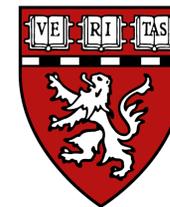




Clinical use of a True 3D imaging system to guide intraprocedural decision making in vascular IR procedures



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LEARNING OBJECTIVES

By using case examples, the reader will learn about the potential utility of a True 3D interactive imaging system as it is used in real time to facilitate intraprocedural vascular IR decision-making.

BACKGROUND

EchoPixel offers a True 3D, interactive virtual reality imaging system that allows for conversion of image dataset files from an intraprocedural Cone Beam CT or pre-procedural CTA/MRA into a True 3D model. This 3D anatomic model is projected onto a z-Space display system and viewed with stereo glasses. This allows an interventional radiologist to see patient specific vascular anatomy in an open 3D space. The user can then interact with the images by rotating, magnifying, and analyzing a selected anatomic area of interest. The True 3D system was used in the Interventional Radiology suite at a single institution on 17 patients over a span of three months. Selective cases are chosen to highlight the possible benefits of using this new and interactive technology.

CLINICAL FINDINGS/PROCEDURE DETAILS

True 3D visualization of vascular anatomy during an interventional procedure can be valuable in delineating complex anatomic relationships and guiding treatment. Two case examples are discussed: 1) True 3D imaging reconstructed from intraprocedural cone beam CT demonstrated useful information regarding the origin of a miniscule vessel feeding a right hepatic artery branch pseudoaneurysm in a patient with a large volume hemoperitoneum. No definitive vessel source was noted on DSA or pre-procedural CTA. 2) True 3D imaging reconstructed from intraprocedural cone beam CT helped to identify a rare variant of right hepatic artery origin from the very proximal celiac trunk. This imaging facilitated catheterization of the right hepatic artery in a patient undergoing right hepatic artery chemoembolization.

TEACHING POINTS

EchoPixel interactive intraprocedural True 3D imaging system is an innovative tool which may allow operators to more quickly perceive complex vascular anatomy. With interactive 3D anatomic visualization it may be easier to delineate blood supply to neoplasms, define sources of extravasation, and provide roadmaps for treatment planning.

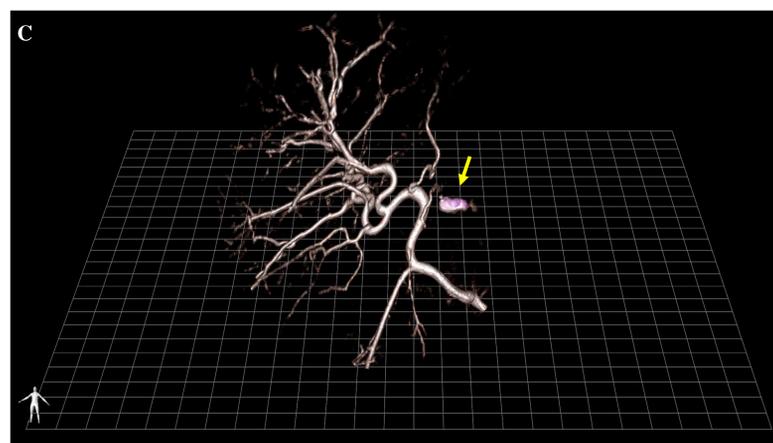
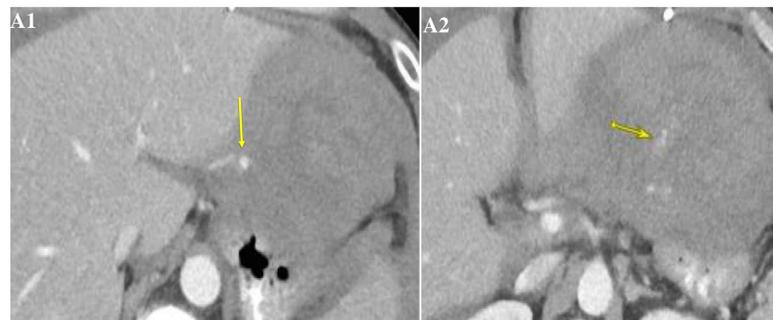
Disclaimer: EchoPixel Hardware and Software were provided for limited clinical evaluation by EchoPixel, Inc., Santa Clara, CA

Special thanks to Curtis Ball BS, RT for assistance with image processing.

Case 1

Clinical history: 34 year old male with history of hepatitis C, IVDU endocarditis, with prosthetic cardiac valves on coumadin presented with abdominal pain and a 12 point hematocrit drop.

CT: 17 cm hematoma along lesser sac with active extravasation, possibly from right gastric artery



A1-A2. Celiac Arteriogram: **Focal extravasation** arising from **right hepatic artery** with delayed pooling of contrast material.

B. Celiac Arteriogram: Focal extravasation without definable feeding vessel

C. Static Image from 3D workspace demonstrating a pseudoaneurysm (arrow) with a miniscule feeding right hepatic artery branch vessel



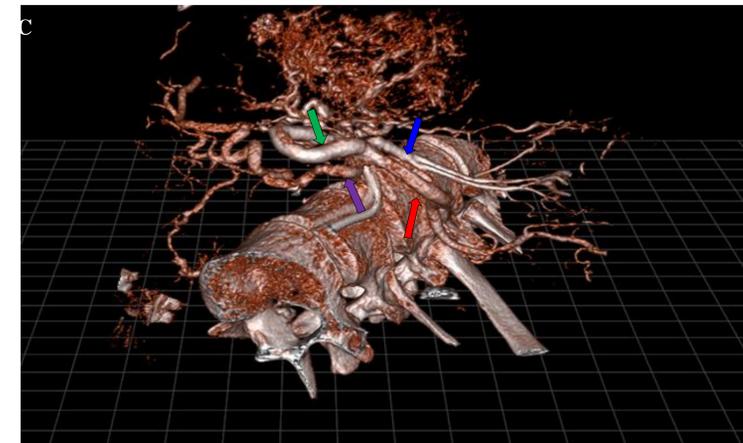
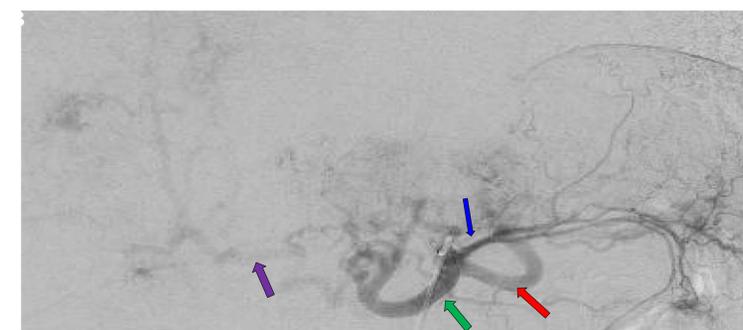
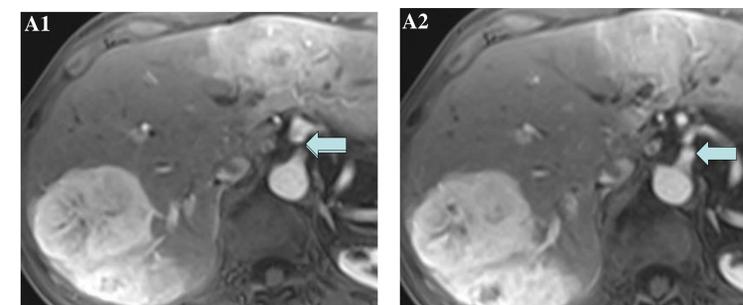
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True 3D imaging reconstructed from intraprocedural cone beam CT demonstrates origin of miniscule vessel feeding right hepatic artery branch pseudoaneurysm. Visualization of this feeding vessel was difficult to appreciate on DSA and axial CT from cone beam imaging.

Case 2

Clinical history: 42 year old female with Von Hippel Lindau syndrome with metastatic pancreatic neuroendocrine tumor to liver status post Whipple and chemoradiation therapy presenting for TACE of right hepatic artery as palliative treatment for regional control of tumor burden

Pre-Procedural MR: Arterially enhancing metastatic disease are seen in both lobes of the liver



A1-A2. Origin of right hepatic artery identified on retrospective review of MRI.

B. Celiac Arteriogram: Celiac trunk appears to trifurcate into **left gastric, splenic, and left hepatic artery** with suggestion of distal reconstitution of proximally occluded **right hepatic artery**.

C. Static Image from 3D workspace demonstrating origin of **right hepatic artery** as well as the **gastric, splenic, and left hepatic artery**.



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True 3D imaging reconstructed from intraprocedural cone beam CT reveals a rare variant of the right hepatic artery arising in a tortuous fashion from the proximal celiac trunk. Vessels have been segmented out to highlight the origin and course of the right hepatic artery. Visualization of this origin was difficult to appreciate on DSA and axial CT from cone beam imaging.