

**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** E. PLATIN,<sup>a,b</sup> A. TUCKER,<sup>b</sup> O. ZHOU,<sup>c</sup> and J. LU,<sup>c</sup> <sup>a</sup>UNIVERSITY OF NORTH CAROLINA, ADAMS SCHOOL OF DENTISTRY, CHAPEL HILL, NC, <sup>b</sup>XINVIVO INC., MORRISVILLE, NC, and <sup>c</sup>UNIVERSITY OF NORTH CAROLINA DEPARTMENT OF PHYSICS AND ASTRONOMY, CHAPEL HILL, NC

**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.<sup>1</sup>

**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.<sup>2</sup>

**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.<sup>3</sup>

*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

D.D. RICE, A. GRANDHI, G. ROQUE TORRES, J. GUO, and L. BAKLAND, LOMA LINDA UNIVERSITY SCHOOL OF DENTISTRY, LOMA LINDA, CA

**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 subjectively 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  $\mu$ m, 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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### IMAGING APPEARANCES OF FACIAL COSMETIC AUGMENTATIONS AND POTENTIAL COMPLICATIONS

J. ROCK, and S.M. MALLYA, UNIVERSITY OF CALIFORNIA LOS ANGELES (UCLA) SCHOOL OF DENTISTRY, LOS ANGELES, CA

**Background:** Cosmetic augmentation procedures are used for facial rejuvenation procedures. One category of materials used for augmentation is prefabricated silastic implants. Injectable materials used for augmentation include calcium hydroxyapatite microspheres, which stimulate dermal fibroblast proliferation. In general, these cosmetic procedures are safe, and the rate of complications is low. With increasing use of computed tomography (CT) for a variety of dental applications, the oral and maxillofacial radiologist is likely to encounter patients who have had prior cosmetic augmentations. The radiologist should be familiar with the radiographic appearances and locations of commonly used facial cosmetic augmentation materials, and differentiate these from pathologic entities.

**Discussion:** We present representative cases to demonstrate the radiographic appearances of facial cosmetic enhancements. These include dermal fillers and silastic implants. The presented cases also illustrate potential complications of these augmentations and their importance to diagnosis of problems in the oral and maxillofacial region. Complications include infection and movement or dislodgement of these grafts. The radiologist should be familiar with the principles of the surgical techniques so that deviations from the natural history of the graft can be promptly recognized and managed as necessary. Depending on severity, surgical intervention may be needed to prevent augmentation instability. Therefore, referral to a physician is necessary for complete evaluation and appropriate treatment. Nevertheless, the purposive contributions of the oral and maxillofacial radiologist provide key insight and support to health care providers in evaluating interval cosmetic augmentation stability.

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### ATYPICAL SPINDLE CELL NEOPLASM OF THE JAW MIMICKING A BENIGN LESION—

A RARE CASE REPORT N.P. SELVAM, M. HANSEN, and D. KASHTWARI, UNIVERSITY OF FLORIDA COLLEGE OF DENTISTRY, GAINESVILLE, FL

**Clinical Presentation:** Atypical spindle cell neoplasms are extremely rare lesions, especially in the jaws, and are well known for their aggressive behavior.<sup>1</sup> We present the case of a 58-year-old male in whom this tumor was incidentally noted on routine dental examination. The tumor resembled a benign odontogenic lesion on computed tomography (CT) and magnetic resonance imaging (MRI). Because of its propensity for metastasis, positron emission tomography (PET)/CT was performed to rule out distant metastasis.

**Differential Diagnosis:** Correlating the innocuous clinical presentation with the radiographic appearance of well-defined nature of the lesion and its paracoronal position with respect to an impacted tooth, the differential diagnosis included dentigerous cyst, other odontogenic cyst, cystic ameloblastoma, and other benign odontogenic tumor. Because of the irregular margins, we assumed the lesion could have been secondarily infected.

**Diagnosis and Management:** Histopathologic examination revealed an atypical pleomorphic spindle cell neoplasm of indeterminate origin. The patient underwent segmental mandibulectomy with radical neck dissection. Follow-up PET/CT revealed mild fluoro-2-deoxy-D-glucose (FDG) avidity in the left intraparotid lymph nodes. This could be a reactive process or recurrent/second primary tumor. A close follow-up after 3 months was recommended.

**Discussion:** Undifferentiated spindle cell sarcomas are high-grade, aggressive soft tissue sarcomas with no specific line of differentiation. To our knowledge, fewer than 30 cases have been reported. This case would be of specific interest to oral and maxillofacial radiologists because of its resemblance to a benign odontogenic lesion on CT and MRI. In conclusion, this malignancy can mimic benign lesions, and this may have significant influence on formulating the treatment plan, favoring a more conservative approach.

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### RARE PRESENTATION OF RADICULAR CYST WITH REVIEW OF THE LITERATURE

N. SHUFF, R. JAGTAP, M. HANSEN, A. RUPRECHT, and D. KASHTWARI, UNIVERSITY OF FLORIDA COLLEGE OF DENTISTRY, GAINESVILLE, FL

**Clinical Presentation:** A 61-year-old male with a non-contributory medical history and a facial swelling of 1 week's duration reported to his local emergency room. The physician prescribed penicillin and made a dental referral. The dentist obtained a pantomograph and, upon visualization of the lesions, referred the patient to the University of Florida Emergency Department, where cone beam computed tomography (CBCT) was performed. The pantomograph illustrated 2 well-localized, partially corticated, radiolucent entities, which appeared hydraulic in nature, in the maxilla and a well-defined, corticated, mixed-density entity, which appeared hydraulic in nature, in the right parasymphyseal region of the mandible. Evaluation of the CBCT scan affirmed the maxillary lesions to be consistent with radicular cysts. The mandibular lesion was well defined, expansile, corticated, and unilocular