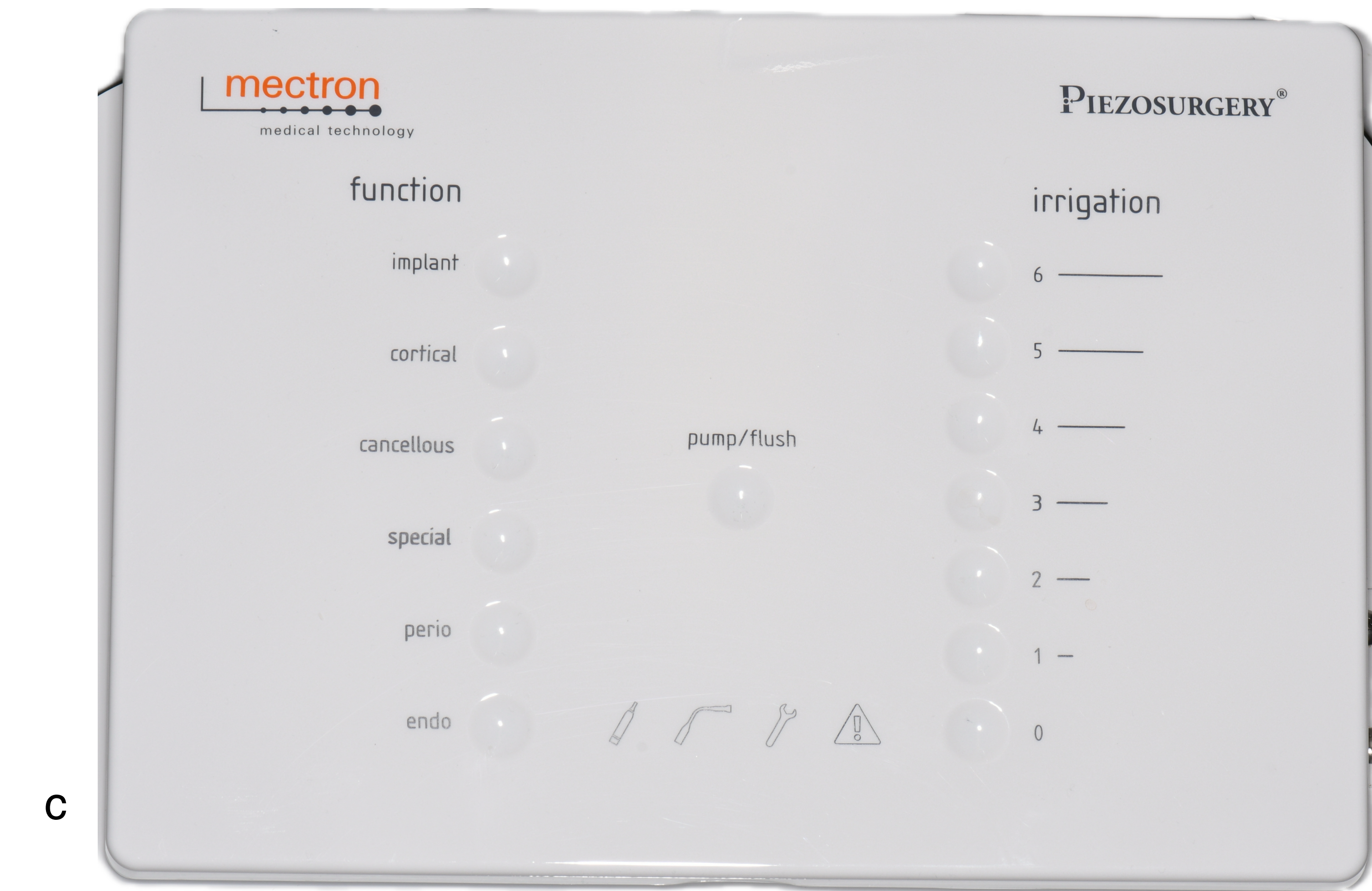


Figure 1. Examples of implant removal methods. (a) (b) Counter torque ratchet technique, (c) (d) Piezoelectric surgical device

Materials & Methods

Case 1:

A 70-year-old ASA class II patient presented with severe peri-implantitis at #12 and #13 implants, and a hopeless restorability prognosis for teeth #11 and #14. After the crowns and abutments of the #12 and #13 implants were removed, extractions of #11 and #14 were completed. Following these extractions, a full-thickness flap was elevated, and corticotomy around the #12 and #13 implants was performed using a piezoelectric device. A reverse torque technique was then applied to remove the implants in a minimally traumatic approach. After implant removal, ridge preservation was achieved using freeze-dried bone allograft and a non-cross-linked collagen membrane. Secondary intention closure was obtained using 5-0 glycolon sutures.

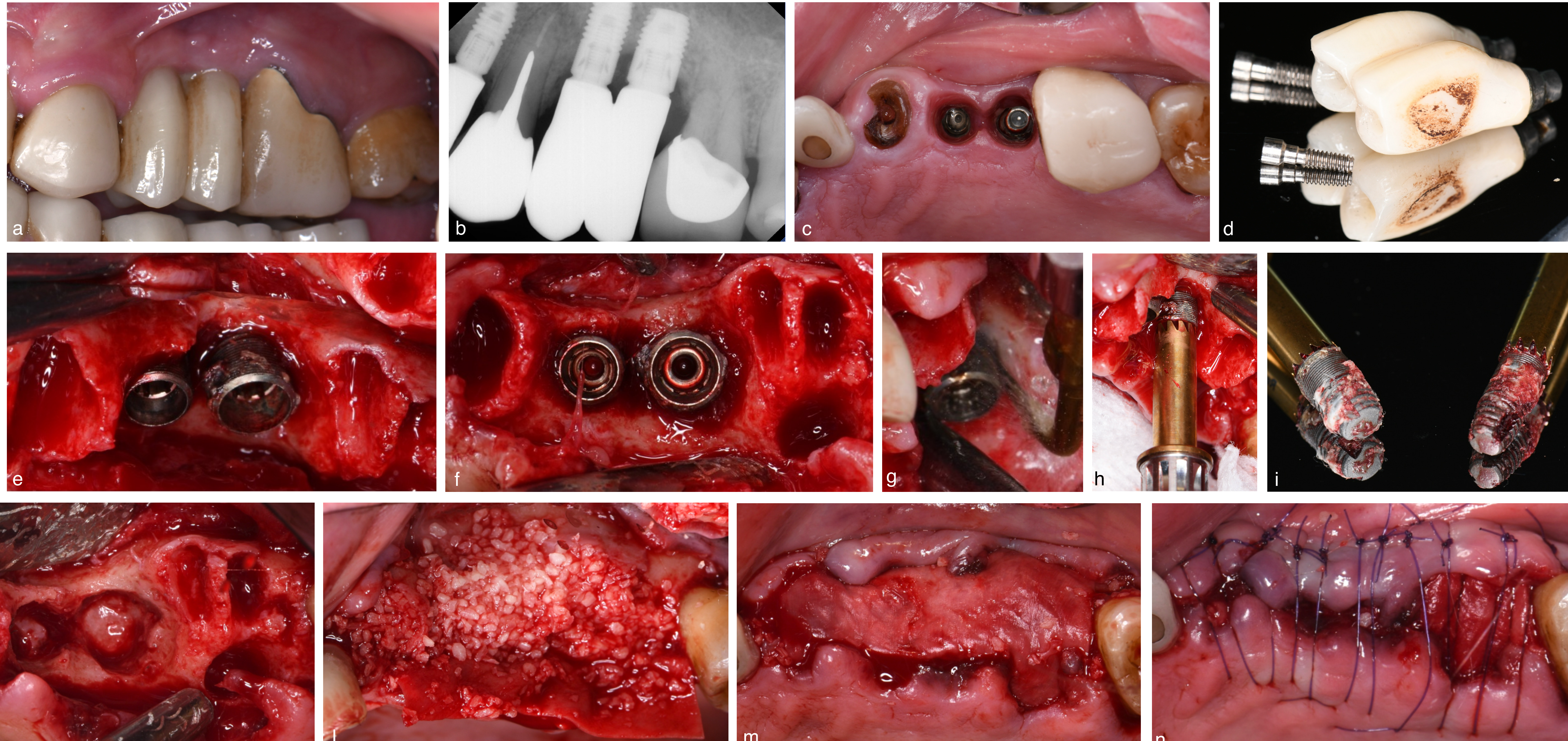


Figure 2. (a) Preoperative buccal view, (b) preoperative periapical X-ray, (c) occlusal view following prosthesis removal, (d) removed prostheses, (e, f) full-thickness flap reflection—buccal and occlusal views following #11 and #14 extractions, (g) piezoelectric surgical device, (h) counter-torque ratchet technique, (i) removed implants, (j, k) buccal and occlusal views of extraction and implant removal sockets, (l) freeze-dried bone allograft placed into sockets, (m) non-cross-linked collagen membrane placed over the graft material and tucked under the buccal and palatal flaps, (n) secondary tissue closure.

Materials & Methods

Case 2:

A 76-year-old ASA II patient presented with severe peri-implantitis affecting the #22 implant. Following a prosthetic assessment, a plan was developed for the removal of the #22 implant and the placement of #21 and #25 implants to support an implant-retained overdenture. After full-thickness flap reflection, a piezoelectric device was used to complete the corticotomy around the #22 implant, and an elevator was utilized to deliver the implant. Following implant removal, the surgical guide was seated, and fixation pins were secured. The #21 and #25 implants were placed according to protocol. The #25 implant exhibited buccal dehiscence of 1.5 mm on the buccal surface and was grafted with freeze-dried bone allograft, which was then covered with a non-cross-linked collagen membrane. Primary closure was obtained using 5-0 glycolon sutures, and a postoperative periapical X-ray was acquired.

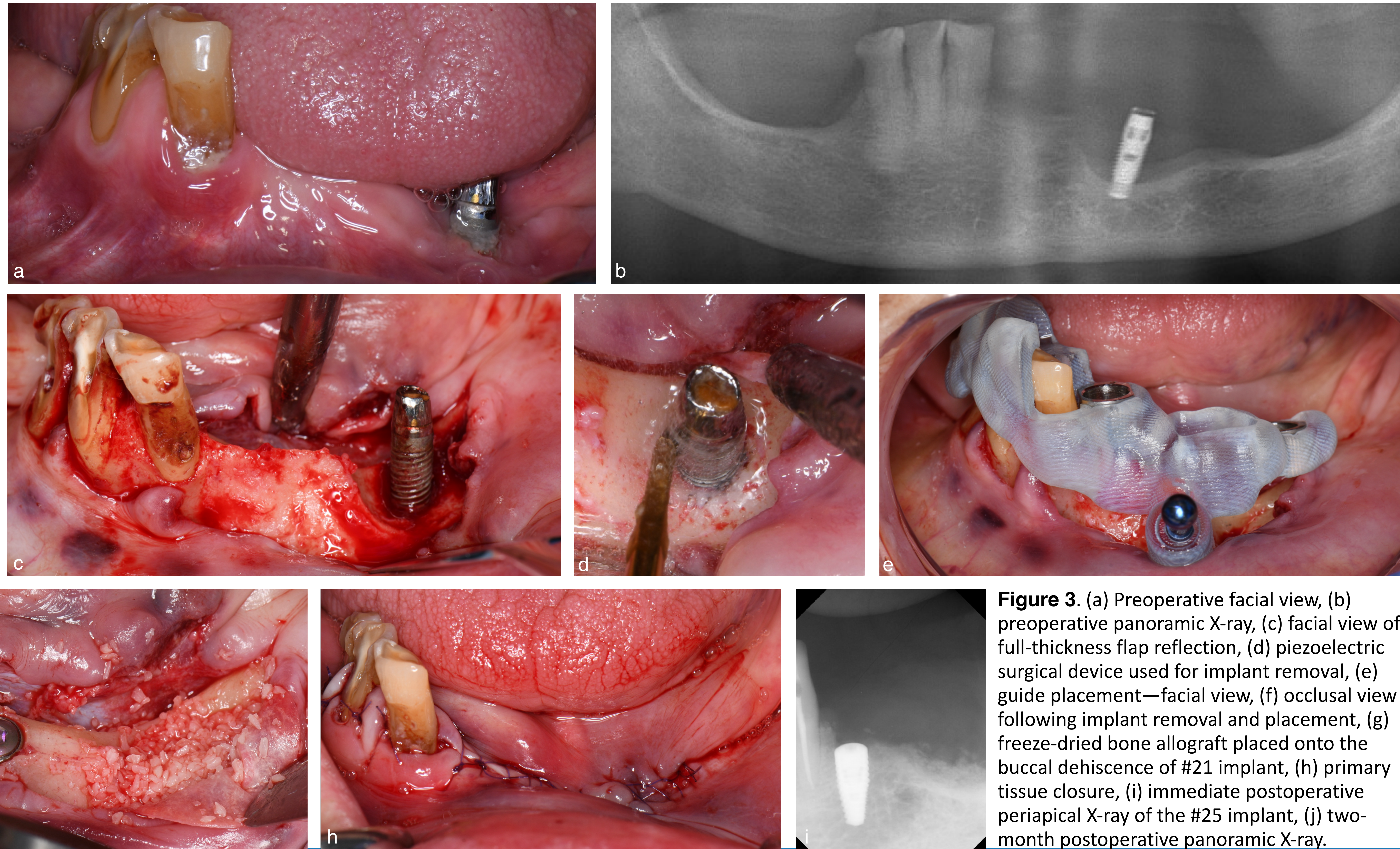


Figure 3. (a) Preoperative facial view, (b) preoperative panoramic X-ray, (c) facial view of full-thickness flap reflection, (d) piezoelectric surgical device used for implant removal, (e) guide placement—facial view, (f) occlusal view following implant removal and placement, (g) freeze-dried bone allograft placed onto the buccal dehiscence of #21 implant, (h) primary tissue closure, (i) immediate postoperative periapical X-ray of the #25 implant, (j) two-month postoperative panoramic X-ray.

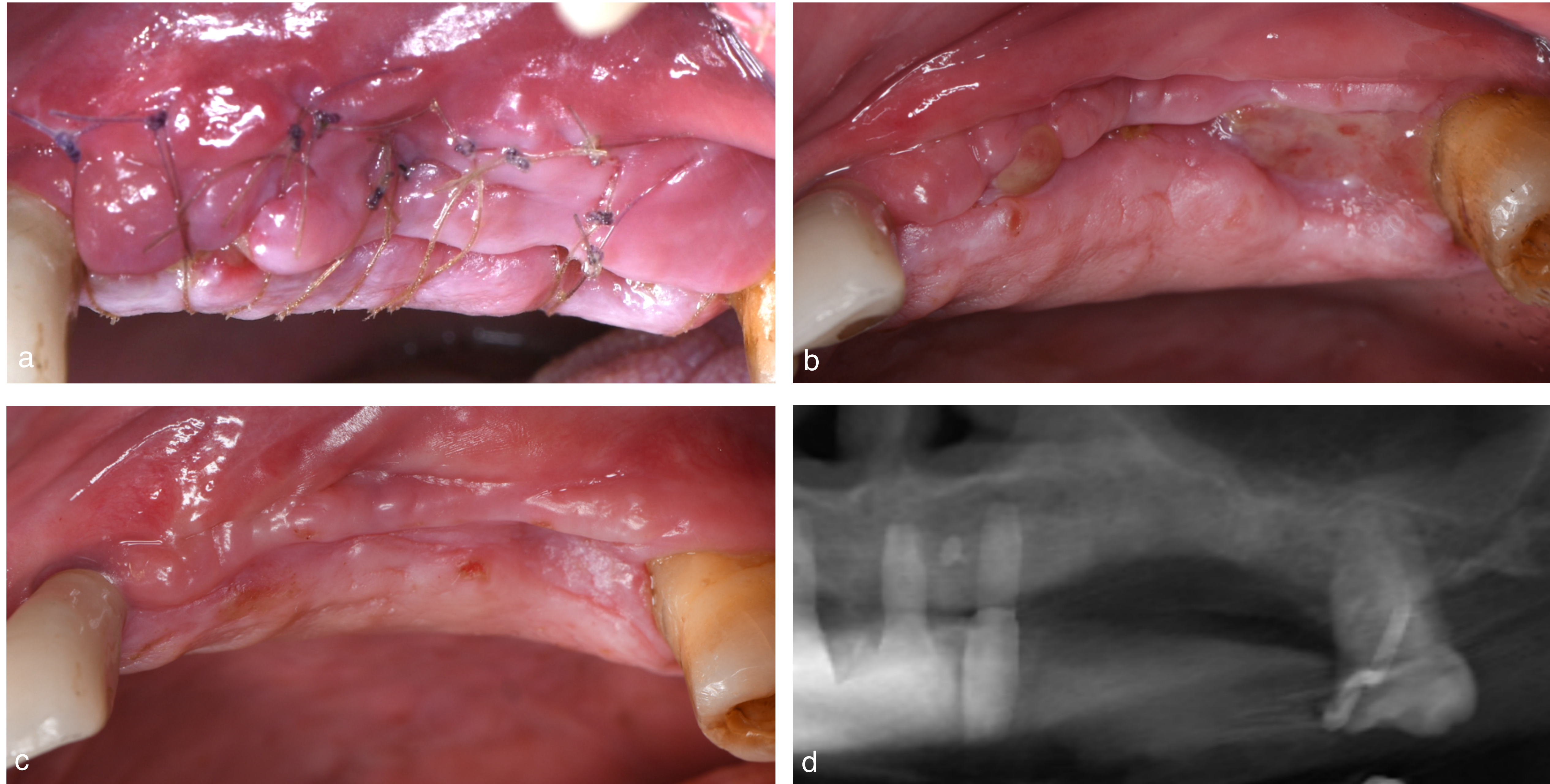


Figure 4. Case 1 follow-up. a) buccal view at 2-week post-op, b) buccal view at 1-month post-op, c) buccal view at 4-month post-op, d,e) 4-month CBCT images of healed extraction and implant removal sites

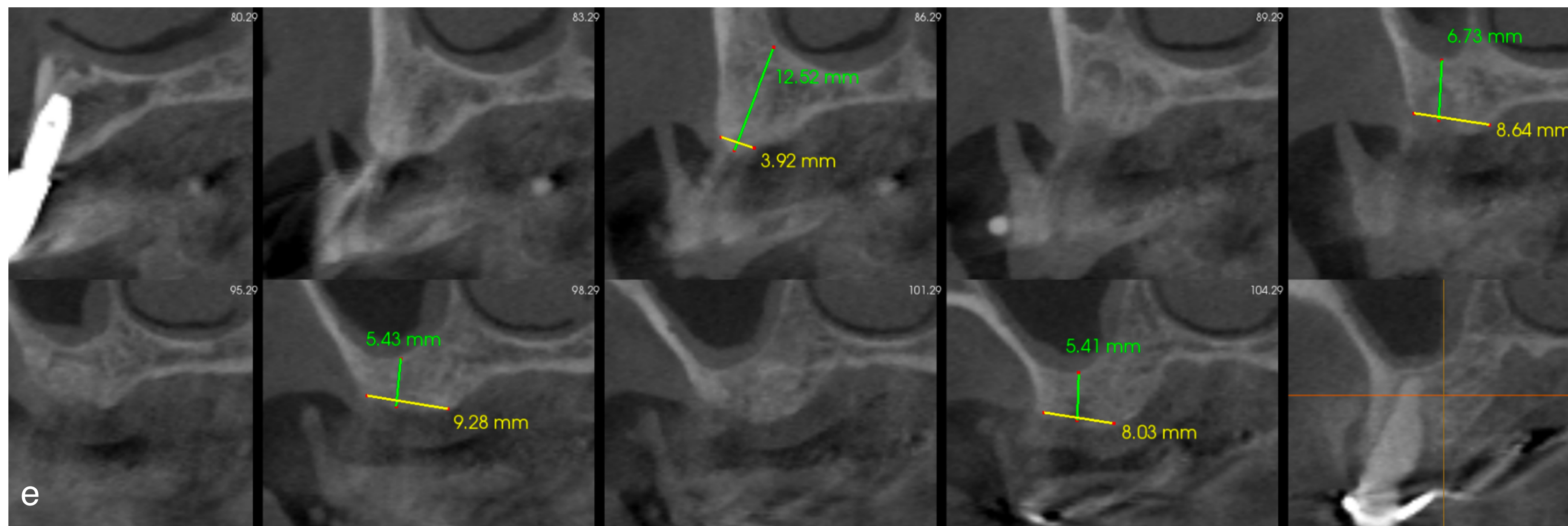
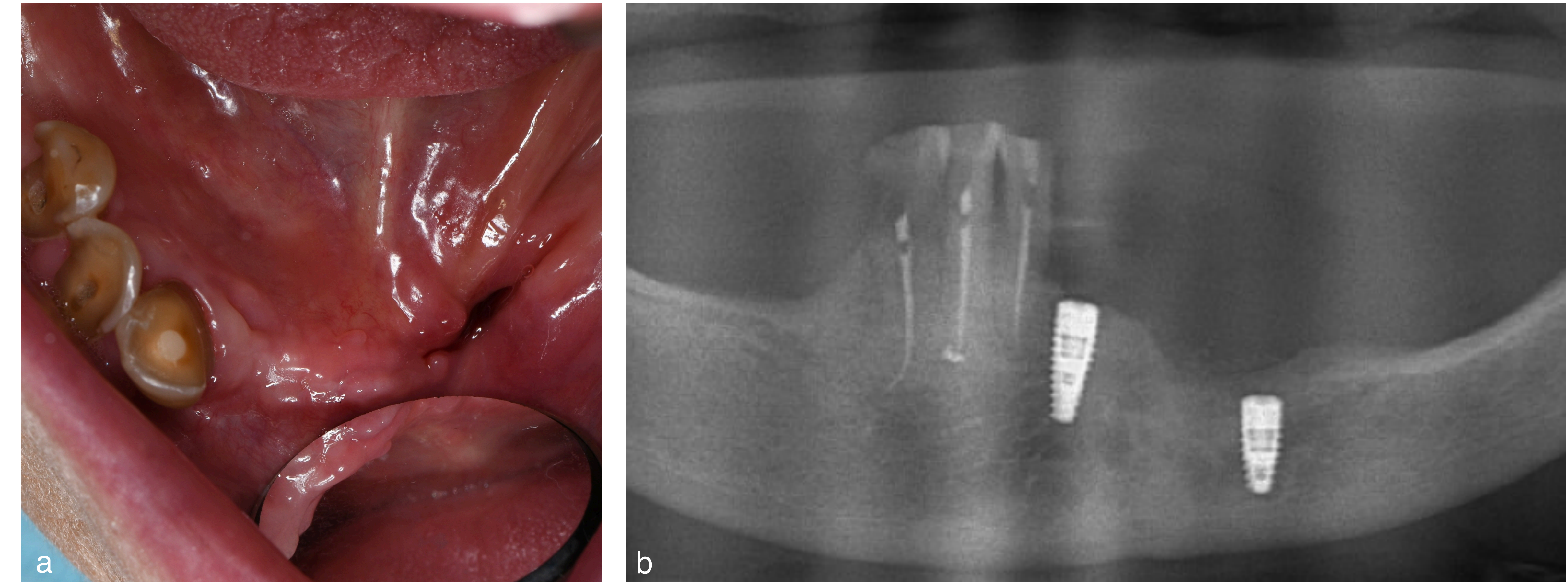
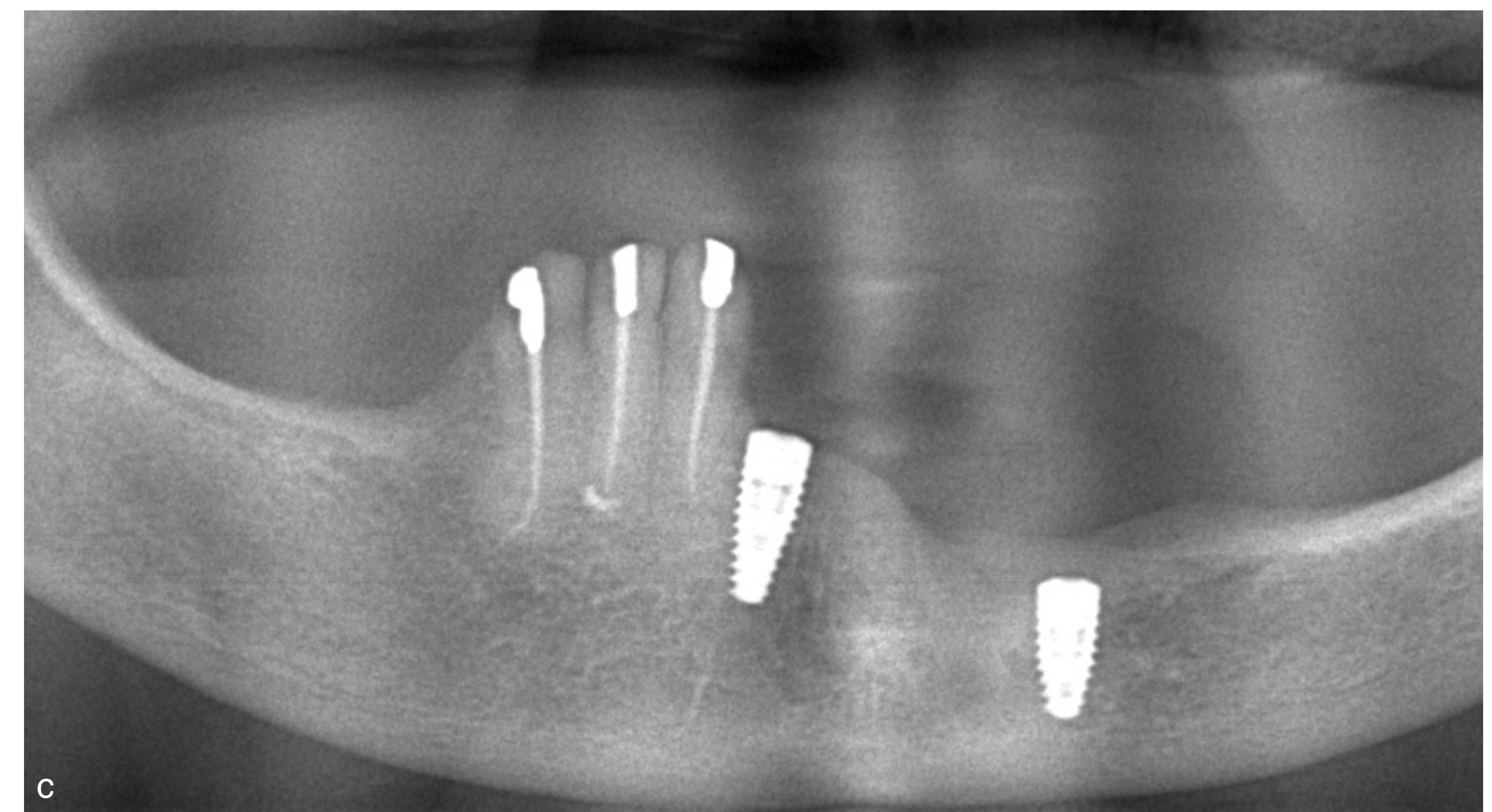


Figure 5. Case 2 follow-up. (a) Occlusal view at the 2-week post-op, showing healing by secondary intention at the implant removal site #22, (b) panoramic X-ray at the 2-month post-op, showing complete soft tissue closure at site #22, (c) panoramic X-ray at the 5-month post-op.



Results

The addition of a piezoelectric device
The integration of a piezoelectric device facilitates multiple implant removal techniques while minimizing trauma to surrounding tissues. Both cases proceeded without significant intraoperative complications. However, implant removal sites that underwent ridge preservation exhibited less granulation tissue formation and delayed epithelialization during healing compared to tooth extraction sites with ridge preservation.

Conclusion

Various techniques can be utilized for implant removal, and the integration of piezoelectric devices helps minimize torque and trauma associated with conventional methods. Further research is needed to better understand the differences in wound healing between tooth extraction sites and implant removal sites.

