Enhancing the three-dimensional visualization of a foreign object using Mimics software

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Abstract

A patient was referred to the Oral and Maxillofacial Imaging Division and the attending dental specialist suspected a foreign object in the anterior region of the maxilla. The region was scanned using a Kodak 9000 3D cone-beam computed tomography (CBCT) extroral imaging system (Carestream Health, Inc.) to determine the type and morphometric characteristics of the foreign object. The CBCT images failed to determine the identity and nature of the foreign object. CBCT images were then exported to the Materialise Interactive Medical Image Control System (Mimics) software to evaluate whether this software can help in enhancing the visualization of the foreign object in the maxillary region. The findings showed that there was an improved visualization of the foreign body and the type of the object could be determined with certainty. The object was identified as an endodontic file and was clearly visible when visualized as a reconstructed 3D model in Mimics software. Although the identification of abnormalities has been dramatically improved using 3D scans, the visualization can be further enhanced using image processing software like Mimics.

Keywords: Mimics software, CBCT, Foreign object, Detection, Endodontic file

Introduction

Perforation is an artificial communication between the root canal system and the supporting tissues of the tooth [1]. Root perforation requires proper closure in order to secure the tooth and the first step is the perforation detection. Pentagonal radiograph is among the oldest methods used for radiographic detection of