

Enhanced patient care through collaborative team play: An orthodontist and an OMF.Radiologist's collective perspective

Sumit Yadav,
Aditya Tadinada¹

Division of Orthodontics,
¹Department of Oral and
Maxillofacial Radiology, UCONN
School of Dental Medicine,
Farmington, CT, USA

Abstract

The overarching theme of patient-centric care should serve as the fundamental basis for our treatment plans. Treatment plans that best utilize knowledge; training and technology must be developed on current evidence that rests on soundly researched principles. In orthodontics, the evolution of cone beam computed tomography as a new three-dimensional imaging modality has brought a paradigm shift in the radiographic evaluation of the maxillofacial structures. However, the coming of new technology does not warrant its use in routine practice and tight imaging protocols must be developed to include and promote the evidence-based patient-centric approach. This principle is best approached if the effort is a collaborative one. Collaboration between all the disciplines that contribute to patient care must act as a unified force to deliver superior care. In this editorial, we present a successful collaborative effort between orthodontics and oral and maxillofacial radiology that have engaged in collaborative efforts to deliver superior patient care, better predoctoral and postdoctoral training programs and how this effort has yielded excellent contribution to research.

Key words: Two-dimensional imaging, three-dimensional imaging, radiation dose

In every specialty of life, there are going to be some solo travelers and some collaborative team players. We have had the good fortune of having been on the better side of things, where our research and clinical practice have personally benefitted from embracing newer technology and bringing synergistic efforts to be a part of many exciting teams.

Significant changes have happened in the diagnostic and treatment approach landscapes in dentistry over the recent years. One such change that deems special mention is the evolution of cone beam computed tomography (CBCT)

and its introduction to dentistry. The coming of CBCT has truly changed the way we diagnose and treat patients in dentistry today. CBCT is a low dose high spatial resolution imaging modality that is becoming the three-dimensional (3D) modality of choice for imaging the maxillofacial region.^[1,2] CBCT has brought about a paradigm shift in the use of 3D imaging in orthodontics. Since a vast majority of orthodontic patients are younger individuals who by “tissue age” are highly radiosensitive, the use of 3D imaging has been very limited. This is because conventional medical grade multi-slice computed tomography (CTs) deliver a significantly high amount of radiation dose when compared to conventional two-dimensional (2D) images.^[3-6] Hence, based on the criticality of the task at hand, 3D imaging using multi-slice CTs has been very limited for most orthodontic tasks except complex orthognathic surgeries and management of cleft lip and palate patients. Like with most modalities, the first generation CBCT machines were big, expensive and occupied a large footprint, but the second and third generations of CBCT machines have a significantly lower dose, smaller foot print and have become

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Address for Correspondence:

Dr. Sumit Yadav, UCONN School of Dental Medicine, Farmington, CT, USA. E-mail: syadav@uchc.edu

very affordable. These changes have brought a true shift in the use of CBCT in dentistry and more specifically in orthodontics.^[7]

At the University of Connecticut school of Dental Medicine, we have formed many collaborative teams that function in an interdisciplinary manner, with the association between orthodontics and oral radiology being a very successful collaboration. For well over a decade, some interesting questions have constantly intrigued us and the orthodontic community at large: what happens to the cortical bone immediately after, 6 months and 2 years post expansion? Do we gain or lose the buccal and palatal cortical bone? What happens to the bone levels, when we procline the mandibular incisors? All these questions in their entirety can be answered by acquiring a CBCT scan of a patient pre and post treatment. Our collaboration over the recent years has yielded at least 6 interesting “proof of concept” studies both from a basic science perspective and from a clinical and translatory perspective. These studies have laid the foundation to some more interesting questions that we are currently perusing as a part of our collaborative initiative. Our firm belief is that strong collaborative applications are also the most successful grant applications because they have the fortified strength of knowledge from multiple specialists.

Furthermore, in day-to-day clinical practice, 3D radiographic information plays an important role in diagnosis and treatment planning. However, here is where all of us clinicians have to bring our collective efforts to focus on an important issue. The issue of radiosensitivity and radiation dose delivery. The ubiquitous use of radiation can cause disastrous public health issues. So very tight radiation protocols must be established that enable the use of radiation wherever necessary and curtail unnecessary radiation exposure to patients.

The concept of as low as reasonably achievable (ALARA) is almost a responsibility on every clinician's conscious. This concept is evolving into as low as diagnostically acceptable” or “ALADA” because very low dose and poor resolution images don't often contribute to a successful treatment plan. But from routine orthodontic cases to complex surgical cases, key decisions about imaging protocols are best achieved through successful collaborations between orthodontists and oral radiologists. A campaign that has taken the forefront in advocating radiation safety especially for the children is the “Image Gently” campaign.^[8] It has spearheaded a trend where radiation exposure is done with caution, best used when needed and judiciously managed as necessary. The American Academy of Orthodontics (AAO) is the most recent addition to endorse this movement.

So having agreed that 3D imaging has significantly changed our diagnostic capabilities and has impacted how we treat our patients, an interesting perspective that has become obvious to us through this evolutionary process of going from 2D to 3D, is to form trustworthy relationships between the orthodontic team and the OMF Radiology team who can work together to navigate the intricacies of cases and when necessary find clever ways to wade through tough waters. We have found that having a close connection between the treating teams not only has helped us in delivering better patient care but also in understanding the nuances of incidental findings on 2D and 3D imaging.

Conventional wisdom says that with more power comes more responsibility, similarly with more area being imaged, there is more anatomy to be analyzed. It is at challenging times like these that specialties have to make strategic team plays. As David Turpin, the editor of AJODO stated in his editorial “Befriend your oral and maxillofacial radiologist”^[9] that from an orthodontists' standpoint, there are obvious questions that the AAO's Scientific affairs committee suggested which are: We know that 3D imaging is going to be an integral part of our workflow, when we take these scans, who is responsible for interpreting the scan?, Is this cost of reading a CBCT scan included in the scan or is it additional, as in the case of panoramic radiograph, it is the responsibility of the diagnostician. Do patients have a choice regarding the degree of interpretation included? What are the challenges in training and understanding the complex maxillofacial anatomy? How is this problem handled in medicine?

From an orthodontist's view point, we cannot emphasize enough the value of the radiology team's opinion in understanding the scan, dealing with incidental findings and associated liability issues.^[10,11] It, of course makes life easy both from a philosophical and from a practical stand point where there is more time on the clinician's hand to focus on patients and on research than hunt the “unknown waters” of a 500-file long CBCT scan. AT UCONN we attest to this strongly as we are a team that has found value in this association.

To serve the patient's best interests, we need to use CBCT technology judiciously in clinical practice but use it when necessary. The value of this wonderful technology must be leveraged, but it needs training, expertise and firm understanding of the physics behind ionizing radiation and its effects on human tissues. This level of training not being easily achievable, the need for a radiologist is obvious. Another area, where we see tremendous value in having a good team, is taking research to the next level and to develop better appliances for the patient and acquiring

3D image of the area of interest is a great advantage to achieve this.

Orthodontists have a responsibility to ensure that the radiographic techniques they employ provide the necessary information, with the least possible radiation exposure. This is especially true when the information obtained may affect the orthodontic intervention, that is, the imaging modality selected must minimize the patient radiation exposure while optimizing maximal diagnostic benefits. To take this into practice, working with the OMF.Radiologist to establish firm selection criteria and workflow patterns must be established, where all the scans have a report for both legal and treatment planning purposes for the benefit of the patient and the treating clinician. AAOMR along with American Dental Association has continuously recommended and advocated “ALARA” for the use of ionizing radiation, this should be a constant reminder for everyone using X-rays.

To summarize our experiences, the Orthodontics and OMF.Radiology team has been a very productive one. It helped in firming up our 2D and 3D imaging protocols for screening, evaluation of impacted teeth, temporomandibular joint diseases, managing syndromic cases and planning orthognathic procedures. We have had tremendous help in image interpretation and on the research end, our collaborative efforts are very promising and delivering results that can only attest to the need for doing more collaborative research. We really feel, that a crosstalk between two largely different specialties like orthodontics and OMF.Radiology can come together for

one single cause called ”enhanced patient care through research” which can positively impact the lives and smiles of many patients.

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