TECHNO BYTES

Interview with an Insignia doctor: David M. Sarver

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Insignia (Ormco, Orange, Calif) offers custom-designed orthodontic appliances via fully interactive software. It is a precise, start-to-finish process that works with Damon, Inspire ICE, and conventional appliances. Insignia software incorporates the clinician's treatment plan into a virtual 3-dimensional model of each patient's ideal occlusion and delivers a complete custom solution: patient-specific brackets, precision (computer-assisted) bracket placement, and custom wires to eliminate time-consuming adjustments in all phases of treatment. Dr David Sarver, an orthodontist in Birmingham, Alabama, has treated patients with the Insignia technique since 1997. (Am J Orthod Dentofacial Orthop 2009;136:853-6)

Robert P. Scholz: When did you get interested in the Insignia technique (Ormco, Orange, Calif) and when did you start using it?

David M. Sarver: My first exposure to Insignia was in the late 1990s, when I met Dr Craig Andreiko. He showed me a new project he was working on—orthodontic appliances designed to the specific needs of each patient. I have always had a keen interest in technology and thought that each patient should be evaluated individually; 1 treatment plan does not fit all. I was intrigued by the use of computer-aided design and manufacturing technology to produce customized appliances and have been through several generations of the appliance since then.

RPS: Most orthodontists treat a patient to a "milestone" and then schedule a repositioning appointment or do some wire bending to achieve the final detailing. Why doesn't this work?

DMS: I think that it does work in the end. In finishing the smile design in many of our orthodontic patients, we reposition brackets to arrange both the posterior teeth for occlusal detailing and the anterior teeth to better fit our concepts of smile esthetics. For example, in the posterior sections, we can see vertical discrepancies, rotations, and disparate marginal ridges. When we sit behind the patient and look at alignment, we can see incisal edge alignment and some other things, but it is not until we get out of the chair and go around to the front of the patient and ask him or her to smile that we see the relationship of the incisors to the soft tissue of the lips on smile. The object of this use of technology is to reduce or eliminate this detailing by reducing bracket placement errors that we all experience, since detailing adds time to treatment. The time issue is more than just a marketing issue; it also involves the burden of care on each patient and the family. Another practical issue concerns the quality of the outcome, by whatever criteria are important to the orthodontist and the patient. We all experience the patient or parental pressure that starts in the final quarter of treatment, and I am sure all have experienced having to finish a patient before you are satisfied with your effort. So getting closer to the finish before the patient begins hammering on us gives us time for the detailing that makes it a great outcome.

RPS: How does an interested doctor become certified for Insignia?

DMS: At first, you had to sign up and take a course. I understand that now a sales representative will come to your office and spend time with staff and doctor to introduce the technology, assign a user name, help set up the practice preferences (bracket and archwire characteristics), demonstrate how to submit a case, and introduce the Approver software. Often, the representative will actually start a patient at this visit. The main task for certification is, believe it or not, learning how to take excellent polyvinyl silicone (PVS) impressions; another important task is to understand the Web interface and how the orthodontist might design the appropriate occlusal scheme for a patient, as well as the desired esthetics.

RPS: Was the learning curve a challenge?

DMS: Well, remember that I started on this project before the Web interface (the Approver software) existed, so that was a real effort. But now, I believe the learning curve is really quite rapid, particularly since

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many orthodontists are familiar with clear aligner concepts and their Web interfaces. Similar to many other systems that we are used to, we send the PVS impressions to the manufacturer, which scans them and produces a "virtual model" that is then set to its initial treatment goals by a technician. The doctor then takes over and can control tooth placement in 3 dimensions via the Web interface. I assume that every orthodontist knows how to straighten teeth, so this is really a straightforward process to position teeth to where the doctor thinks is the best place for them. The doctor also has control over arch form, the shape of which is determined at the beginning of treatment. All archwires are then manufactured to the designed arch form, and the shape is adhered to throughout treatment. The brackets are cut individually as well to the specified in-out, tip, and torque. This is significant in many ways. For example, a mandibular canine might be so severely rotated that we can't get the bracket on the center line of the tooth. Normally, we would derotate the tooth enough to allow us to rebond and reorient the bracket to finish its derotation. With Insignia, the slot might actually be cut at an angle to accommodate the position of the bracket; this means that, although the bracket looks wrong, the slot is actually right where you want it. The biggest conceptual change for me was to understand that treatment was directed not so much by the wire, but the slot.

RPS: Please describe the treatment planning feature you use at the start of treatment.

DMS: Our treatment planning process starts with the patient examination. In addition to occlusal relationships and macro-esthetic characteristics, lip and incisor relationships both at rest (lip support characteristics and incisor display) and on smile (incisor display, gingival display, smile width, smile arc) are evaluated. These soft-tissue characteristics are not obtainable with a radiograph or any other static record, and we believe that it is important to start treatment design here and then integrate standard quantification of the dentoskeletal relationships. We measure and record these observations so that we can be more accurate in our initial bracket setup for smile esthetics. Once records are completed and submitted for scanning, we access the records online. The first step for me is to determine arch shape. Insignia gives me a proposed arch form based on the buccal and lingual limits of alveolar bone. The strategy is to place the roots of the teeth in the center of cancellous bone for periodontal health and minimal resistance to tooth movement. The original model and arch shape is T1, and the technician, following predetermined preferences designed by the orthodontist, performs the initial occlusal setup and archwire shape. At this point, I access the patient's

Insignia file online, and, with software tools, I can modify the setup to his or her specific needs. For example, I might want to widen the premolar width to improve the buccal corridors on smile but at the same time maintain intercanine width. Next, we evaluate occlusal fit, rotations, and need for overcorrections. I will then finish with anterior tooth placement, because my smile design includes gingival incisal heights, incisor display, and smile arc.

RPS: How does the virtual target setup work when we are guessing at root position and anatomy?

DMS: Anatomically, the consistency of root position relative to crown shape is probably pretty good, but that's a guess. Certainly, an experienced orthodontist can visualize the long axis of the tooth, and, in most cases, the long axis of the tooth coincides with the long axis of the root. We send a panoramic x-ray with the impressions to help the case designer visualize the long axis. I might take a panoramic x-ray to look at root position and see that a root might not be where I want it to appear on the panoramic film. But I am careful to look at the crown and its intraoral relationship, and make a clinical judgment that the root might not be perfectly lined up with the long axis of the crown, but the crown looks appropriate in the mouth. Almost invariably, I will go with my clinical judgment, since panoramics are quite inaccurate for making this judgment. The Insignia software has recently been upgraded to help with angulations. The cases are developed from the mandibular skeletal anatomy, so anatomy works in our favor. Having real roots from cone-beam computed tomography scans might be a possibility here, for those who are going in that direction.

RPS: Does the feature allow you to incorporate a consonant smile line in the treatment plan?

DMS: The Web interface is designed to allow manipulation of the smile arc and incisor display. This is done with a reference line by which we can toggle vertical incisor placement; this allows us to place the teeth appropriately to achieve the desired smile arc as closely as possible. The major shortcoming of indirect bonding is the transfer of the teeth to attain the goals of smile design. In the 3-dimensional representation of a patient's teeth, we must keep in mind the incisal relationships that we documented on our initial examination. If not, studies show that, in at least one third of your patients, the smile arc will be flattened after orthodontic treatment.

RPS: Does Insignia allow for the use of self ligating brackets?

DMS: Yes.

RPS: Do you offer Insignia to all your full-treatment patients or are you selective in whom you choose to use this technique?

DMS: I tend to be a little selective at this point, since I am currently evaluating which patients benefit the most from this technology.

RPS: There is additional cost associated with using this technique. Can you share with us approximately how much this is per patient?

DMS: About $500, but this includes brackets, wires, and electronic models. With Insignia, however, I don't have an up-front investment in hardware and software, so I pay only for each patient for whom I am actually using the system.

RPS: Insignia claims that its technique greatly reduces treatment time, but so far I have seen no data proving this. Have you noticed decreased treatment times, and can you give some examples?

DMS: I am not sure that I have seen those claims from Insignia, but that certainly would be a goal and a benefit. I want to answer this question with the comment that I really lament the recent emphasis on speed of treatment over quality. I could finish every patient I treat in 12 months if that is the goal. My interest is, and always will be, the best outcome that I can achieve for each patient. On the other hand, orthodontists must balance the quality of treatment with its burden. Five years of orthodontic treatment to obtain totally perfect gnathologic and esthetic results would be unreasonable. To me, more efficient treatment gives me time to work on the details in the targeted time frame, not to be hurried out of treatment by an impatient patient or parent, only to get dissed later by the dentist and then the parents, whose memory becomes amazingly short. I have gathered data in my office that reflect less average treatment time. Because I have not really analyzed it statistically, I am reluctant to say that treatment time has been reduced.

RPS: What are the usual archwire sequences for a Class I nonextraction patient?

DMS: First, I hate that question! After the brackets are placed, I generally start with a .014-in copper-nickel-titanium alloy wire for initial alignment and follow with what we determine is the best sequence. Again, each patient is different. For example, in a short-faced patient with a deep overbite, I might progress to a full-dimension edgewise maxillary archwire and keep a light round archwire in the mandibular arch. Why? I want to open the bite with posterior extrusion and will use vertical elastics to extrude the posterior teeth; this accomplishes bite opening and also improves the facial proportions.

RPS: How does indirect bonding via individual tooth jigs work? Is it time efficient? Do you bond the brackets or is this a staff function?

DMS: The tooth jigs are fabricated by computer-aided design and manufacturing technology with the same precision as the brackets and wires, and connected through the jig as determined by the final setup. The tooth guide attaches to the occlusal and incisal surfaces, aided by a tacky adhesive to prevent slippage, and the bracket is attached at the end of the jig. This means that we can see the bracket directly to ensure that it is flush with the surface of the tooth. It also has the big advantage of allowing us to clean off the excess bonding material before polymerization.

Group jigs are selected at the time of case submission. Jigs are made from a precision scan of the stone model poured from the PVS impressions. Scan data are captured at better than 50-μm accuracy. Jigs have 2 parts: the receiver that contains the brackets and the anatomic part that seats on the occlusal aspect of the tooth. The actual jig is machined from foam used to test automated milling machines for accuracy, and so they are machined on a 5-axis milling machine with accuracy better than 10 μm.

Indirect bonding is performed with multiple tooth jigs selected by the doctor. I like the description that Dr Bob Smith used— "direct view indirect bonding process"—whereby the doctor can place the jig and the bracket and see 3 of the 4 tooth surfaces, so that the excess can be removed before curing. Visualization of the bracket also ensures that the bracket is where we want it. As for time efficiency, the effectiveness varies, as in all clinical procedures, by how much delegation the doctor is comfortable with or can obtain. The competency of the doctor and staff is an important criterion.

RPS: Since each bracket is custom built for each tooth, what happens when a patient loses a bracket and cannot find it?

DMS: The most commonly lost and irretrievable brackets are the first and second molars, and Insignia provides duplicate bracket and jig setups for those teeth. If other brackets are lost, you can order a duplicate.

RPS: Has your use of this technique offered you marketing improvements to patients and dentists?

DMS: In my opinion, yes. Dentists really appreciate the effort for occlusal precision and enjoy participating in the treatment design if they wish. Patients find that the "custom bracket system for you or your child" is quite appealing.

RPS: What do you consider the main advantage of using Insignia and would you recommend this technique to others?

DMS: I would recommend the system to others because of my appreciation of the ability to design treatment as individually as possible, rather than a "1 size fits all "approach. It allows us to truly plan treatment with the end in mind. For example, we currently put brackets on crooked teeth and in the end sort it out.

Insignia allows me to see the teeth straightened in the virtual setup, and brackets are then designed to be placed on "straight teeth" in the desired final relationship with an unbent wire. The key to quality is consistency, and, at the end of the day, the ability to visualize treatment from beginning to end before I start allows me to consistently see conflicts and hazards ahead of time, thus improving my navigation of treatment.

RPS: David, thanks for donating you time for this interview. It has been most informative, and I am sure it will assist our readers in understanding one of the many new technologies impacting orthodontics.