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THE EDITOR'S CORNER

A Shift in Paradigm

The Encarta online dictionary defines a *paradigm shift* as “a radical change in somebody’s basic assumptions about or approach to something”. Our specialty is indeed in the midst of several paradigm shifts. In years past, fixed orthodontic appliances involving bands, brackets, and archwires were the only means of delivering complex tooth movements with control in all three planes of space. If patients wanted “full treatment”, they had to have “braces”. With the advent of computer-generated removable aligners, however, the paradigm is shifting to the point that in the near future, invisible aligners may be reliably used to treat comprehensive orthodontic cases. Similarly, the paradigm of diagnostic orthodontic radiography has traditionally involved static, two-dimensional radiographs, manually traced on acetate. Digital radiography has now obviated darkrooms in private practices, and the rapidly growing technology of cone-beam computed tomography (CBCT) threatens to make two-dimensional radiography a thing of the past. While the vast majority of diagnostic radiographs—whether digital or analog, 2D or 3D—remain static, there can be no doubt that dynamic video imaging—again, either digital or analog, 2D or 3D—is the shape of things to come. Likewise, digital models have virtually replaced plaster casts for diagnostic purposes.

Initial orthodontic records have historically been intended to capture the information deemed necessary to diagnose malocclusion and detrimental esthetic appearance. Clinicians who completed their orthodontic training before the age of CBCT, digital radiography, digital cephalometric analysis, and digital models were taught that to adequately diagnose a case, we had to have a “ceph”, a “pano”, a well-trimmed set of plaster or acrylic study models, and a complete set of photographs including the frontal facial view, the frontal “smiley”, at least one side profile view, and a full set of intraoral photographs. Even this long-established paradigm seems likely to shift before too long. And as changes occur in diagnostic procedures, similar alterations will occur in treatment planning.

The old examination and record-taking protocols were intended to give the doctor a set of “hard” data that portrayed the patient at a frozen moment in time. The bite that was recorded to trim the plaster models was made in either the habitual centric occlusion or the idealized centric relation. How often does the patient remain in these static positions? Not very often. The smiling view we have photographed for years presented a facial position that existed for a mere fraction of a second, after we tried to say something to make the patient smile while we triggered the shutter. In reality, the patient’s face is in perpetual motion throughout life and, therefore, is never “frozen in time”. Static photographs simply do not convey all we need to know about a dynamic facial musculature.

From the time of Charles Tweed, the proof of the pudding with respect to the evaluation of treatment outcomes was the ability of the doctor to “put the plaster on the table”—that is, to present before-and-after study models demonstrating the before-and-after occlusion. The underlying skeletal relationships were demonstrated with superimposed before-and-after cephalometric radiographs. Both of these diagnostic modalities were predicated on a treatment paradigm that set forth an “ideal” occlusion as the primary goal

and “ideal” jaw relationships as the secondary goal. It was assumed that the appropriate soft-tissue relationships—labial posture, soft-tissue profile, and incisor display relative to lip curvature—would simply fall into place. But the recent development of patient-centered diagnosis and treatment planning has called these paradigms into question. Nowadays, the dynamic nature of facial expression, coupled with an emphasis on facial and, particularly, smile esthetics, demands that we adopt the *actual, dynamic* functional occlusion—the occlusion that occurs *within* the patient from moment to moment throughout a lifetime—as our standard, rather than the occlusion frozen in plaster or wax or any other static material.

In this issue of JCO, Dr. S. Jack Burrow of the Department of Orthodontics at the University of North Carolina School of Dentistry presents a succinct and fascinating review of the current paradigm shift in orthodontic diagnosis and treatment planning and the concomitant shift in biomechanics. If there’s nothing revolutionary presented here, what *is* new is a massive shift in emphasis—from a lifeless set of plaster models “on the table” to a living, breathing, chewing, swallowing, laughing, smiling patient.

RGK