

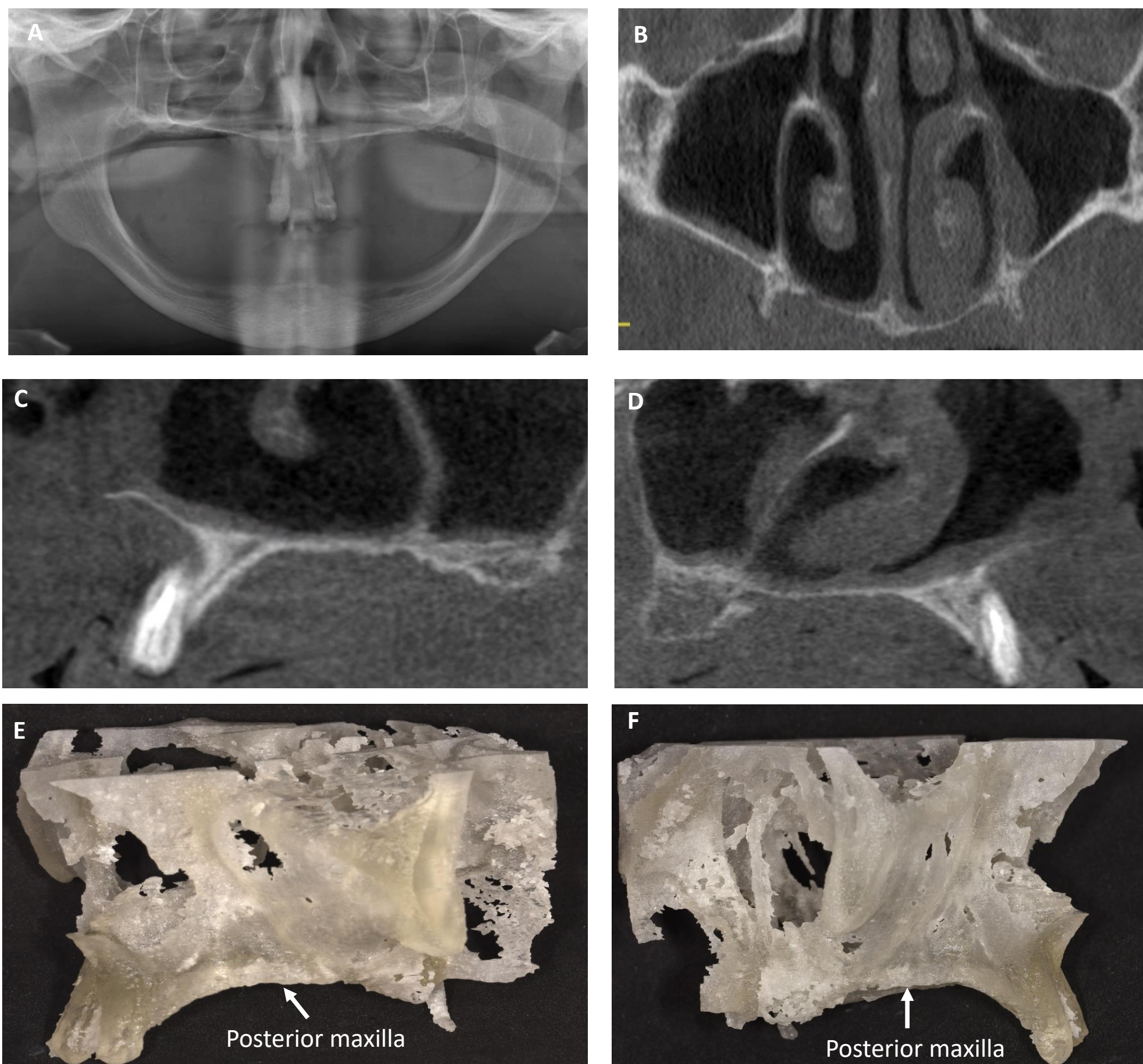
INTRODUCTION

Ectodermal dysplasia (ED) consists of a large group of inherited disorders characterised by defects in tissues of ectodermal origin. These patients can present with a spectrum of hypodontia severity, which can result in a reduction or absence of alveolar bone growth. The reduction in height and width of under-developed alveolar ridges can make implant treatment challenging. Extensive bone augmentation procedures or extra-maxillary implants can be alternative modalities; however, they can be invasive and costly. Patients who do not consent for these procedures require innovative and lateral decision-making to deliver functional and predictable outcomes.

METHOD

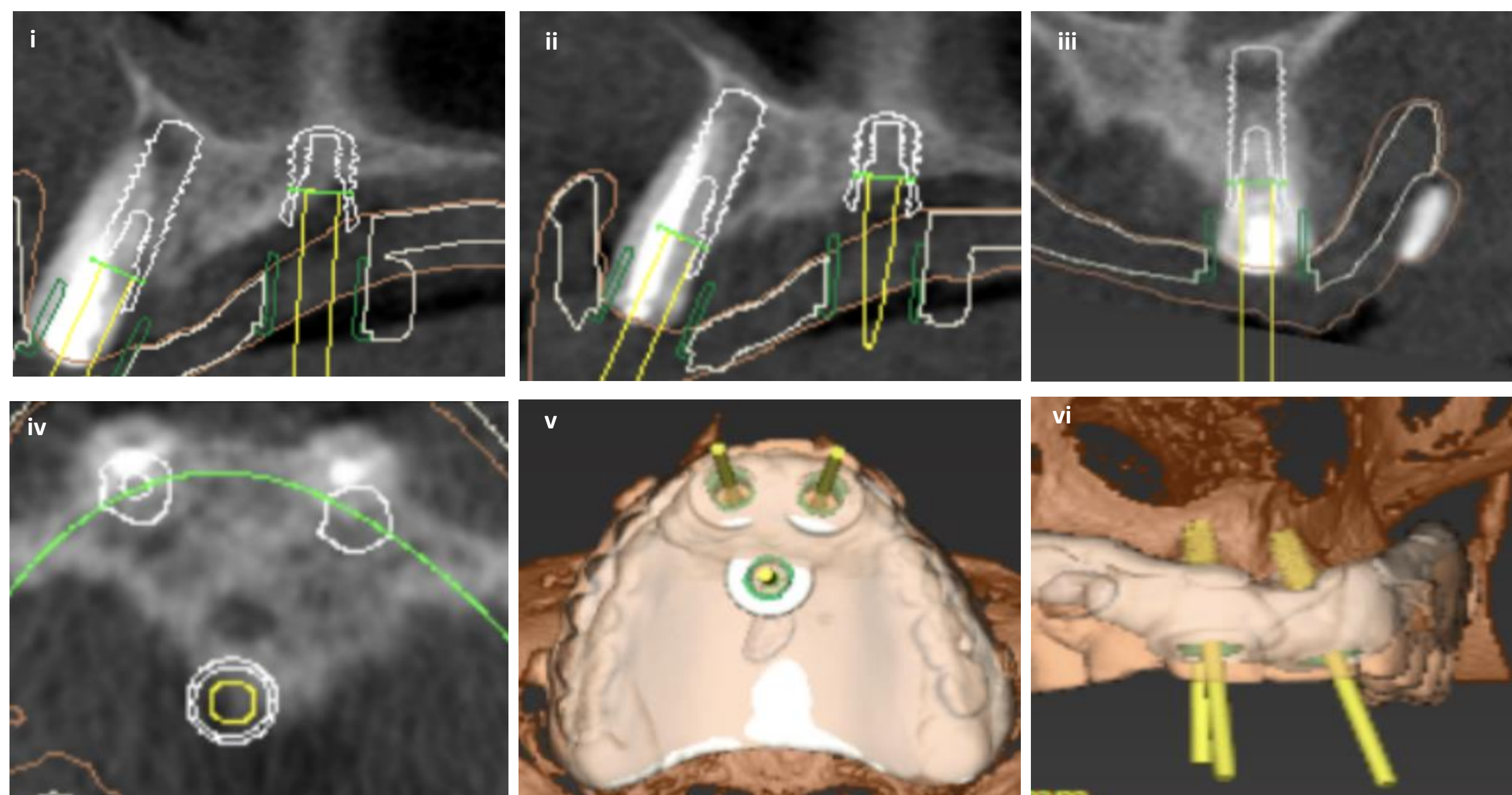
A 23-year-old male diagnosed with ED and oligodontia was referred to the department of Restorative Dentistry at The Royal London Dental Hospital. His primary complaint was unretentive maxillary and mandibular dentures worn throughout adolescence. He presented with severely under-developed maxillary and mandibular alveolar ridges, with endodontically treated retained maxillary incisor roots. Cone-beam CT imaging revealed reduced bone volume in both arches and complicated by bilateral pneumatisation of the maxillary sinus. All treatment options were discussed including alveolar implants to support overdentures, implants for a fixed prosthesis requiring advanced bone augmentation with sinus lift or extra-maxillary implants. The patient gave preference to procedures which avoided extensive bone augmentation and extra-maxillary implant. As such, conventional maxillary implants were planned.

IMAGING & 3D MODELS



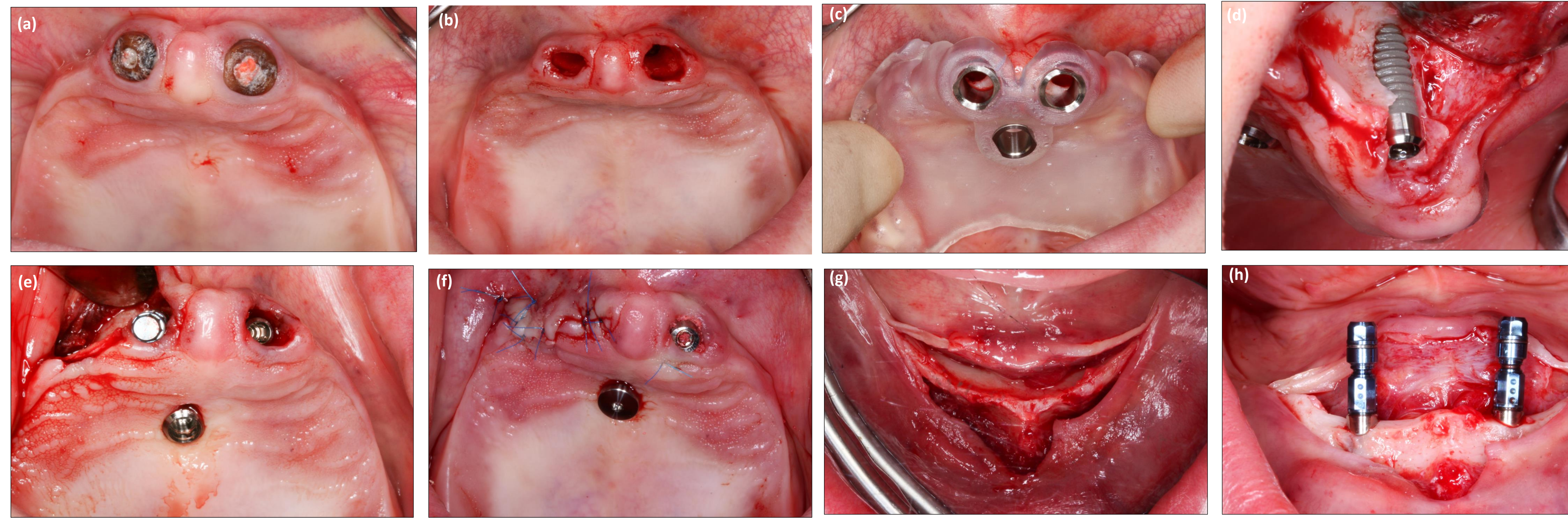
Figures: (A) Dental panoramic radiograph showing reduced alveolar bone height in both arches; **(B)** Coronal section of a CBCT confirming under-developed posterior alveolar maxillary ridges; **(C) and (D)** Sagittal slices demonstrating left and right posterior maxilla respectively; **(E) and (F)** 3D printed models demonstrating left and right posterior maxillae respectively.

(1) IMPLANT PLANNING



- Figures (i), (ii) and (iii)** - Co-Diagnostix® implant planning software demonstrating two 10mm Straumann® standard plus narrow neck implants (Ø3.3mm) in the anterior maxillary ridge utilising the incisor root sockets.
- Figure (iv)** - Due to a lack of posterior bone width and height, a 4mm mid-palatal implant was planned to improve the anterior-posterior spread
- Figure (v)** - A surgical guide was constructed to help implant placement
- Figure (vi)** - three implants planned are divergent from each other

(2) SURGICAL PHASE



- Figures (a) and (b)** – Pre-operative maxillary occlusal view and post-atraumatic extractions of the UR1 and UL1 roots respectively.
- Figure (c)** – Placement of surgical guide. A flapless approach using a punch was undertaken through the mid-palatal access of the guide.
- Figures (d) and (e)** – Planned implants were placed in the anterior maxillary ridge with simultaneous guided bone regeneration using bovine deproteinized bone and porcine collagen membrane for the UR1 and UL1 implants. Flap access was created for the UR1 implant due to the need for additional bone grafting
- Figure (f)** – closure of the flap and placement of healing caps for all three maxillary implants.
- Figures (g) and (h)** – Flap raised with midline relief and two 12mm standard plus narrow neck implants (Ø3.3mm) were placed in the mandibular inter-canine region.

(3) PROSTHODONTIC PHASE

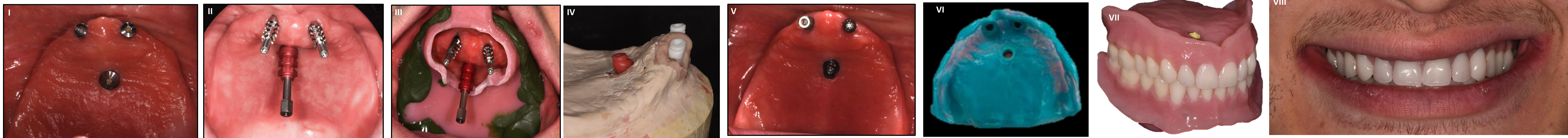


Figure I – Following second stage surgery, the UR1 implant was exposed. Good healing and stability was evident for all implants.

Figures II and III – An implant level impression was undertaken using an open customised tray. A visual illustration of the impression posts shows the angulation of the implants.

Figure IV – Angled plan abutments (15°) were used and surveyed on the master cast to optimise the path of insertion.

Figure V – Novaloc® locator-type angled abutments (15°) were chosen for the maxillary implants and placed as per survey for path of insertion.

Figure VI – An abutment level impression was taken once the jaw relationship and aesthetics were finalised.

Figures VII and VIII – Implant-supported overdentures were then constructed and the patient achieved a successful functional and aesthetic rehabilitation.

RESULTS

Careful planning and surgical execution were essential for strategic implant placement. Adherence to prosthodontic principles ensured stability and retention of both implant-supported overdentures to obtain a successful functional and aesthetic rehabilitation. There was a risk the acrylic over the mid-palatal implant would be too thick, however good communication with the technician enabled this region not to be over-contoured and phonetics unaffected.

CONCLUSION

There are no long-term studies detailing the clinical success or patient-reported outcomes in the use of mid-palatal implants in under-developed alveolar ridges. In the case presented by the authors, the mid-palatal implant was used strategically to improve retention and avoided extensive bone augmentation procedures and extra-maxillary implants. To date the patient is under regular review with no apparent issues thus far.