

MULTIFUNCTIONAL Device. From Teeth Arrangement to IMPLANT Placement.

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Background

Since decades, multifunctional devices obtained from a mucosal supported total prosthesis have been duplicated and used as tomographic guide, surgical guide and prosthetic guide. We describe a case where we designed, manufactured & used a multifunctional device for a totally upper jaw edentulous patient, combining analogic and digital (DICOM & STL files) procedures to compare the discrepancy in 3D positioning between digital planning and post surgical results. (FIG. 1).

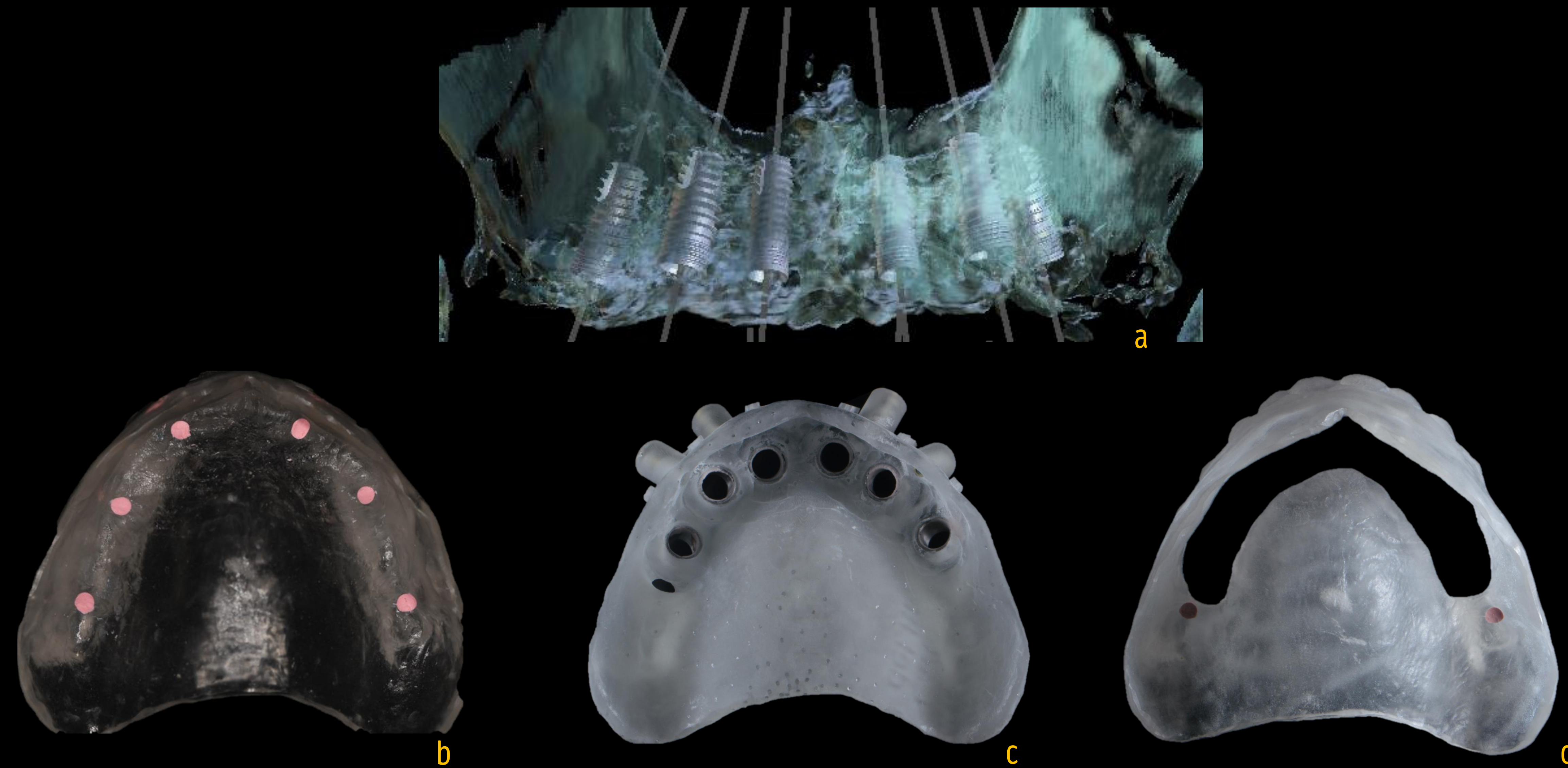


FIGURE 1. Implant Planification (a), upper total prosthesis (b), upper restrictive surgical guide (c), multifunctional device (d).

Clinical Case

A 56-year-old male patient arrives at the Implantology Department*, UNAM, with 2 implants locator abutments & 2 canine roots without prosthesis. Extractions and explantations were performed & a total denture was elaborated. The diagnosis and planning was made through a multifunctional device, which was scanned & combined with the DICOM files for the placement of 6 implants in the maxilla (FIG 2).

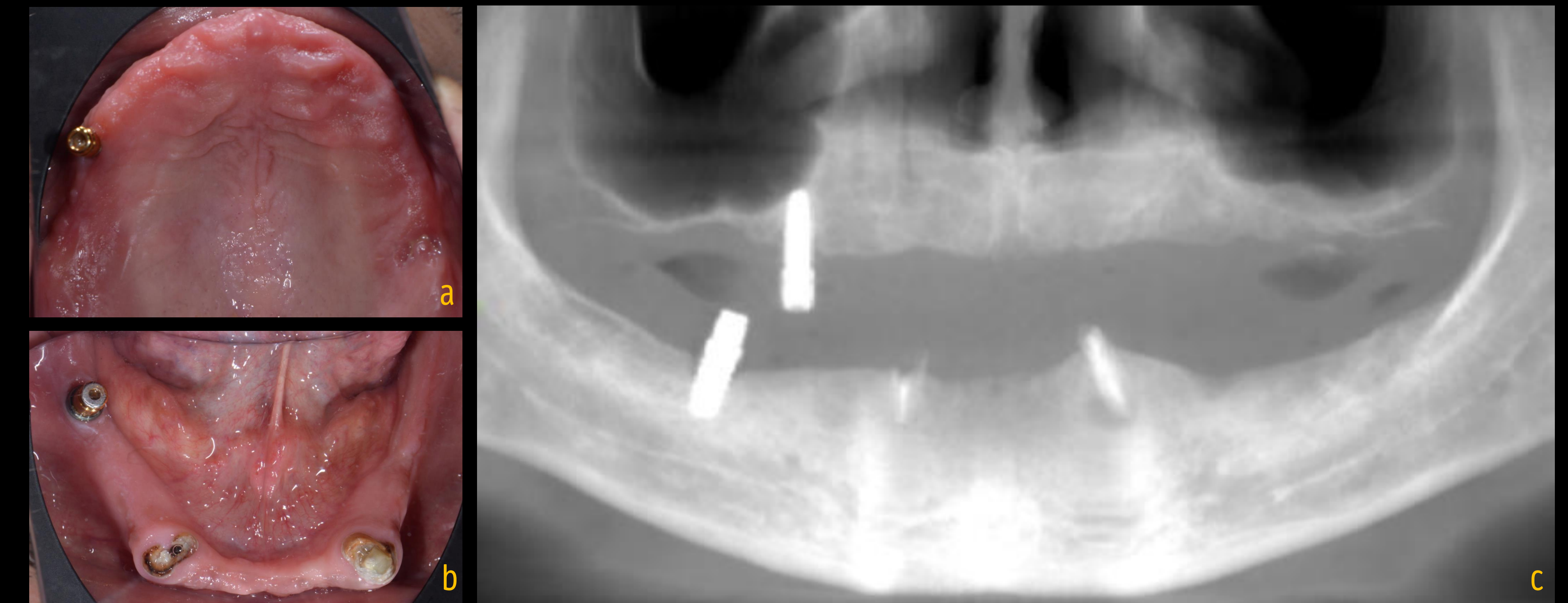


FIGURE 2. Initial clinical situation of the upper (a) and lower (b) arch where the root remains and implants with axial abutments are clinically observed and orthopantomography where apical lesions are seen in teeth and integrated implants with slight crest loss (c).

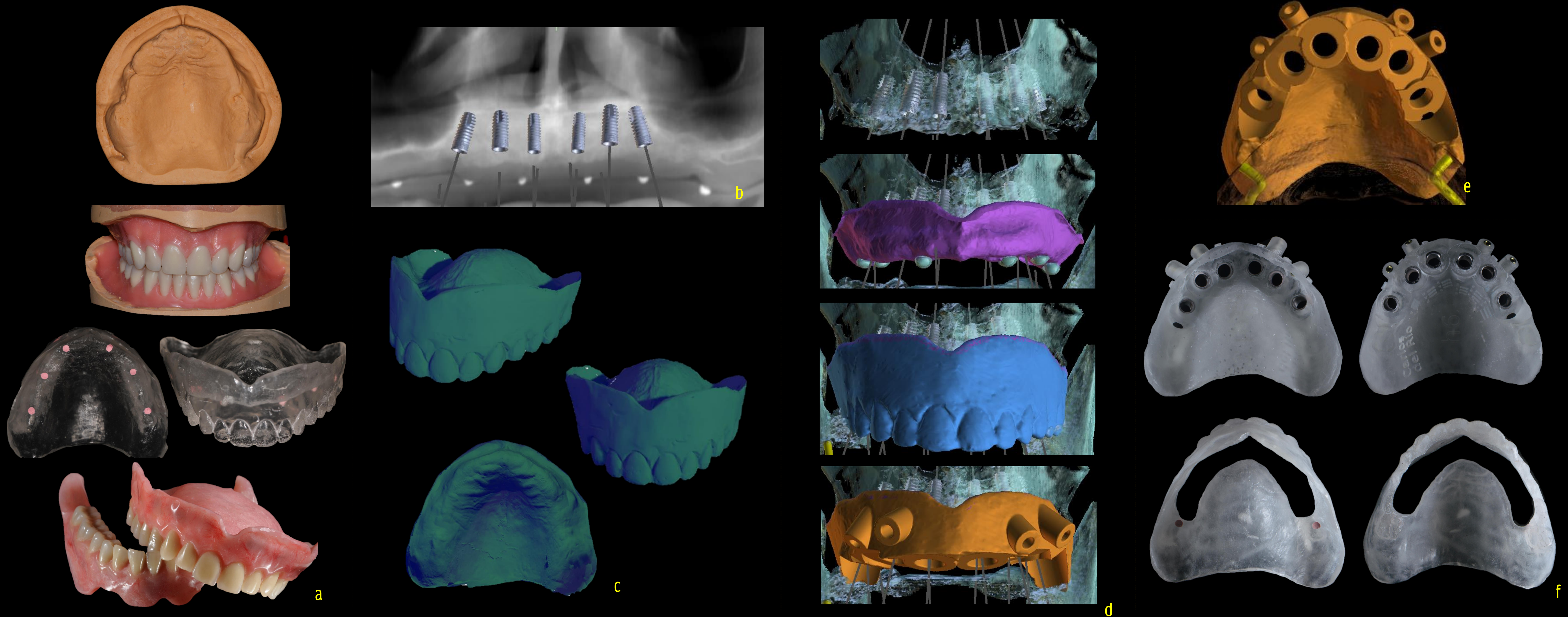


FIGURE 3. PLANNING PROCEDURE. (a) manufacturing of mucosa-supported total prosthesis and transparent duplicate with radiopaque markings, (b) digital planning of the placement of 6 implants in the upper arch in bluesky, (c) STL file of the scan of the transparent duplicate of the upper total denture, (d) digital splicing of the position of the implants with the STL file of the total prosthesis resulting in the design of the restrictive surgical guide based in the multifunctional device, (e) design of the restrictive surgical guide in its occlusal view, with ring height of 6mm, (f) Restrictive surgical guide printed in resin with its positioning rings and multifunctional device in occlusal and gingival view.



SURGERY TIME...

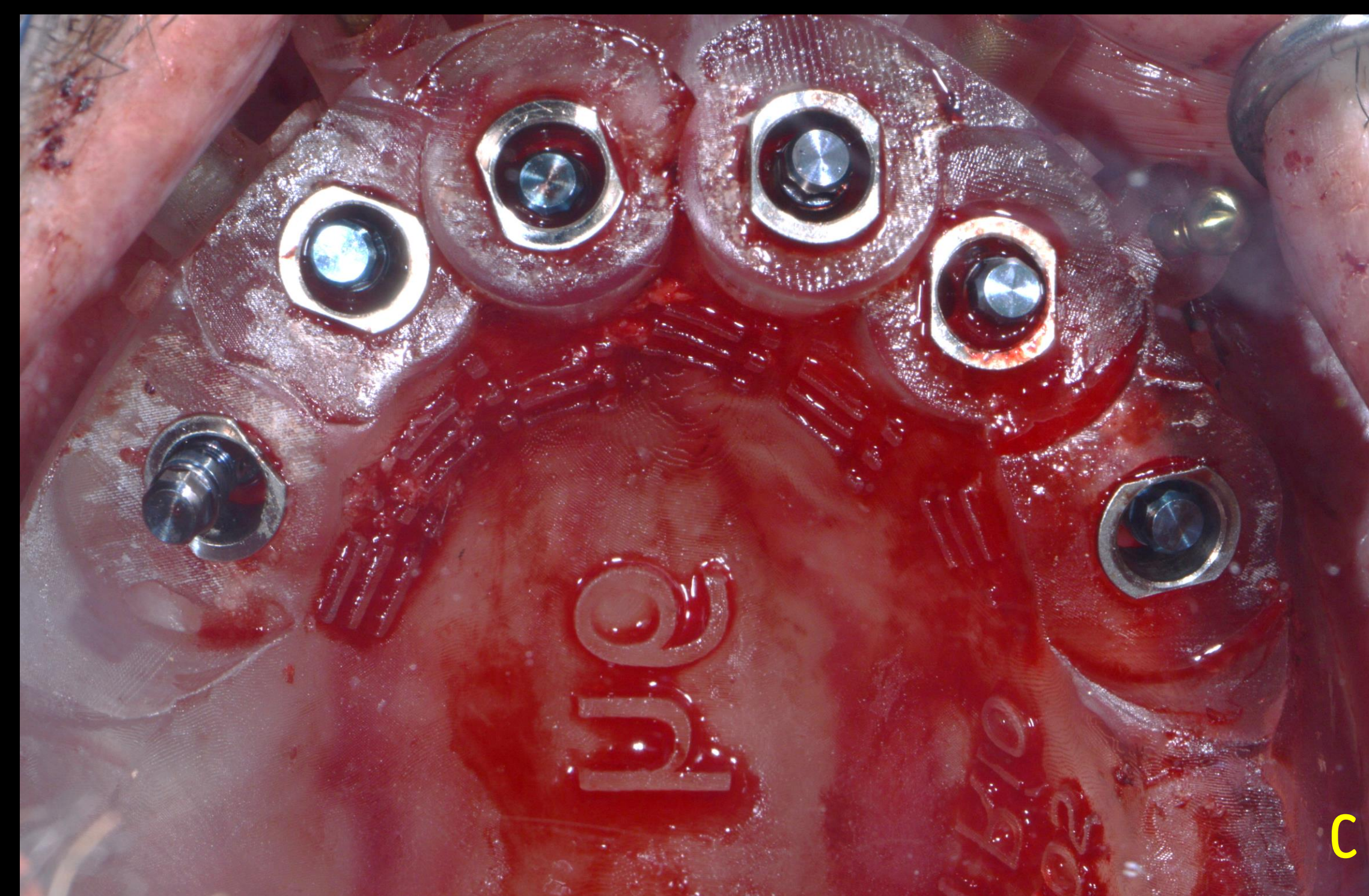
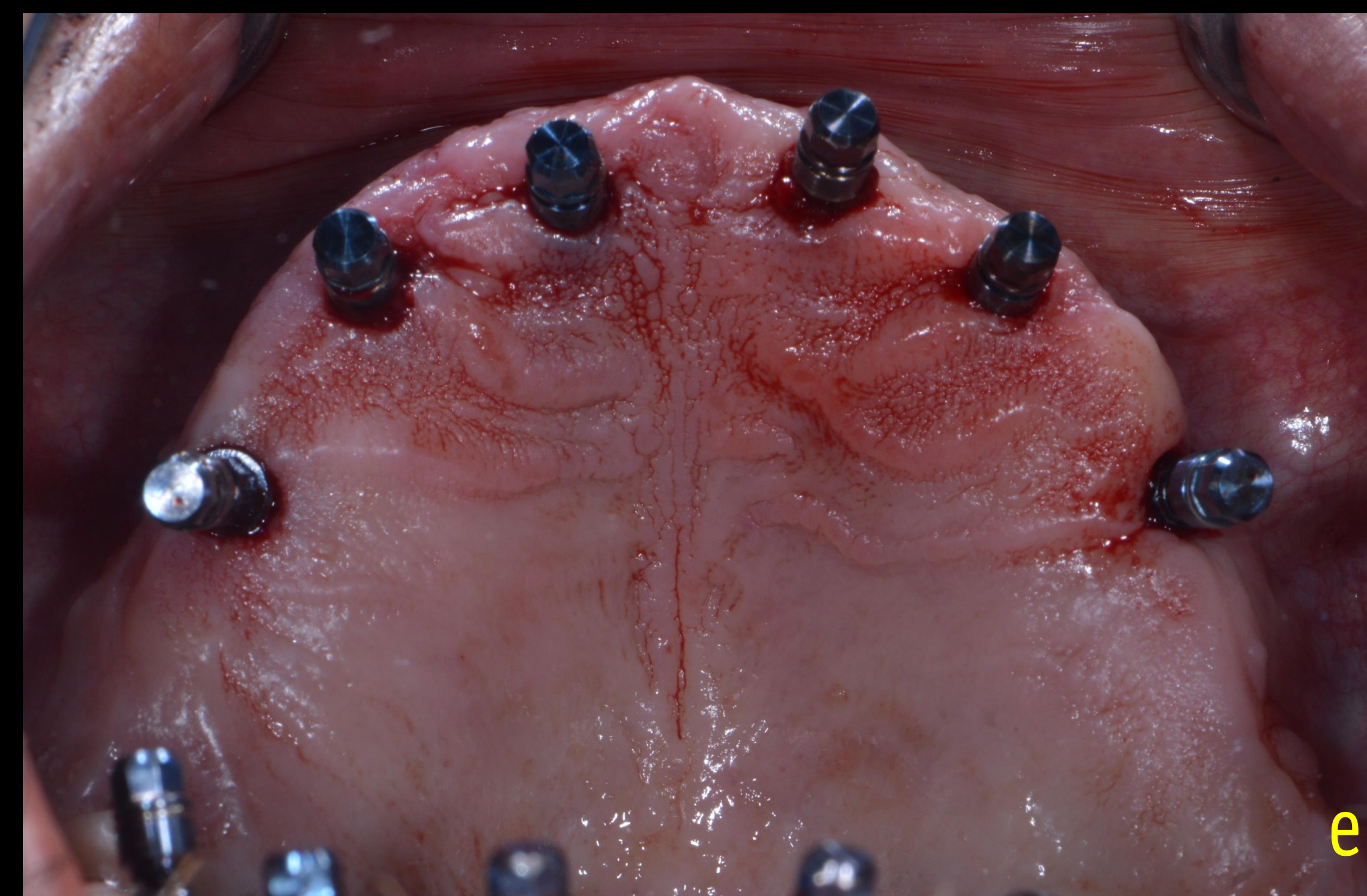
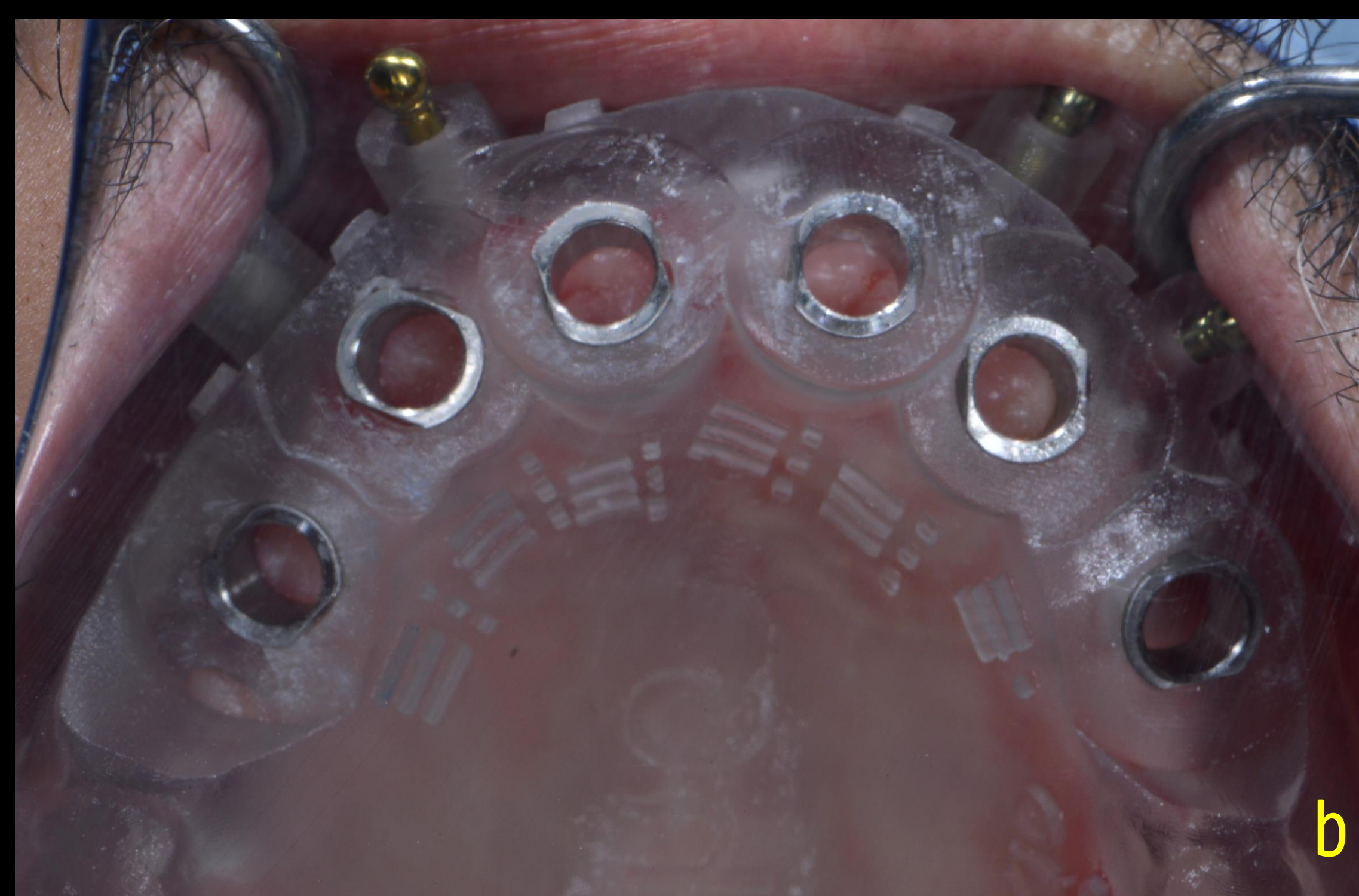
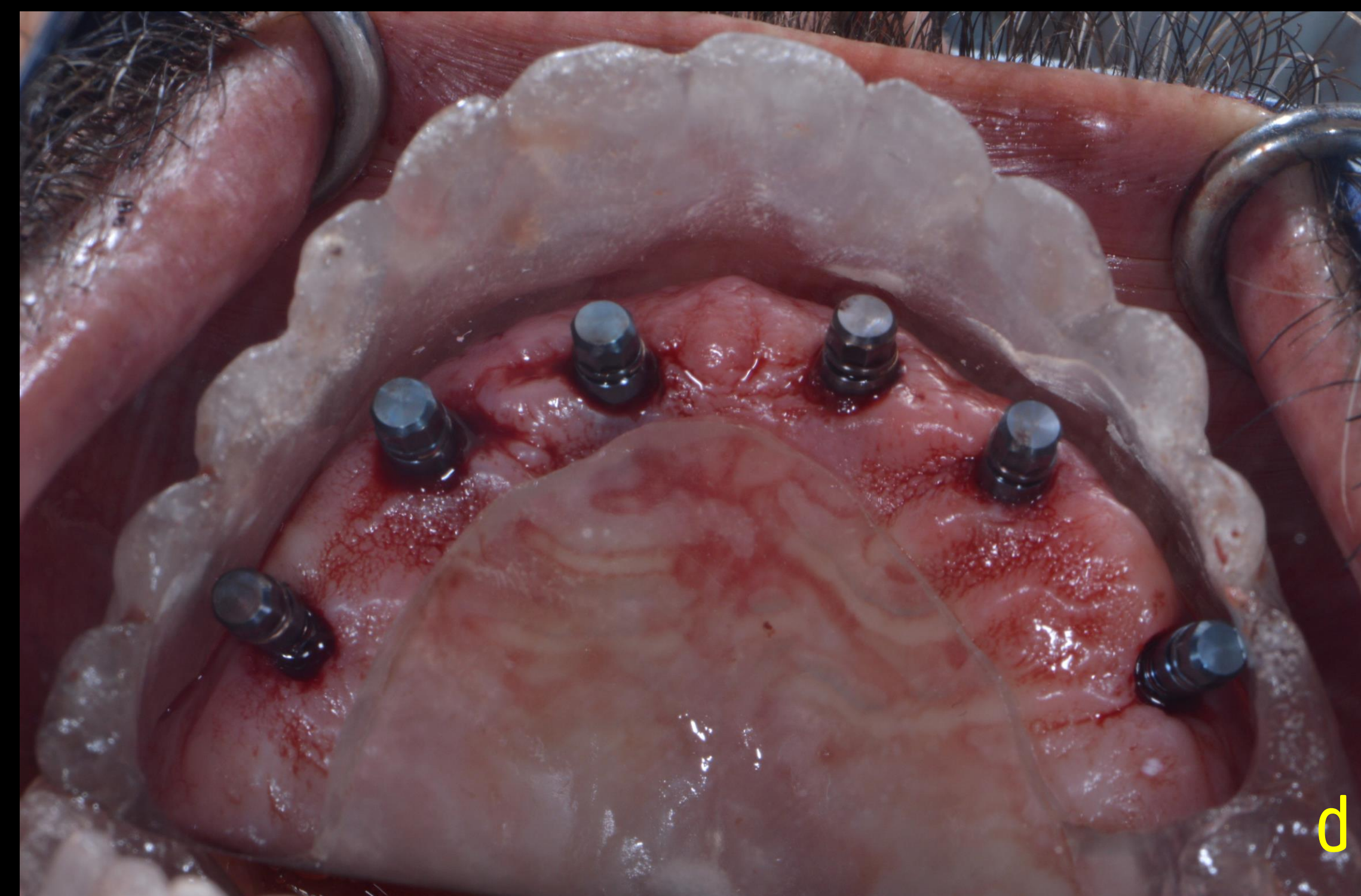
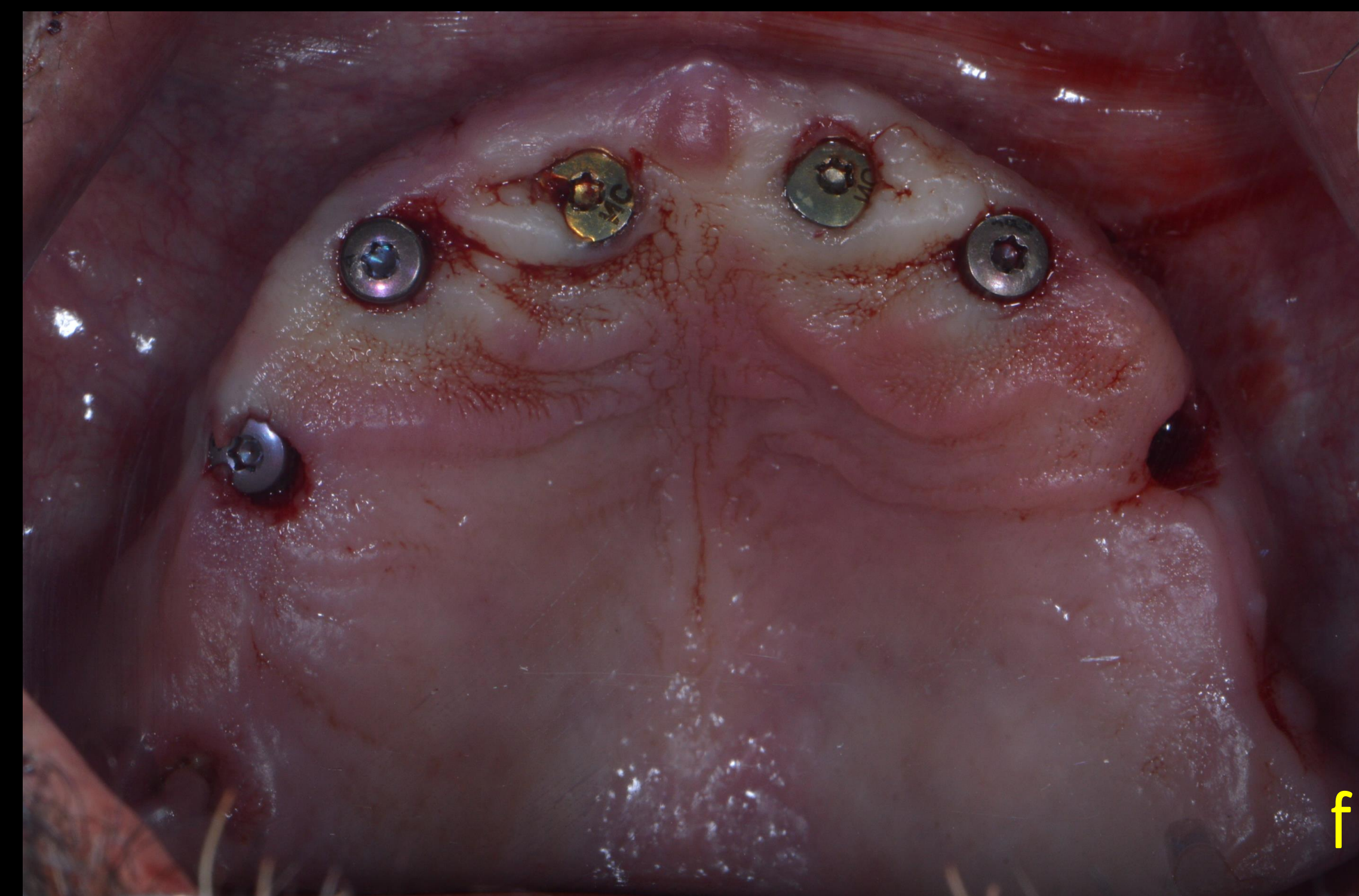
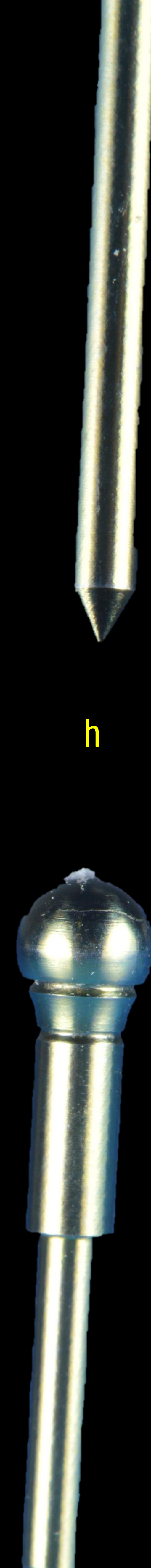


FIGURE 4. SURGICAL PROCEDURE. (a) initial clinical situation of the maxilla after the healing of the explantations, (b) positioning of the restrictive surgical guide by means of 3 vestibular fixation pins, (c) implants placed through the restrictive surgical guide by flapless protocol (d) multifunctional device is positioned in maxilla to check prosthetically favorable emergence position, (e) maxilla with the implants with their loxim mount, (f) placement of healing screws and cover screw in implant placed in 16 (g) BLT implant, all implants were 10 mm long, 4 had a diameter of 4.1 and 2 had a diameter of 3.3 (h) surgical holding pin.

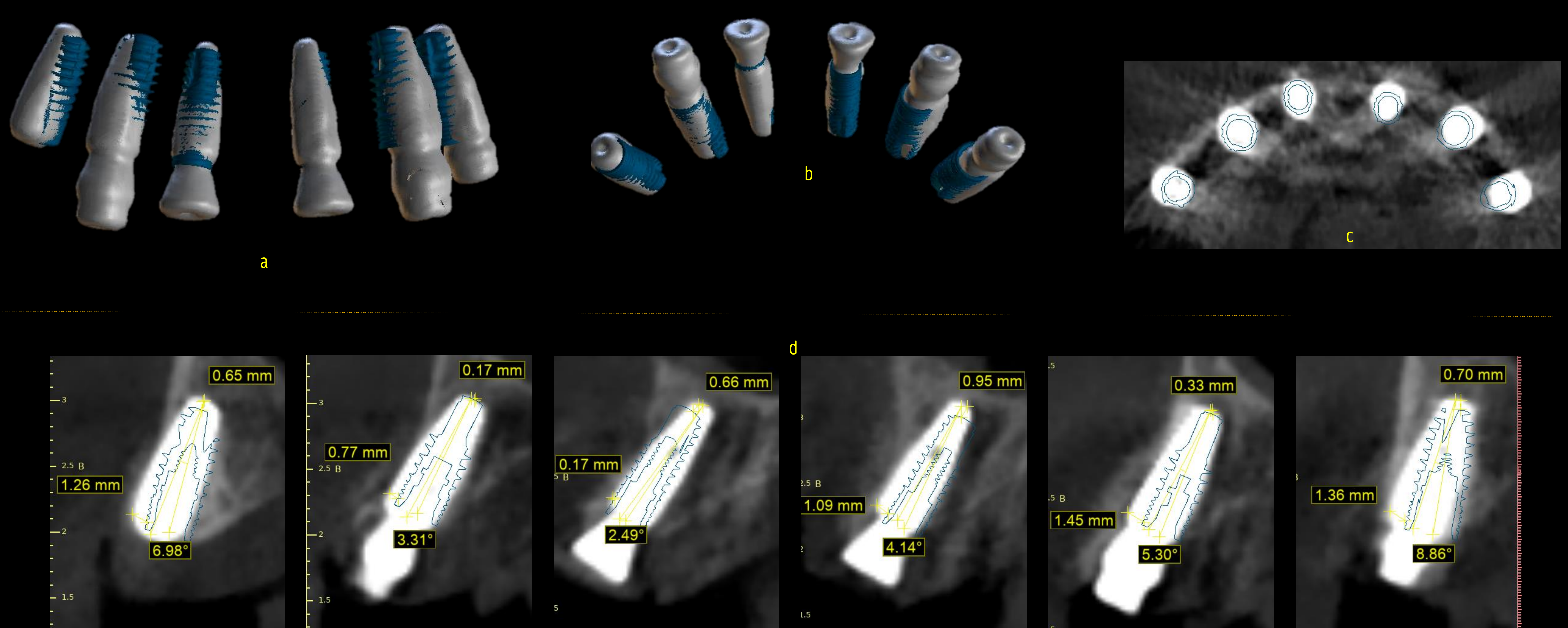


FIGURE 5. DIGITAL COMPARISON. Digital overlaying of planning STL file of the digital planning with post-surgical DICOM file (a) front view, (b) palatine view and (c) oclusal view, (d) individual digital joint per implant (implants zone from left to right, 16, 14, 12, 22, 24, & 26), showing discrepancies in positioning in the vestibular, apical direction & in the angulation of the emergence.

Results

Making use of digital and analog tools to achieve a highly predictable clinical result. Within all the planning carried out in this clinical case, there is a discrepancy between the digital planning and the actual placement, obtaining an average discrepancy in the buccal direction of 1.01 mm, in depth of 0.57 mm and in emergency angulation. of 5.18 degrees. (TAB 1.)

IMPLANT	VESTIBULAR	DEEP	ANGLE
12	0.17MM	0.66MM	2.49°
14	0.77MM	0.17MM	3.31°
16	1.26MM	0.65MM	6.98°
22	1.09MM	0.95MM	4.14°
24	1.45MM	0.33MM	5.30°
26	1.36MM	0.70MM	8.86°
Averages	1.01MM	0.57MM	5.18°

TAB 1. MEASURES OF DISCREPANCY. Between planning and the final surgical result, in vestibular direction, depth and emergency angulation

References



Conclusions

The manufacture of a multifunctional device in an analog manner and converting it to an STL file, gives us the possibility of carrying out the digital planning of prosthetically guided dental implants in a DICOM file and thereby designing a restrictive surgical guide based on said device. FIG 6. which has a high degree of predictability. The literature describes different circumstances why this spatial bias exists, such as the operator's experience in fully guided surgery, the guide being completely mucosa-supported, the depth of insertion of the fixation pins, etc. The clinical case studied had a slight spatial bias, statistically and clinically not relevant to the well-being of the final prosthesis.

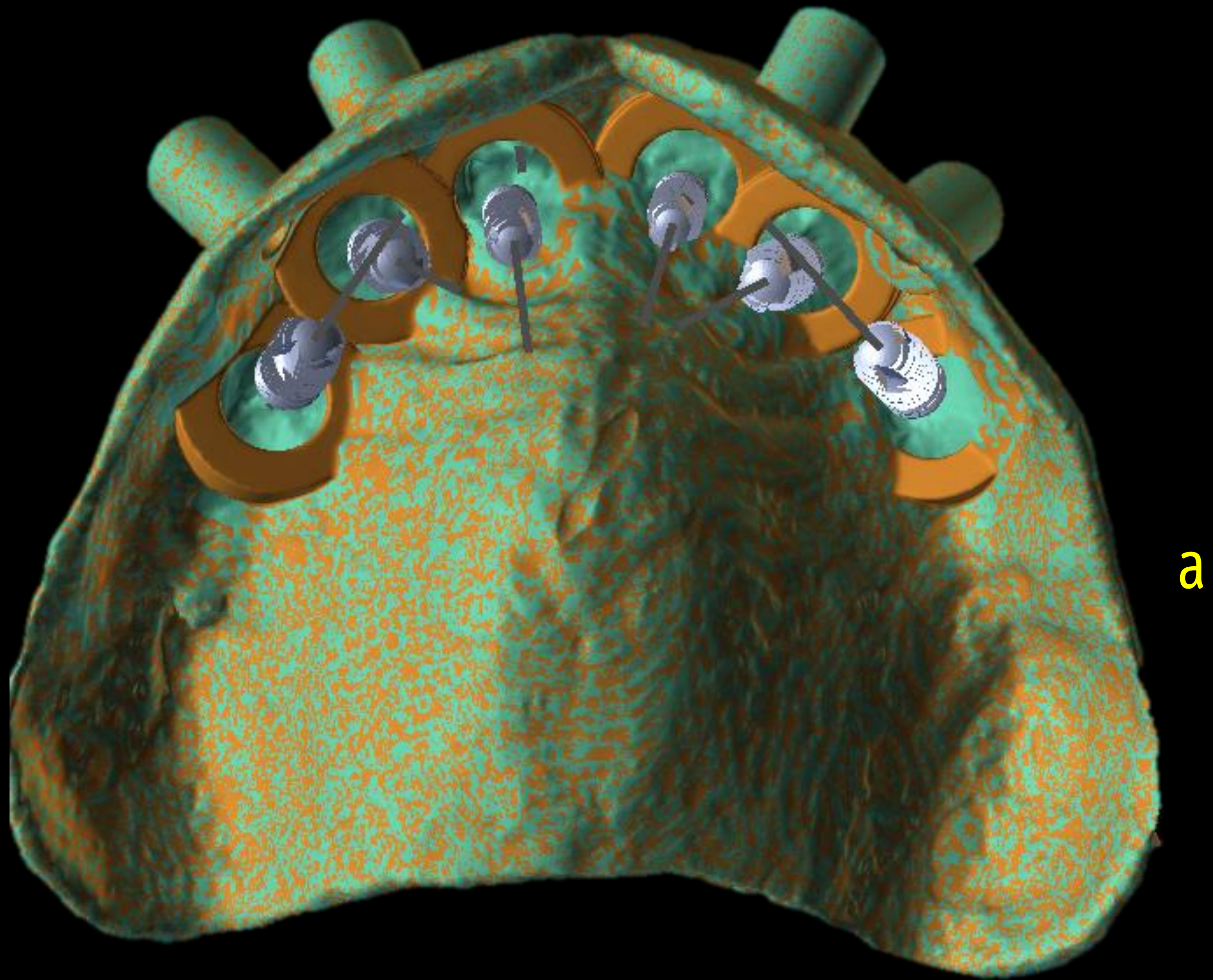


FIGURE 6. DIGITAL SPLICING of final placement planning and DICOM file STL, with surgical guide design (a).

