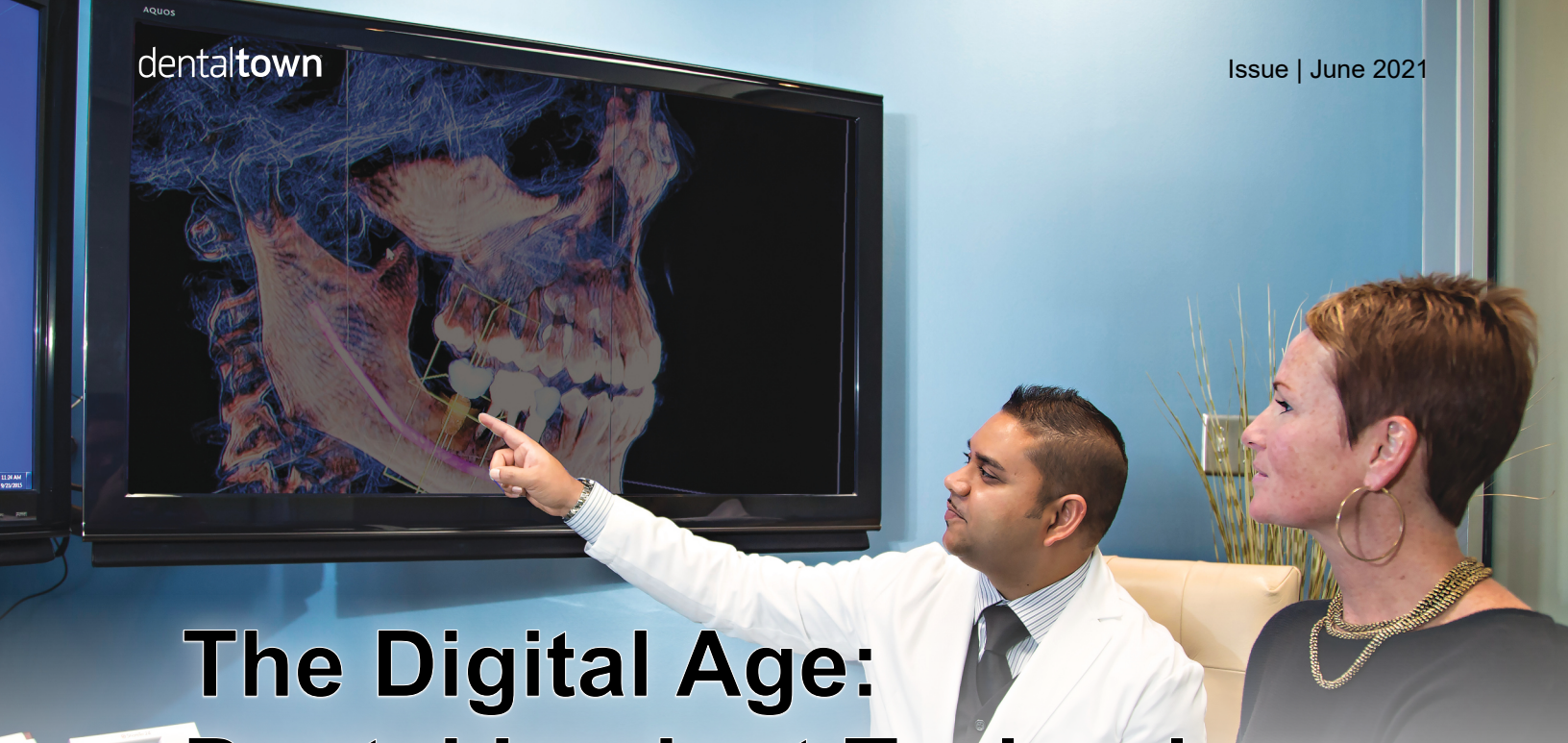

The Digital Age: Dental Implant Technology

By Neal Patel, DDS, CDT

As clinical dentistry moves away from analog tools, the opportunities for efficiency grow exponentially

When I opened my dental practice in 2008, I was awed by the transformative power of technology. Through the years, I've stayed up to date with the latest dental technology trends to expand beyond private practice to teaching and research. Understanding the intricacies of new technology is hard work and takes a lot of time, but I believe it's a requirement for successful modern dentistry. The latest digital tools—ranging from practice management software and cone-beam imaging to intraoral scanning and chairside milling—have dramatically streamlined processes and improved patient diagnosis and treatment in fewer visits.

Digital dentistry is quickly revolutionizing the practice of dental medicine, yet the concept still isn't quite mainstream. Many practitioners are timid about investing in new and unproven digital equipment, citing cost concerns and the time constraints of proper training. While there is a certain amount of risk involved, I believe in leveraging new technology to better treat complex cosmetic/beauty and restorative cases. Research has shown that integrated digital solutions can improve the clinical efficacy of dental implant restoration, compared with conventional analog dental implants.[1]

Our office's digital platform is centered around a highly accurate intraoral scanner, state-of-the-art cone-beam imaging, versatile practice management software and the latest digital design and milling software and hardware. In our practice, 3D CBCT is the cornerstone of care. The Axeos scanner (Fig. 1) from Dentsply Sirona is my imaging solution of choice because it offers a precise measurement of the teeth, soft tissues, nerve pathways and bone, and seamlessly connects with add-on technology. In addition, 3D diagnostic imaging offers patients a more interactive care experience, leading to increased case acceptance.

CAD/CAM technology is a foundational element of our integrated digital workflow for prosthetic implant placement and restoration. CAD/CAM allows for

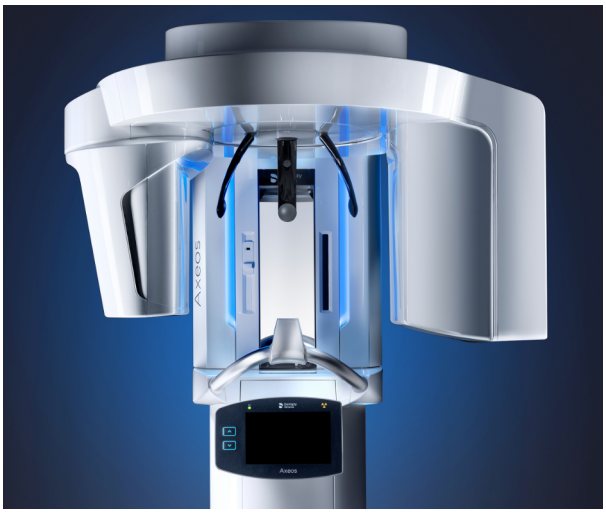

Fig. 1 - The Axeos 3D/2D Imaging System by Dentsply Sirona provides enhanced 3D imagery for Dr. Neal Patel's practice.

imaging, design and chairside milling in one visit, making appointments more convenient for both clinicians and patients. These instruments, along with Cerec Primescan intraoral scanners, enable our practice to provide exceptional oral health care to patients (Fig. 2).

This entire suite of integrated solutions has transformed our practice, allowing us to do more, better. For one, I use CBCT imaging data for implant placement (Fig. 3) in a range of other modalities, including sleep apnea, endodontics and orthodontics. With the newest addition to our digital arsenal, 3D printers, we're able to scan, design, print and produce a range of applications, such as crown/bridge models, surgical guides, indirect bonding trays and gingival masks.

Digital dentistry in practice

In the traditional analog world of dentistry, several different variables—the clinician's experience and skill set, the lab technician's skills and bandwidth, and the patient's comfort level—must all work in tandem; a single mistake can cause delays, worsen clinical outcomes, and pose a significant travel and cost burden for patients. The beauty of digital dentistry is that it streamlines services across the

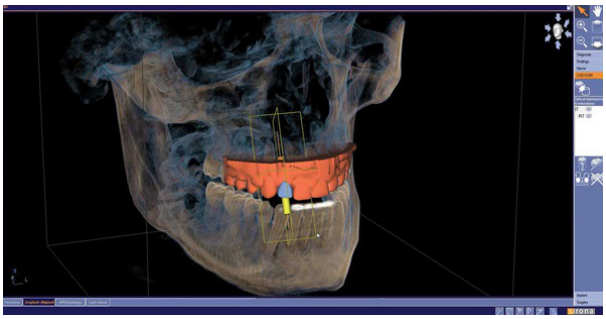

Fig. 2 - Dentsply Sirona CAD/CAM software helps Dr. Neal Patel digitally plan surgeries with unprecedented accuracy.

gamut of dental care and comprehensive interdisciplinary procedures. In our practice, digital technology has reduced clinical time for a comprehensive implant procedure by more than half—from eight visits to three visits from consultation to final fitting, as described below.

Traditional analog dentistry: Visit one, the consult, requires obtaining a film-based image for diagnostics and overall examination to determine if the patient is a candidate for dental implant therapy. At visit two, the clinician acquires diagnostic impressions for creation of a radiographic scanning appliance. At visit three, the patient is imaged with the scanning appliance with either 2D imaging or 3D imaging for evaluation of the future restorative plan relative to existing anatomy. If the patient is a candidate for implants, the clinician may prescribe additional grafting or creation of a surgical guide. On visit four, the patient is scheduled for implant placement. Visit five is traditionally a postoperative visit to ensure proper healing. Another appointment, visit six, may need to be scheduled to address soft-tissue contouring or even uncovering the implant. At visit seven, the dentist obtains the final impression for the laboratory to create the abutment implant crown. Finally, on visit eight, the final implant prosthetic is seated.

On occasion, additional appointments may be required if the shade and contour from the previous visit were not appropriate. Keep in mind, extra time must also be built in for lab delays and additional cosmetic refinements if necessary. All of these

Fig. 3 - The integrated digital workflow implemented at Infinite Smiles reduces production time and greatly improves clinical results.

factors can affect the patient because of time off from work and travel to and from appointments.

Digital dentistry: At visit one, we are able to acquire digital intraoral scans of both hard and soft tissues using Primescan and merge that data with the Axeos CBCT image to design and place a virtual, custom-fit 3D prosthetic. The software allows us to provide patients with a visual representation of the implant and the procedure itself. From this data at the initial consultation, the dentist and laboratory are able to create a surgical guide and even potentially an immediate implant provisional, using CAD/CAM with either milling or printing technology. This removes all the analog methods of impressions and stone models, along with manual labor for fabrication of said surgical guide and provisional. On visit two, the clinician is able to place the implant fully guided with immediate prosthesis or even custom healing abutment. Because of this minimally invasive procedure, additional follow-up visits may not be required. On visit three, we can provide the final implant restoration in a single visit with chairside CAD/CAM prosthetics, which are fully customized and aesthetically matched to the patient's smile.

For most of my patients, the CBCT image is the starting point and the backbone of care. The 3D image allows us to accurately diagnose a patient's problem and build an effective solution. In addition, with the baseline data we acquire from the scan, we can conduct nearly every facet of dentistry.

Empowering patients & building trust

We expect our patients to trust what we stand for and what we have to offer. 3D diagnostic images help us build this trust because they help patients understand why they need a given procedure. Visual data and education help foster a mindset shift that increases case acceptance and patient satisfaction. A recent study has shown that dental patients are embracing the new era of advanced digital technology and visual communications.[2]

My practice prides itself on being a front-runner in the latest technology and equipment. With CBCT as our "workhorse," we are able to deliver highly personalized treatment with reduced chair time, fewer visits and more predictable outcomes—making for a better patient experience. When patients are more involved and engaged with their care, they are more likely to agree to our recommendations and interventions.

Looking to the future

Ultimately, dental professionals define our practices through patient experience. Contemporary digital dentistry gives us an opportunity to elevate our treatment modalities and results in the best dental care for our patients. Patients are more confident in our ability to manage their long-term oral health care, boosting the potential for long-term relationships and increased referrals. From a practice efficiency perspective, workflows can be streamlined and new service offerings can be uncovered, maximizing the potential of our practices. To clinicians who may be hesitant to dive in: Now is the time to push forward! Of course, with anything new, there is a learning curve to adapt to the technology. The key to success and productivity is adequate training and education for all of those involved in using the equipment. As you gain experience with today's innovative digital tools, you'll be better prepared for the next generation of dental technology. It will be a win for the practice from a business and clinical perspective, a win for office staff members who are working in a more modern, progressive atmosphere and, most importantly, a win for your patients.

References

1. Gedrimiene A, Adaskevicius R, Rutkunas V. Accuracy of digital and conventional dental implant impressions for fixed partial dentures: a comparative clinical study. J Adv Prosthodont. 2019;11:271-279.

2. Saponaro PC, Yilmaz B, Johnston W, et al. Evaluation of patient experience and satisfaction with CAD-CAM-fabricated complete dentures: a retrospective survey study. J Prosthet

About the author

Dr. Neal Patel, a dentist and a certified dental technician, opened Infinite Smiles in Powell, Ohio, in 2008. An authority on 3D diagnostic imaging with CBCT and same-day dental restorations with CAD/CAM, Patel travels the U.S., Canada and overseas to train doctors in the use of modern dental technology in procedures such as computer-guided dental implant placement. He graduated from The Ohio State University, where he served as implant prosthodontic fellow and helped establish techniques and protocols for digital implantology and prosthetics.