

CS 9000 3D

## CBCT Helps Avoid Unnecessary Root Canal

Nestor Cohenca, DDS

### Case Overview:

A female, aged nine years and six months, presented for recall exam/hygiene and pre-orthodontic evaluation. The medical history was non-contributory, and her dental history revealed good oral hygiene with no evidence of active plaque or calculus present. Mild crowding on upper and lower anterior teeth was diagnosed in addition to anterior open bite. Radiographic examination included bitewings, a panoramic view, and periapical films of the anterior dentition as part of their comprehensive evaluation. Upon clinical examination, all maxillary incisors were responsive to a cold sensitivity test. Teeth were not tender to percussion and were non-mobile. Periodontal probing confirmed a normal attachment with no readings greater than three millimeters.



A periapical radiograph revealed the presence of a lateral radiolucency on the maxillary left lateral incisor.



**Nestor Cohenca, DDS**  
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Dr. Cohenca received his dental degree from the National University of Asuncion, Paraguay and in 1994 completed the endodontic program at the Hebrew University in Jerusalem, graduating cum laude and receiving the Ino Sciaky Best Graduate Student Award. He served 11 years as an accomplished faculty member and private practitioner in Israel. He is a Diplomate of and was an examiner for the Israel Board of Endodontics, and a past president of the Israel Endodontic Society.

He has served as clinical assistant professor and coordinator of Trauma and Sports Dentistry at the University of Southern California. He is currently an Associate Professor of Endodontics and Adjunct Associate Professor of Pediatric Dentistry at the University of Washington. He serves as Director of Endodontics and Traumatology at the Center for Pediatric Dentistry and Seattle Children's Hospital. In 2010, Dr. Cohenca became a Diplomate of the American Board of Endodontics and received an honorary membership to Omicron Kappa Upsilon National Dental Honor Society.

He is active in research and teaching and lectures both national and internationally. He has published more than 50 peer-reviewed articles and serves as Associate Editor of the Dental Traumatology Journal and Board Director of the International Association of Dental Traumatology. Dr. Cohenca maintains a private practice limited to Endodontics in Redmond, WA.

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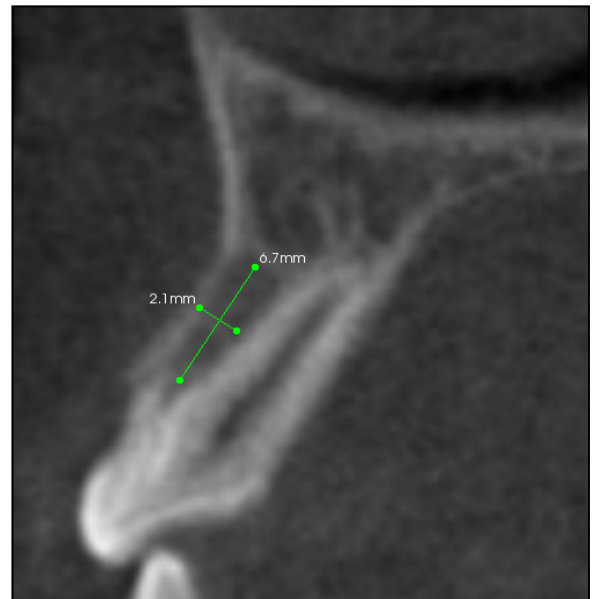
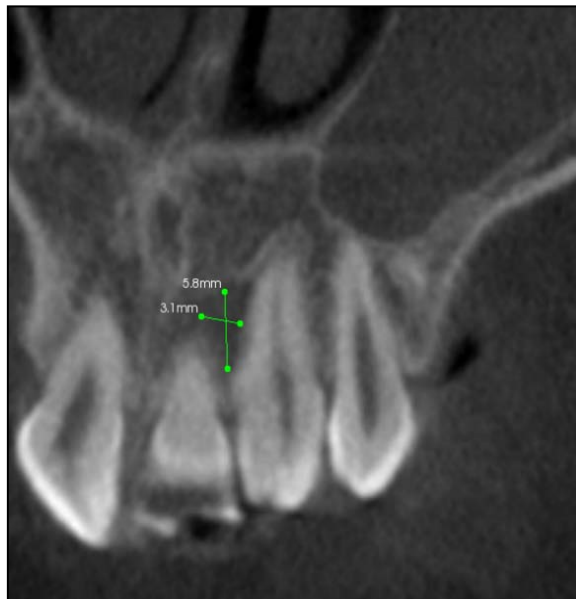
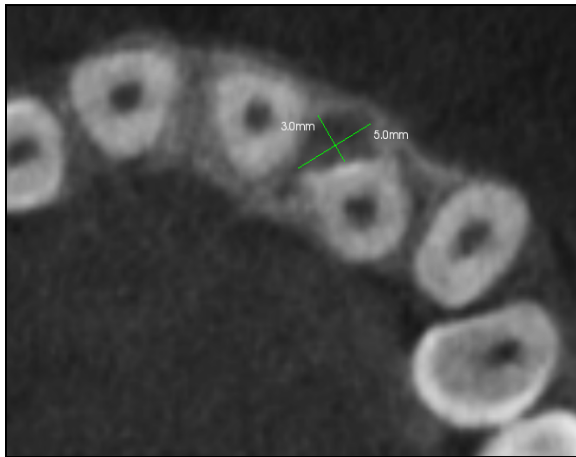


Clinically, the coronal anatomy of the maxillary left lateral incisor was consistent with a dens invaginatus, a diagnosis only made in approximately five percent of cases. A periapical radiograph confirmed the anatomical anomaly and revealed the presence of a lateral radiolucency on the maxillary left lateral incisor.

**Treatment Plan:**

A Cone Beam Computed Tomography (CBCT) study was prescribed in order to determine the extent and location of the invagination as well as the relationship between the periradicular radiolucency and the anatomy of the tooth. The CBCT study was performed using the i-CAT (Imaging Sciences International, Hatfield, PA) at 125  $\mu$ m, and the images demonstrated the presence of a type III dens invagination directly correlated with a radiolucency on the mesial and buccal aspect of the maxillary left lateral incisor. The apical area did not reveal any bone loss or radiolucencies.

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Pre-treatment CBCT scan at 125  $\mu$ m reveals extent and location of invagination and relationship with tooth anatomy.

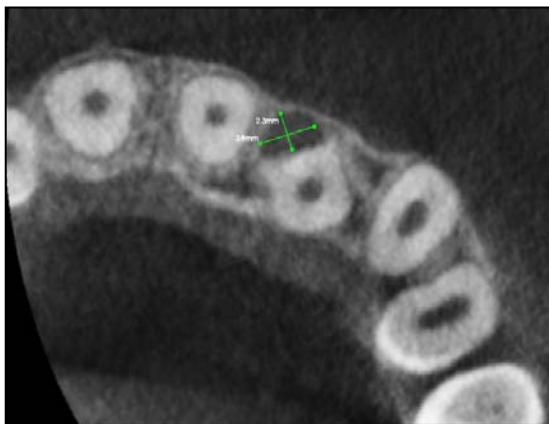


Based on the clinical and radiographic examination, the maxillary left lateral incisor was diagnosed with a normal pulp on the main canal space, and a necrotic pulp only related to the dens invagination. The periradicular tissues were diagnosed with asymptomatic periradicular periodontitis.

A conservative treatment plan was presented to the parents aimed at treatment of the invagination only, leaving the main canal unexposed and the pulp vital. Non-surgical endodontic treatment was performed under the operating dental microscope and the invagination space sealed with white Mineral Trioxide Aggregate (MTA) (Pro Root, DENTSPLY, Tulsa Dental, Johnson City, TN); the access was then sealed with a composite resin.

Six months later the patient returned asymptomatic for follow-up. Clinically, the tooth was responsive to all sensitivity tests and not tender to percussion or palpation.

The CBCT follow up scan was taken with a different CBCT system at 76  $\mu$ m (CS 9000 3D, Carestream, Atlanta, GA) and demonstrated significant bone healing in all three dimensional planes.



Post-treatment CBCT scan at 76  $\mu$ m shows significant bone healing in all three dimensional planes.

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Testimonial:

1. Conservative treatment is always preferred as retention of root structure is always preferred to its removal when possible. In this case, the use of CBCT saved the patient from an unnecessary root canal.
2. Given the significant variations in available resolution within CBCT, one should assess whether a resolution which may be adequate for oral and maxillofacial surgical planning is also adequate for specific determination of the anatomical features often presented in dens invaginations.
3. In this case two CBCT scans of the patient were taken from the same angles by different CBCT devices at varying resolutions (the lower-resolution i-CAT at 125 um and the higher resolution CS 9000 3D at 76 um). The contrasting quality of these images illustrates that higher resolution CBCT scans deliver more advanced images, which can lead to more accurate diagnoses and better patient care.
4. Early referral for endodontic treatment, along with regular access and interface between different specialists, helped produce the conservative and effective treatment for this case.
5. For cases with complex anatomy, the use of high resolution CBCT 3D imaging should be considered and recommended to achieve the least invasive and most conservative treatment possible.

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