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Improved efficiencies in implant dentistry: Use of patient-specific accelerated therapy to drive practice growth

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DENTAL IMPLANT THERAPY has been growing steadily over the last several decades. However, the penetration rate of implants within the overall tooth replacement market remains relatively low. This has been driven by factors such as clinician education, increased costs of surgical/restorative procedures, limited insurance coverage, and the extended length of time associated with treatment. The implant industry has responded to these hurdles by offering value brands that mitigate some of the challenges. Although competitive pricing is helpful, it may lead to the use of inexpensive and/or poorly designed implants in cases where more advanced designs are indicated. A short-term windfall can easily turn into financial and clinical challenges.[1-3]

Site-specific implants for specific and varied implant surgical and prosthetic therapies allow clinicians' choices regarding precisely designed products for individual clinical applications. These implants have been developed to provide improved primary stability, avoid/minimize preimplant bone grafting procedures, and allow for improved soft- and hard-tissue preservation around implants.[4,5] Site-specific implants can also accelerate treatment by placing specific implants directly into extraction sockets immediately after tooth removal. Furthermore, if primary stability is optimized, site-specific implants can be loaded sooner, which usually leads to fewer patient visits, better soft-tissue profiles, and quicker overall treatment.[5-9]

SCREW- VERSUS CEMENT-RETAINED IMPLANT RESTORATIONS

Cacaci et al. recently published the results of a clinical study that compared the performance of screw- versus cement-retained implant restorations.[10] After a mean clinical service time of 36.9 months, porcelain veneer fractures occurred in 1.8% of the cases. The authors concluded that the type of retention did not have an impact on restoration survival rates. Weigl et al. reported similar results in their clinical study that compared screw- and cement-retained crowns.[11] They also reported that treatment times were significantly shorter for screw-retained restorations.

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Figure 1: Diagram of implant angle corrections for Co-Axis Implants

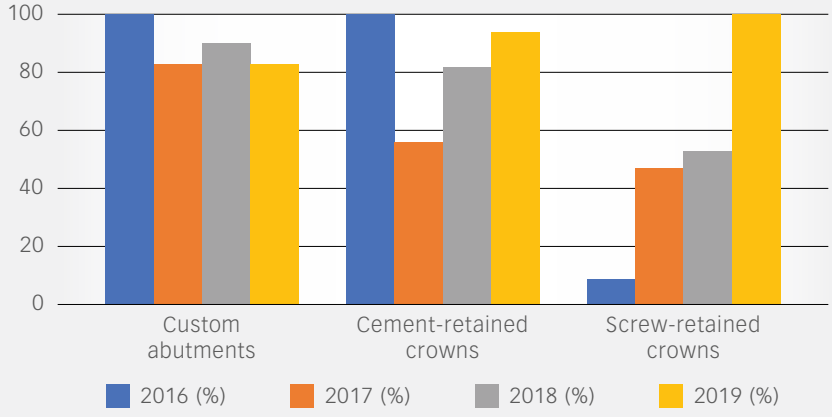
Earlier, Vigolo et al. reported the results of a 10-year clinical study that compared screw- versus cement-retained crown restorations.[12] They concluded that there was no evidence of significant differences in clinical parameters of peri-implant marginal bone or peri-implant soft tissues with either cement- or screw-retained single-tooth implant restorations.

Excess subgingival cement has been associated with increased incidences of peri-implant mucositis and peri-implantitis. Screw retention has an added benefit in that cement is not used, so it cannot be left behind.

Staubli et al. published a systematic review regarding excess cement and the risk of peri-implant disease.[13] They concluded that excess cement was a possible risk indicator for peri-implant diseases and was more frequently observed with soft-tissue healing periods shorter than four weeks. To reduce the risk of peri-implant disease associated with excess cement, supragingival crown margins were recommended.

Author Gary Morris, DDS, tracked the paradigm shift from cement- to screw-retained implant restorations in his clinical prosthodontic practice. This was directly related to the introduction of angled implants (Co-Axis Implants, Southern Implants; figure 1). Co-Axis Implants were designed with angle offsets between restorative platforms and implant bodies of 12, 24, or 36 degrees. This design

Table 1: Percentages of specific single-implant restorations. Custom abutments/cement-retained crowns averaged approximately 80 per year from 2016–2018. Screw-retained crowns increased from approximately five per year in 2016 to 50 in 2018.



permits optimal bone/implant contact between implants and available bone, and the restorative platforms emerge at an optimal esthetic angle. Cement retention was no longer needed. Morris also noted decreased prosthetic complications such as crown loss/dislodgment with screw-retained restorations (table 1).

Site-specific implants, together with the appropriate protocols and team approach that the authors have adopted, have generated significant benefits, including increased patient acceptance, a greater number of implant procedures, more efficient treatment plans with reduced patient visits, and a decreased need for revision therapy over time. More patients treated more definitively using faster protocols have allowed the authors to flourish even though the number of clinics offering less expensive dental implants continues to increase in areas adjacent to their practices.

Photo courtesy of Southern Implants. Used with permission.

Figure 2: Example of a MAX implant with external hex implant/abutment connection

GROWTH OF SIMULTANEOUS EXTRACTION AND MOLAR IMPLANT PLACEMENT

The authors noted a paradigm shift in their practices over the last several years. Hattingh et al. published a technique article regarding immediate placement of ultra-wide diameter implants in molar sockets.[14] Instead of the more traditional protocol that involved diagnosis of a nonrestorable molar with subsequent extraction, graft, osseous healing, implant placement, osseointegration, and implant restoration, the authors adopted an accelerated treatment protocol due to the availability of site-specific implants.

The original protocol generally required 6–18 months for patients to receive implant-retained restorations. The accelerated treatment protocol typically included removal of the nonrestorable molar and then placement of a site-specific, wide-diameter implant (7, 8, and 9 mm diameters; 6 mm diameter External Hex MSc only, MAX implant, Southern Implants; table 2) into the extraction site immediately following removal of the tooth (figures 2–4). Patients experience one healing period and will generally be ready for impressions and placement of definitive restorations approximately 10–12 weeks later (table 3). This protocol saves clinical time, expense, decreases morbidity (one surgical procedure versus at least two), and has improved patient acceptance of implant treatment.

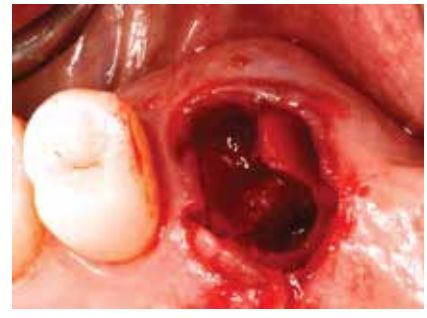


Figure 3: Clinical occlusal image of a maxillary molar extraction site immediately after removal of the nonrestorable tooth

SINGLE-/MULTIPLE-UNIT/ FULL-ARCH TREATMENT WITH AND WITHOUT IMMEDIATE OCCLUSAL LOADING

Anatomical constraints at implant sites often present a conflict between surgical and prosthodontic prerequisites for screw-retained implant-supported prostheses. Howes published the use of a dual-axis implant designed to help clinicians overcome these challenges by facilitating accurate surgical placement and prosthetic simplicity, as well as improved biomechanics and enhanced esthetics.[15] The implants' restorative platforms were offset relative to the body of the implants by 12, 24, or 36 degrees (Co-Axis Implants). This allowed angle corrections at the implant level and simplified restorative procedures and screw access opening locations (figures 5–7).

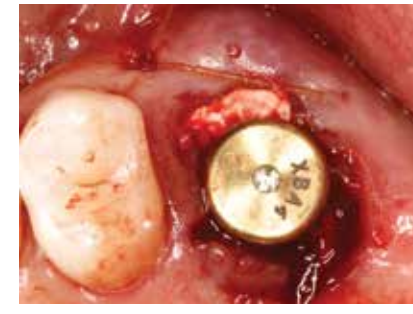


Figure 4: Clinical occlusal image of the maxillary molar extraction site in Figure 3 immediately after placement of the 7 mm MAX implant and healing abutment. Note that the implant almost completely obturated the molar extraction site. A bone graft and membrane were placed on the buccal surface of the extraction site.

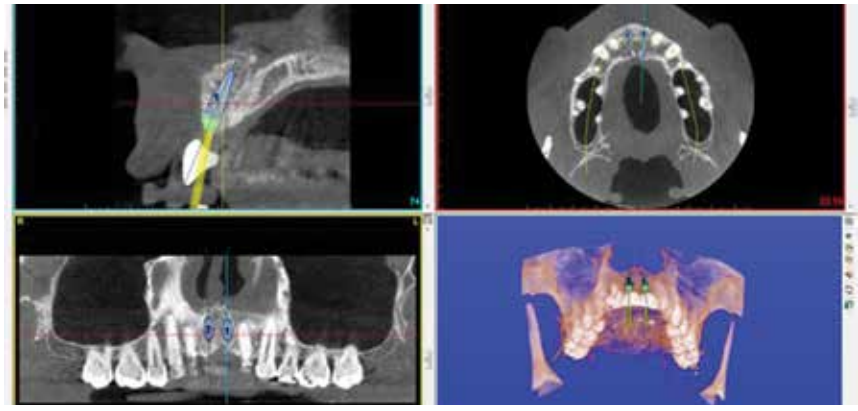


Figure 5: Treatment planning for implant placement of two missing maxillary central incisors. Upper left: blue line indicates the location of the screw access opening for a straight implant. The angle correction has occurred at the occlusal aspect of the implant, and the screw access opening is now located in the cingulum area.

Table 2: Percent increases by tooth site/full arch with specific implant types

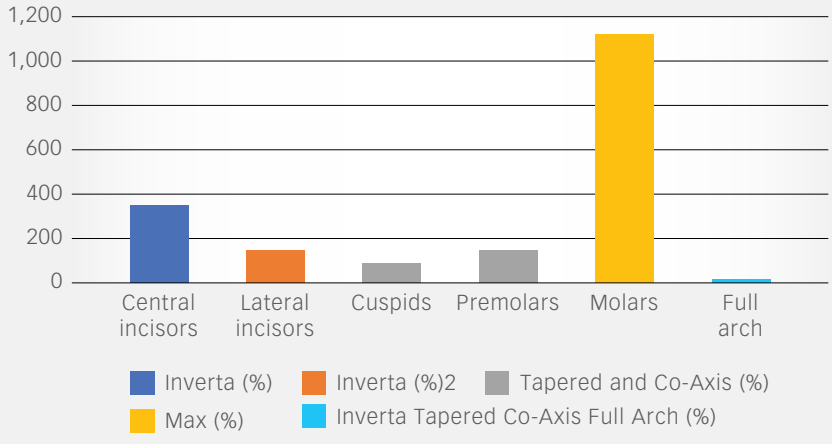
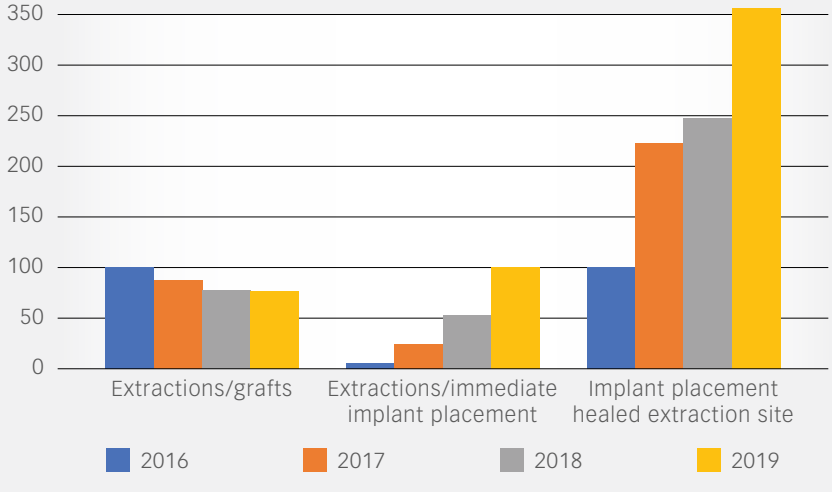


Table 3: Surgical procedures for single-implant placement 2015–2019



One common patient complaint or concern is the amount of time it takes for single-implant restorations to be completed. With site-specific implant types, the authors reported a significant decrease in treatment time (table 4). For instance, in the oral surgical practice, author Mark Steinberg, DDS, MD, reported that in 2015, 82% of the cases took longer than six months for treatment to be completed. In 2019, with site-specific implants, only 52% of the single-unit implant cases took longer than six months to complete.

Similar findings were also noted in the prosthodontic practice (table 5). Differences in the numbers between the oral surgery and prosthodontic practices occurred because the practices are independent with multiple referral sources.

Since the authors have adopted accelerated treatment protocols with site-specific implants, they both have noted increased acceptance rates, as well as growth in implants placed and restored.

Figure 6: Laboratory image of one of the crowns planned for in Figure 5. A laboratory screw is in place and identifies the location of the screw access opening in the crown restoration as designed in the CBCT scan.

Figure 7: Clinical occlusal image of the implant crown restorations for the maxillary central incisors that were treatment planned in Figure 5. Note the cingulum locations of the screw access openings.

Table 4: Clinical duration of implant treatment percentage changes 2015–2019 in a surgical practice.

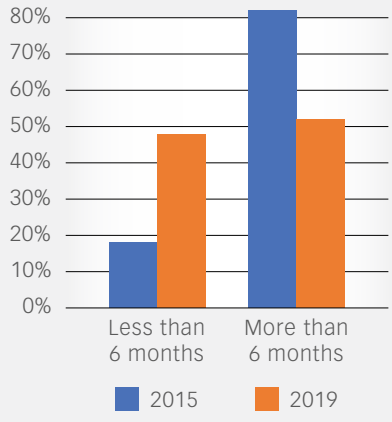


Table 5: Clinical duration of implant treatment percentage changes 2015–2019 in the prosthodontic practice.

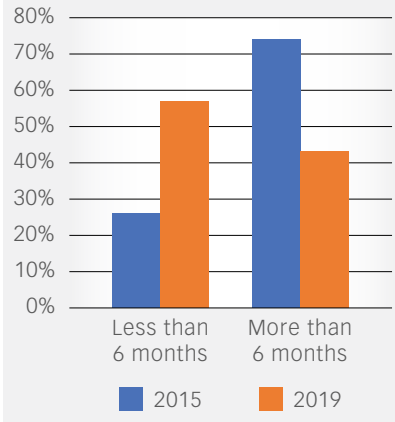


Table 6 illustrates the increased acceptance rate for implant treatment in both practices. Data reflects patient acceptance of implant treatment at the first consultation/clinic visit.

The authors correlated the increased acceptance rates with several factors, including consistent, well-manufactured, precise implant and restorative components; multiple implant choices that fit a multitude of clinical situations; decreased treatment times; and a dedicated manufacturing/sales/administrative team.

One of the first clinical studies (10-year follow-up) involving immediate occlusal loading with full-arch restorations was published by Schnitman et al. in 1997.[16] Life-table analysis demonstrated an overall 10-year implant survival rate of 93.4%. The 10-year life-table analysis of survival was 84.7% for immediately loaded implants and 100% for submerged, unloaded implants. Cumulative survival rates for immediately loaded implants have improved over time. Successful full-arch restorations on immediately loaded implants have also proven to be predictable.[17-20] The increased acceptance rates further increased the growth in implant placement and implant restorations (table 7).

SUMMARY

The science and clinical implementation associated with implant dentistry have changed over the past several decades. Likewise, the authors have also modified and adapted their clinical practices to incorporate innovations into their individual private practices. Innovations in implant restorative components have resulted in increased use of screw-retained restorations, with resultant decreases in implant prosthetic complications and peri-implantitis/peri-implant mucositis. Total treatment times have decreased without sacrificing implant success/survival. Increased implant acceptance rates are likely correlated with decreased treatment times and decreased surgical morbidities. Extraction and immediate implant placement with nonoccluding immediate implant restorations have proven to be as efficient and efficacious as traditional protocols. This protocol is predicated on high implant insertion torque values, which are more easily obtained with improved implant designs. Site-specific implant designs have been developed

Table 6: Case acceptance rates 2016–2019 (prosthodontics and oral surgery practices)

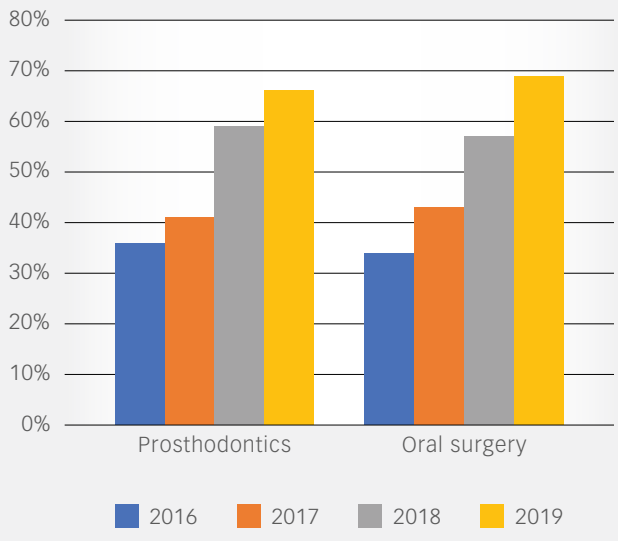
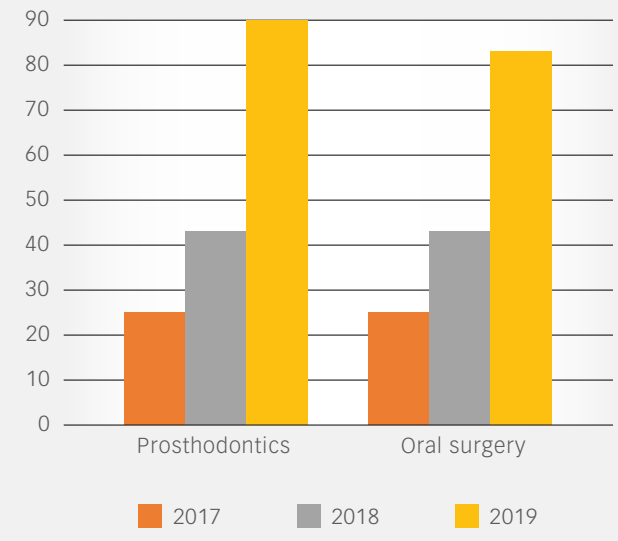


Table 7: Overall growth rates (number of implants placed/restored) 2016–2019. 2016 is the baseline for the computations.



and implemented to assist implant surgeons in placing specific implants for specific clinical situations.

As innovations continue in implant dentistry, change is the only constant. Clinicians and manufacturers will need to continue clinical and laboratory research to meet the ongoing challenges of dentate and edentulous patients. DE

Authors' disclosure: Drs. Morris, Steinberg, and Drago are spokespersons for Southern Implants North America. Products mentioned in this article are used in the regular course of practice.

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