

THREE-DIMENSIONAL VIRTUAL ENDOSCOPY OF THE TEMPORAL BONE

OBJECTIVES: Three-dimensional imaging protocols can improve the physician's comprehension of complex anatomy. Virtual endoscopy software permits the investigator to navigate through the anatomy non-destructively and has been reported to simulate bronchoscopy and colonoscopy. Because of the small and delicate features of the middle and inner ear, virtual endoscopy was used to demonstrate these features of the temporal bone and to compare to actual endoscopic images.

METHODS: Spiral (helical) CT images were obtained using conventional clinical algorithms involving multiple, contiguous 1 mm thick transaxial slices through the temporal bone. Three-dimensional reconstructions were performed on a GE Advantage Windows workstation using dedicated 3D and virtual endoscopy software. The virtual endoscopic image-processing algorithm utilizes selected image intensity threshold levels to visualize and enhance the middle and inner ear anatomy from an endoscopic perspective. Artistic renditions of the inner ear anatomy guided the navigation and observations were compared to the anatomic drawings and were correlated with actual surgical endoscopic images.

RESULTS: Normal temporal bone anatomy and pathologic conditions were evaluated using virtual endoscopy.

CONCLUSION: This technique shows promise for diagnosis, surgical planning, and teaching temporal bone anatomy. As a non-invasive imaging method, virtual endoscopy shows promise in the preoperative assessment of cochlear patency prior to cochlear implantation. Other clinical applications are under investigation.