Intra-oral and panoramic images are not 3-D and clinicians can obtain only vague measurements from them owing to magnification changes due to positioning. In addition, they are not efficient for viewing certain pathologies. In response to these limitations, CBCT 3-D imaging technologies were developed. CBCT 3-D captures a volume of data and, through a reconstruction process, it delivers images that do not contain magnification, distortion and/or overlapping anatomy.

In recent years, CBCT 3-D has begun to make significant inroads into every discipline in our dental profession, expanding the horizons of clinical dental practice by adding a third dimension to cranio-facial treatment planning. CBCT uses advanced 3-D technology to provide the most complete anatomical information on a patient’s mouth, face and jaws areas, leading to enhanced treatment planning and predictable treatment outcomes.

Essentially, this represents a paradigm shift, where measurements and anatomical relationships are precise and provide practitioners with a clear understanding of their patients' anatomical relationships. According to dental practitioners using this technology, it helps them perform treatment more efficiently.

Regarding oral implantology, it is estimated that growth in implant-based dental reconstruc-
tion products will outstrip all other areas of dentistry, according to Kalorama Information. The traditional method of replacing a tooth with a dental bridge has been shown to be problematic, and more permanent solutions are urgently needed.

With a rapidly ageing population in the developed world and the resulting enormous need for dental restoration, a large number of companies have seen the opportunity to adopt these sophisticated dental techniques. And indeed, as some have predicted, the growth in dental implant-based procedures has increased considerably in recent years.

As a result, there has been a rapid increase in the number of practitioners involved in implant placement, including specialists and generalists, with different levels of expertise. At the same time, a number of unusual complications associated with these procedures have arisen.

A literature and web search revealed several published reports of such complications, which include implant fractures (Fig. 1), impingement on adjacent teeth (Fig. 2), perforation of the lingual undercut (Fig. 3), sinus perforations (Fig. 4) and implants displaced into the maxillary sinus (Fig. 5).

The clinical management associated with some of these complications is difficult at times and considered very invasive. Therefore, while the quantitative relationship between successful outcomes in dental implant treatment and CBCT-based dental imaging is unknown and awaits discovery through large prospective clinical trials, I strongly believe that using CBCT- and 3-D-based dental imaging is becoming a reliable procedure from a precautionary standpoint based on a series of recent preliminary clinical studies and case reports.

I also strongly believe that by taking 3-D CBCT images prior to placing dental implants, many of the above-mentioned complications can be circumvented.

Editorial note: Dr Almog's presentation, Introduction to CBCT, especially as it pertains to prevention of failures in oral implantology, at the Dental Tribune Study Club Symposia at Greater New York Dental Meeting 2010 is available online at www.DTStudyClub.com.

Reference


About the Author

Dr Dov Almog is a prosthodontist with more than 30 years of diversified professional experience in clinical, academic and research environments. His publications include articles on CBCT, dental implants, carotid artery calcifications and practice management. In 2003, in acknowledgment of his research on incidental findings of carotid artery calcifications on panoramic radiographs, he received the Arthur H. Wuehrmann Award from the American Academy of Oral and Maxillofacial Radiology. Dr Almog currently serves as chief of the dental service for the VA New Jersey Health Care System of the US Department of Veterans Affairs.