Future Trends in Implant Dentistry

Full-Arch Rehabilitation and Desktop 3-D Printing

Our implant editor, Dr. Michael Tischler, interviews Dr. Michael Scherer—a self-described computer nerd, an experienced clinician, and one of *Dentistry Today*'s Leaders in Continuing Education—on a variety of hot topics dealing with contemporary implant treatment, digital dentistry, products, and other clinically related matters.

Dr. Tischler: *Thank you for your time Michael! We know you well with the articles you have been published in* Dentistry Today *on full-arch reconstruction, implant overdentures and fixed prostheses, digital technology, to name a few topics. Please tell our readers briefly about your background.*

Dr. Scherer: I thank you and *Dentistry Today* for this interview. It is a pleasure working with you and the team!

I was intrigued by the power of what we, as dentists, can do to improve the quality of life of our patients with comfortable teeth. In dental school, the first patient I treated was a lady who has been a part of our family since before I was born. Her name is Eula. I described her journey in my book: *Lost Your Teeth, But Not Your Appetite.* She came to me with broken teeth, decay, and infection, and we treated her with implant overdentures. Fifteen years later, she is using her same denture and LOCATOR abutments and inserts (Zest Dental Solutions). In fact, every time I go home to visit, I bring my overdenture kit to check her inserts to see if they need to be replaced, which, amazingly, in more than 10 years, hasn't happened yet!

Michael D. Scherer, DMD, MS

That is a great story! Please tell us more about your book.

Dr. Scherer: Absolutely! I can tell you that I have personally seen, or been part of, the treatment of thousands of patients with full-arch reconstruction with implant overdentures or fixed restoration in my time in private practice and in academic practice. The biggest challenge has always been with the consultation examination and explaining all the differences between the treatment options. Clinicians know what I'm referring to: "I have some bad news. Your teeth are in terrible shape and need to come out, so let's chat about the options." Then, most of us will pull out pamphlets and models and talk to the patients for an entire appointment about their options. In the end, all they have heard is, "Oh my! I'm going to lose all my teeth!?" So, I wanted to help by sending them home with something to coach them through their decision-making process. It took me several years to write it, but now I have a book that clearly described every detail from a patient's perspective. It is written so that it doesn't confuse the patient, and it is easy to give to our patients before leaving the office. With this book, patients can now review, in detail, all of the options they have in implant dentistry. Patients now come in for the second visit, often the financial consultation visit, with their copies of my book highlighted, circled, and often with questions written in the margins.

Is your practice focused on implant treatment? Please tell us more about what a typical day is like for you.

Dr. Scherer: I practice in a small and semi-rural area of California. I love full-arch reconstruction and, yes, especially treatment plans that involve implant dentistry. While I treat patients from many backgrounds and with many treatment needs, I have a reputation for doing excellent dentures and implant bridges. My typical day is like every clinical practice: we have hygienists seeing patients and patients on my schedule for restorative needs. Other dentists within the community refer patients to our office specifically for dentures and full-arch reconstruction. I do, in addition, have many days where I don't touch a tooth and work almost exclusively with full-arch cases.

What type of full-arch reconstruction do you do the most of and which do you like best?

Dr. Scherer: I, personally, love discussing and treating patients with any of the treatment options for those who are edentulous or soon-to-be missing all of their teeth. I still do a tremendous number of complete dentures, especially maxillary dentures, *without* implants. However, for the mandibular arch, I almost never treat patients with conventional complete dentures anymore. Implants are a proven modality with a long-term success rate that makes the treatment wonderful. Across my entire practice, implant overdentures make up the majority of the cases done.

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Why do you think that is?

Dr. Scherer: I have found that there are 3 big limitations to treatment acceptance. First, and foremost, is the *financial* reason. Cost of treatment is many practice's No. 1 road-block, and it's no different at my office. The major affect our office can have to increase treatment acceptance is to give affordable options for my patients. Typically, most offices push full-arch fixed restorations, such as All-on-4 (Nobel Biocare), because it's considered by many to be the elite treatment. It also comes at an elite price, typically between $25,000 to $30,000 an arch! While I do have some patients who can afford this type of dentistry and will greatly appreciate it, many of my patients just simply can't afford those prices. I do my best to give affordable options in between the $4,000 to $10,000 range; typically, the options in this price range are overdentures with 2 to 4 implants.

Secondly, some patients have a tremendous amount of *surgical anxiety* associated with implant procedures. Even if cost isn't an issue, I have had many patients indicate to me that they're afraid of treatment, either due to medical history complexity or the perception that "I don't have enough bone for implants." Several consults per week deal with patients who have been told by multiple clinicians, "You don't have enough bone, you will suffer with dentures." Talk about scary! I like to discuss the anterior mandible and how predictable implant procedures are there with my patients.

One thing that we often don't discuss in dentistry more is the *lack of awareness of treatment options.* Most patients have heard about dental implants, especially with the marketing campaigns of corporate implant practices around the country offering same-day implant treatment. Many patients feel this "sounds too good to be true" or "my dentist probably can't do that for me." As clinicians, we get comfortable with one method of treatment and typically only offer the one protocol that we are most familiar with, such as a fixed bridge; when other treatment options, such as implant overdentures, could also exceed the patient's expectations.

So, do you think that one treatment is better than the other?

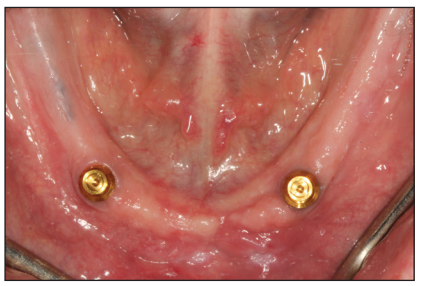

Figure 1. Standard Diameter 2-Implant LOCATOR Overdenture (Zimmer-Biomet).

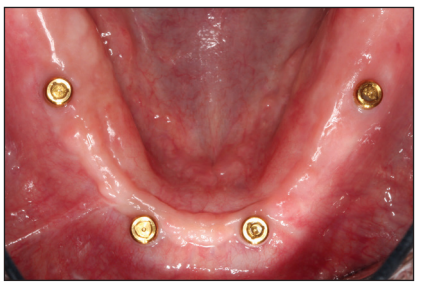

Figure 2. Narrow-Diameter 4-Implant Overdenture with LOCATOR Overdenture Implant System (Zest Dental Solutions).

"It's my job to figure out which option is best suited for that patient. It can not be a one-size-fits-all approach."

Dr. Scherer: This is a tricky question. They all can work extremely well but we strive for patient-specific treatment. It's my job to figure out which option is best suited for that patient. It cannot be a one-size-fits-all approach. Importantly, however, I never push a patient. It's my job to lay the treatment detail out and let the patient decide.

Do you think the 2-implant overdenture is a good choice for many patients?

Dr. Scherer: It is interesting that you ask that. I've been treating patients with LOCATOR overdentures for more than 10 years, and with an incredible amount of success. Remember Eula, who we mentioned earlier? She has only 2 implants in the mandibular anterior and is doing really well. In fact, I was so inspired I ended up publishing several papers studying the effectiveness of implant position, number, and retention mechanisms across multiple configurations. I showed that the LOCATOR 2-implant overdenture was more than adequate for proper denture retention and stability (Figure 1). Furthermore, the literature has shown that 4 implants and stud-style abutments, such as a LOCATOR, is just as good, if not potentially easier, for the patient to keep clean and better long-term, than a bar design (Figure 2).

What's your take on narrow-diameter implants, and aren't they also called mini implants?

Figure 4. Intraoral scanners: 3M True Definition **(left)** and 3Shape TRIOS **(right)**.

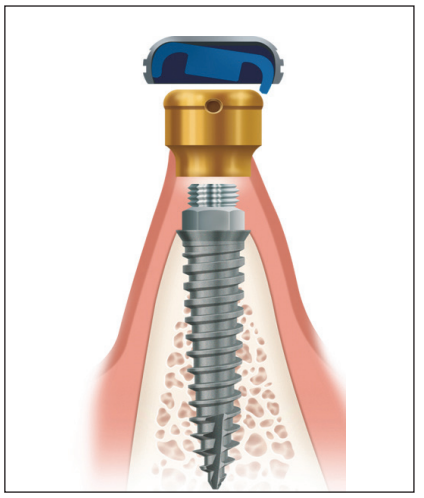

Figure 3. LOCATOR Overdenture Implant System (LODI [Zest Dental Solutions]).

Dr. Scherer: Yes, but I never call them "mini implants." With that name, in my opinion, it sounds like it is a "lower quality implant" and doesn't come across with the proper message that I want to send to patients. I have even found that patients come to me saying, "Are they as good as 'regular' implants?" I respond to patients who ask these questions by indicating that the implant that I use for narrow bone cases is just as good as the one that I use in regular bone cases. That patient just has a narrow ridge, so I provide a narrow implant. They totally get it. It's not *what* you say, but *how* you say it.

What implant systems do you use in your practice and how do you restore them for your overdenture cases?

Dr. Scherer: My go-to narrow-diameter implant system is the LOCATOR Overdenture Implant System (LODI) (Zest Dental Solutions) (Figure 3). They have designed a 2-piece standard implant with a narrow shape that allow it to fit within any bone ridge situation. I have been placing and restoring these implants for more than 4 years now and have had incredible results.

I have heard you describe yourself as "computer nerd who just happened to become a dentist." Can you please elaborate?

Dr. Scherer: Yes, it's true! Growing up, I just naturally flocked to video games. So when computers were first coming on board in the 1980s, playing games on the desktop computer was a natural progression.

Wait. Are you saying you are playing video games every day in your office

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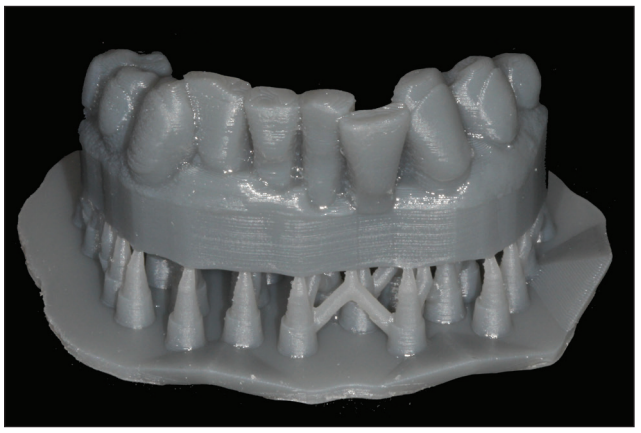

Figure 5. One of the first 3-D prints generated from 3M's True Definition Scan and Form1 3-D printer (AU: FormLabs?).

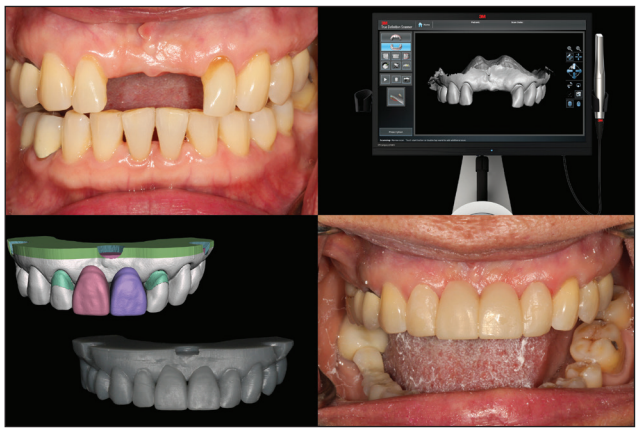

Figure 6. Using intraoral scanning and 3-d printing to wax-up and make a provisional.

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between patients?

Dr. Scherer: I wish! My wife, Dr. Melissa Shotell, is an orthodontist who treats teenagers all day long whereas I treat predominantly older, retired baby boomers. Sometimes, I would love to join her patients in the waiting room gaming. If I tried doing that with my patients, they would think I'm nuts. However, it turns out that dentistry and video games are very similar. Both require a tremendous amount of hand-eye coordination, critical thinking, troubleshooting skills, *and patience.*

Dentists are at the forefront of the technological revolution in healthcare. Doctors and our dental laboratory teams are using computers every day to generate our restorations via optical scanning. We are also using critical thinking skills to make a spontaneous decision regarding the tooth while working on it.

Wow, now that you've put it that way, it makes sense. Tell me about what you are doing in your practice with digital technology.

Dr. Scherer: After completing dental school and residency, I knew that I wanted to leverage digital technology to make my everyday tasks easier, faster, and potentially more accurate. The challenge was the inherent complexity of digital technology. I have always dreaded making impressions for crown and bridge dentistry. The margins, tearing, voids, patients biting incorrectly, multi-unit framework fit, and so on, would keep me up at night thinking about the challenges the next day at the office. Then, it hit me like a freight-train! Intraoral scanning started to become more open and accessible. Fabricating crowns with intraoral scanning was proven, the big question is what else could we do with it?

How did you begin with intraoral scanning?

Dr. Scherer: I began with the research and the literature to find out which of the scanners on the market were the most accurate. From my research at that time, I felt the 3M True Definition Scanner was the one for my practice. It also happened to be one of the most affordable scanners on the market at the time, so it was a win-win. I have been using that scanner, with some periodic upgrades, for a long time with tremendous success (Figure 4). Recently, I also purchased a TRIOS (3Shape) scanner, principally for my wife Melissa, as the system offers an excellent orthodontics software package that she uses frequently. The most important thing for me was starting simple and affordable, then growing from there.

"Dentists are at the fore-front of the technological revolution in health care."

I see, so you started with simple procedures and then took it from there. What was your next step?

Dr. Scherer: I was receiving crowns back from the dental laboratory team with 3-D printed models from my 3M True Definition Scanner. So, I said to myself, "Could I 3-D print in my office?" I started looking at what it would take to get involved in 3-D printing and it was very expensive and overly complex. This was late 2013 to early 2014 and, at the time, there weren't many companies selling 3-D printers, and the ones that did were very expensive. I bought several printers to test them out with filament technology, DLP projectors, and resin. And then, I then found out about Formlabs, which is a company that was started via Kickstarter to manufacture a desktop-grade printer at a low cost. I asked myself the same questions that many still do, "Can it really work for dentistry?"

Since then, I was confident that I was one of the first, if not the first dental clinician using desktop 3-D printing in an everyday clinical practice. I discovered open-ended CAD software to do simple model work (Figure 5) or traditional dental wax-ups (Figure 6). There was no manual available and very few people, if any, knew how to use this software for dentistry at the time.

OK. Those were the early days, please tell me what you are doing currently. What did you do this week with your scanners and printers?

Dr. Scherer: I live and breathe digital dentistry every day. I don't just teach it. For example, just this week, I printed 5 surgical guides for implant cases, 14 models for crown and bridge and wax-up cases, and 2 occlusal guards. I finished the week traveling to an oral surgeon's office to teach him how to use the 3-D printed guides in his surgical workflows; where he placed 4 implants in a matter of minutes with the assistance of the surgical guide that was printed in just a few clicks. We are just now starting to see the power in what 3-D printing can do in clinical dentistry!

It is, indeed, an incredible time to be practicing dentistry! Michael, I want to thank you for your time to do this interview. Based upon your own private practice and academic experiences, do you have any words of advice that would like the readers to take away from this interview?

Dr. Scherer: I would say that clinicians should strive to utilize full-arch restorative options, clinical procedures, and digital technology to improve outcomes without tremendously increasing costs. It can seem intimidating, however, anytime we do something for the first time, it can sound and be a bit challenging. Clinicians need to understand the value of cross-platform integration and, while fully integrated systems are available and are outstanding, clinicians need to think outside of the box.

The key is to strive for simplicity. The best system we can ever have is a fully integrated mind!✦

Additional Reading

Burns DR, Unger JW, Coffey JP, et al. Randomized, prospective, clinical evaluation of prosthodontic modalities for mandibular implant overdenture treatment. *J Prosthet Dent.* 2011;106:12-22.

Scherer MD, McGlumphy EA, Seghi RR, et al. Comparison of retention and stability of implant-retained overdentures based upon implant number and distribution. *Int J Oral Maxillofac Implants*. 2013;28:1619-1628.

Scherer MD, McGlumphy EA, Seghi RR, et al. Comparison of retention and stability of two implant-retained overdentures based on implant location. *J Prosthet Dent*. 2014;112:515-521.

Dr. Scherer is an assistant clinical professor at Loma Linda University, a clinical instructor at University of Nevada in Las Vegas, and maintains a practice limited to prosthodontics and implant dentistry in Sonora, Calif. He is a Fellow of the American College of Prosthodontists, has published articles, DVD training series, and online full-arch reconstruction and 3-D printing courses (learndental3d.com) related to implant dentistry, clinical prosthodontics, and digital technology with a special emphasis on implant overdentures. As an avid technology and computer hobbyist, Dr. Scherer's involvement in digital implant dentistry has led him to develop and utilize new technology with CAD/CAM surgical systems, implement interactive CBCT implant planning, and outside of the box radiographic imaging concepts. Dr. Scherer also maintains the following popular YouTube channels: "LearnLOCATOR," "LearnLODI," "LearnSATURNO," "LearnLOCATOR F-Tx." He can be reached via the email address: mds@scherer.net.

Disclosure: Dr. Scherer reports no disclosures.