Discussion: TMJ ankylosis is a pathologic condition in which the mandible is fused to the glenoid fossa by bony or fibrotic tissues, interfering with mastication, speech, oral hygiene, and nutrition. Multiple factors, including trauma, arthritis, infection, congenital deformities, or iatrogenic causes, can result in ankylosis, but trauma remains the most common etiology. In growing individuals, it can result in very severe craniomaxillofacial deformities and can also affect the airway. This case report discusses the clinical and radiographic features affecting the craniomaxillofacial structures associated with TMJ ankylosis and the applicability of 3-D printing in treatment planning. Because TMJ ankylosis can affect multiple aspects of the patient's life, an interdisciplinary management approach is required.

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STATIONARY INTRAORAL DIGITAL TOMOSYNTHESIS USING CARBON NANOTUBES FIELD EMISSION X-RAY TECHNOLOGY: CLINICAL PROTOTYPE

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Background: Tuned aperture computed tomography (TACT) and intraoral tomosynthesis were studied in the past and demonstrated improved detection of various dental diseases. However, interest in TACT waned because the technology was not viable for clinical use. Recently, interest resurged with the advent of the carbon nanotube field emission x-ray source array technology. Researchers from the University of North Carolina (UNC) Department of Physics and Astronomy and the UNC School of Dentistry designed, patented, and conducted several benchtop studies to demonstrate its utility.[1]

Objective: The aim of this study was to develop a viable stationary intraoral tomosynthesis imaging device for clinical use.

Materials and Methods: XinVivo, an imaging device startup company, developed a prototype system designed for intraoral imaging applications.[2]

Results: The prototype met all the requirements for clinical use and met the U.S. Food and Drug Administration (FDA) requirements for intraoral imaging devices.

Discussion: The clinical prototype met all manufacturer specifications. Preliminary studies indicated that stationary intraoral tomosynthesis (s-IOT) provides increased image quality and feature conspicuity at a dose comparable with that in a single 2-dimensional (2-D) intraoral radiography.[3]

Conflict of Interest: Otto Zhou, J. P. Lu, Andrew Tucker, and Enrique Platin have financial interest in XinVivo and are listed as inventors on the patent.

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MICROCOMPUTED TOMOGRAPHY OF CALCIUM-HYDROXIDE EXPOSED VITAL NERVE TISSUE: A PILOT PROTOCOL

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Background: Calcium hydroxide (CH) preparations are used in many endodontic procedures. Extrusion of CH into the mandibular canal may cause inferior alveolar nerve (IAN) injury. With an in vivo rat sciatic nerve sample, this phenomenon was subsequently imaged by using multiple modalities.

Objective: The aim of this study was to determine if histologic differences were evident on microcomputed tomography (MCT), scanning electron microscopy (SEM) and hematoxylin and eosin (H&E)−stained light microscopy in control and test nerve sections.

Materials and Methods: Fourteen sciatic nerve samples were harvested from 7 laboratory rats after CH paste was placed in vivo for a set amount of time. A control was taken on the same nerve more dorsal than the test site. Specimens were scanned on an MCT unit (SkyScan1272, Bruker, Kontich, Belgium) at 2.5 μm, 1200 ms, rotation step of 0.2, frame of 3, and random movement of 30. Samples were observed under a scanning electron microscope (FEG 250; ThermoFisher, Waltham, MA) at $\times$200, $\times$400, $\times$800, $\times$1000, and $\times$1500 magnifications under the low-vacuum secondary electron detector (LFD). Images were interpreted to determine if differences were present in the CH samples compared with the controls.

Results: Preliminary findings showed promise for demonstrating nerve structure and form. In addition, the animal model protocol appears helpful for testing CH and other substances on nerve tissue in vivo.

Discussion: MCT and SEM imaging are effective tools in evaluating nerve structure and change in conjunction with H&E−stained histologic samples.

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