

Radiology of Implant Dentistry

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KEYWORDS

- Dental implants • Multidetector computed tomography • Algorithms • Image processing
- Computer-assisted • Radiation dosage

KEY POINTS

- Multidetector computed tomography is useful in treatment planning, but has limited use during implant surgery and follow-up of cases.
- Low-dose protocols should be applied without compromising the diagnostic quality of images.
- Radiographic stents are necessary in multiple-implant and esthetically challenging cases.
- Proper image reformatting is necessary with sectional images being parallel and perpendicular to the jaws.
- Implant simulations are preferable to linear measurements of implant sites.

INTRODUCTION

Dental implant therapy is rapidly becoming more widespread in the management of missing teeth, and is considered the standard of care in the prosthetic treatment of completely edentulous cases.¹ Implant therapeutics begins with the treatment-planning phase, during which the oral and occlusal conditions are assessed clinically and the prosthetic needs are evaluated. A radiographic examination is then performed to evaluate the bone and the teeth associated with the edentulous area. A prosthetic treatment plan is then formulated that includes the type of prosthesis that will replace the missing tooth/teeth and the number, size, and position of the implants that will support the prosthesis (the implant treatment plan). The next phase in implant therapeutics is the surgical phase, during which the implants are placed. The postoperative phase is then entered, which includes the follow-up and prosthetic stages. In the follow-up stage, sufficient time is allowed for bone healing and osseointegration of the

implant(s) to take place. After bone healing, the prosthetic stage is entered, in which the implant-supported prosthesis is fabricated. After insertion of the prosthesis, long-term follow-up is continued to monitor the overall oral condition. In cases of immediate implant loading, a prefabricated prosthesis is attached to the implants during the surgical phase.

With proper case selection and treatment planning, implant therapy has shown high success rates. Imaging is an important part of implant diagnostics, on which case selection and treatment planning are based. Imaging is also an important tool during the surgical and postoperative phases. Various imaging modalities are of use in this regard, the most commonly used being panoramic and periapical radiographs, which are 2-dimensional (2-D) imaging modalities, cone-beam computed tomography (CBCT), and multidetector CT (MDCT). **Fig. 1** demonstrates the sectional planes in which MDCT images may be viewed. This article presents an overview of the goal of imaging at each stage of implant

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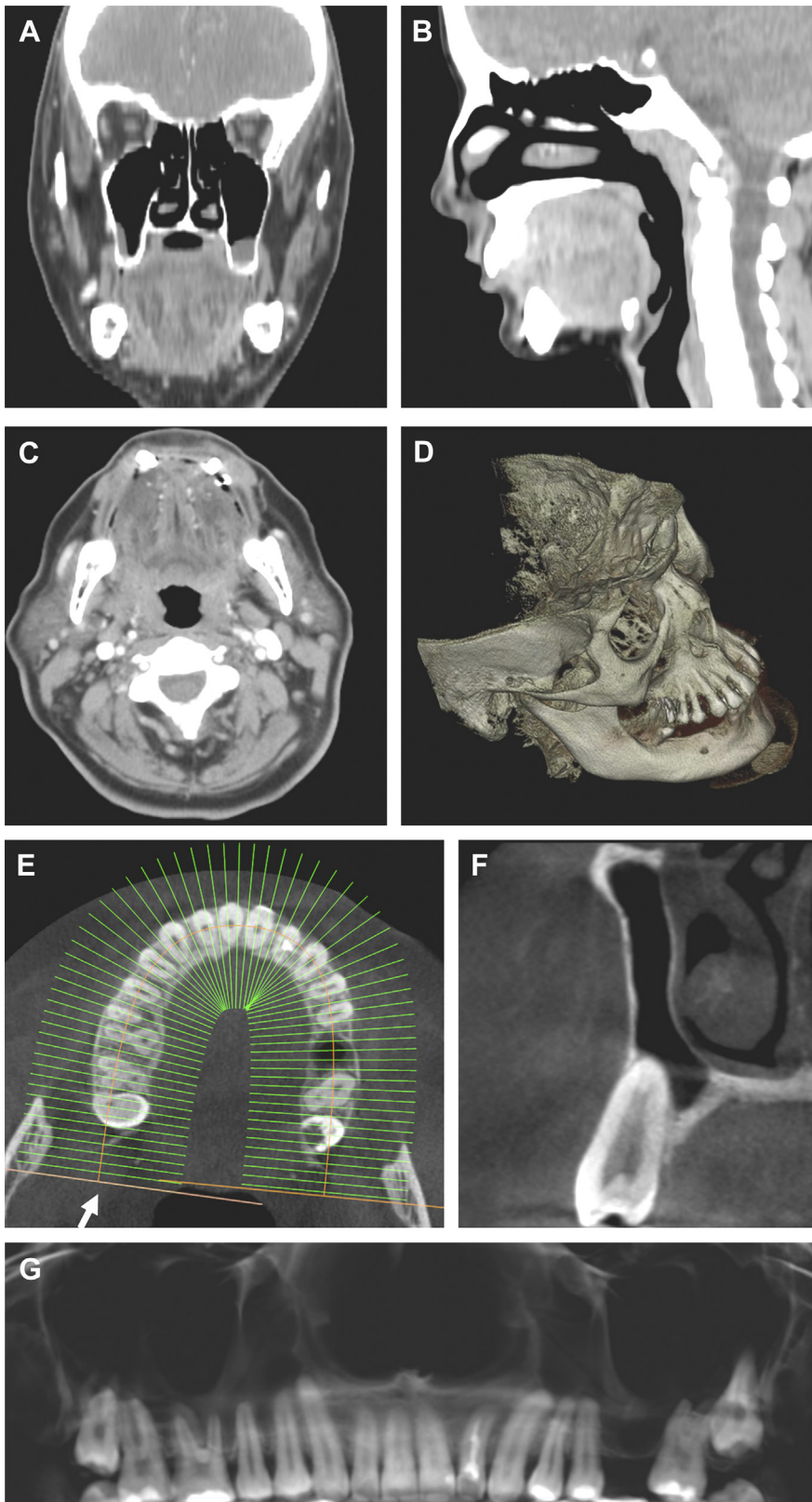


Fig. 1. The MDCT data set may be viewed as sectional images in the orthogonal planes, coronal (A), sagittal (B), and axial (C), or as a volumetric image (D). For dental implant imaging, use of specialized reformatting software allows drawing a curvilinear plane parallel to the curve of the arch in axial section (arrow in E) to produce sectional images perpendicular (F) and parallel (G) to the jaws.

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