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THE EDITOR'S CORNER

The Orthodontist as Sculptor

Legend has it that when Michelangelo was asked how he created his magnificent sculpture of David, he replied that he simply carved away everything that was *not* David from the block of marble, and the figure eventually emerged. That might sound easy enough, but in reality, only a Michelangelo could have pulled it off. The essence of a master sculptor's skill is the ability to visualize a fully completed result before ever beginning to reshape the raw stone.

The art of orthodontics has much in common with the art of sculpture. Indeed, Dr. Norman Kingsley, one of the founders of our specialty, was such an accomplished sculptor that it would be difficult to decide which work he is more remembered for today. Dr. Leonard Fishman, an orthodontic faculty member at the Eastman Institute for Oral Health of the University of Rochester, New York, is currently recognized as a world-class sculptor. Both sculptors and orthodontists strive to achieve esthetically pleasing results in a three-dimensional medium. Both start with raw materials that require reshaping and contouring in three dimensions to achieve those results. To reach the highest levels of success in their respective arts, both sculptors and orthodontists must develop the skill of visualizing the ideal end product, in three dimensions, before beginning their "treatment".

The sculptor has the advantage of being able to scrap a block of stone or wood if the carving is not going as well as expected. In that case, the artist can simply start over. The orthodontist has no such luxury, given that the medium is a living, breathing human being. In the event of a midcourse failure, a "do over" is not an option.

Over the years, every profession that involves working in 3D media has devised tools to facilitate visualization of the end result, even dating back to the ancient *camera obscura*. Orthodontists have employed such procedures from the early days of the profession—think of the various visualized treatment objectives that have been published and adopted. Since the dawn of the digital age, the development of these applications has only accelerated.

Computer-aided design and manufacturing programs are now employed by architects, civil engineers, and plastic surgeons, not to mention contemporary sculptors. Three-dimensional printing is becoming an art form in itself. Of course, virtually every orthodontic practice now utilizes computers, most of which provide some sort of predictive visualized treatment-planning analytics in addition to the usual office-management programs.

With the vast majority of orthodontists now offering the option of Invisalign or a similar system, every practitioner is at least casually acquainted with Invisalign's ClinCheck technology, the software used to predict increments of tooth movement throughout a planned course of treatment. But while the ClinCheck system does provide a highly accurate pretreatment visualization of aligner therapy, it projects only the two dental arches in isolation, without integrating them into

the overall scheme of facial esthetics.

In this issue of JCO, Dr. Luca Levrini, Ms. Giulia Tieghi, and Dr. Valerio Bini describe an innovative tool that enables pretreatment visualization of orthodontic results with a powerful new 3D twist on the familiar Invisalign ClinCheck. Recognizing that prosthetic and conservative restorative dentistry already employ computer programs—collectively referred to as Digital Smile Design software—to analyze the effects of treatment on the smile, the authors have combined that technology with ClinCheck projections in a method designed for esthetic orthodontic treatment planning. Considering today's emphasis on holistic patient care, the ability of the orthodontist to visualize the end result not only in terms of the isolated dentition, but within the overall context of the smile and facial esthetics, is a welcome addition to our diagnostic armamentarium. RGK