



Workflow simplification with XperCT

Relief of complications due to spontaneous gastric perforation

Who/where

Dr. John Racadio, Chief of Interventional Radiology, Cincinnati Children's Hospital Medical Center, Cincinnati Ohio, USA

Challenge

Devise the optimal, least detrimental interventional approach for a very sick teenage patient.

Solution

Complete all the work in the X-ray angio suite, by using XperCT soft tissue imagery to assist in a quick and precise solution.

Dr. John Racadio demonstrates how new XperCT and live 2D fluoroscopy work together to provide a quick resolution to a difficult situation.

“A 15 year-old girl was admitted with a very rare spontaneous gastric perforation,” remembers Dr. John Racadio. “She was very very sick.”

“She went to the OR where they confirmed a hole in her stomach and peritonitis throughout her abdomen. The surgeon repaired the hole, but there was so much swelling, they couldn't close her abdomen. Later, after three days in ICU, it was obvious she was not getting better.”

Institutional excellence

Serving infants to adolescents, Cincinnati Children's Hospital Medical Center (CCHMC) is an international leader in pediatric health care, research and education. Dr. Racadio heads a team of interventional radiologists who have embraced the use of 3D interventional techniques to assist in the diagnosis and treatment of a variety of childhood afflictions.

Real-time 3D reconstruction for the analysis of complex vasculature (3D-RA) is a commonplace tool in the X-ray angio suite at CCHMC. But the ability to visualize surrounding anatomical structures has been missing. Now Dr. Racadio can add CT-like soft tissue imaging in the form of Philips XperCT to his interventional arsenal.

An innovative alternative

With their 15 year-old patient showing no signs of improvement, the intensive care team scrambled to find the cause. Dr. Racadio recalls, “A conventional CT scan showed more ‘free inter-peritoneal’ air than expected five days post op. This raised the specter that the hole in her stomach had opened again.”

The initial plan suggested by the attending physician and surgical team was to bring the patient to interventional radiology where, under fluoro, a contrast injection into her nasogastric (NG) tube would be done to see where the stomach was leaking. If a leak was not apparent, the thought was to bring her back to CT to see if they could identify any leakage of contrast into the peritoneum. If leakage was confirmed, the girl would be sent to OR to remedy the problem.

PHILIPS



Dr. John Racadio

But Dr. Racadio had another idea. “I said why don’t we just do the CT in the interventional suite?”

“So we injected the NG tube under live fluoro and saw a vague increase in contrast near the lesser curvature of the stomach – but nothing conclusive. Then we did an XperCT scan and from the XperCT images were able to pinpoint exactly where the contrast was leaking into the peritoneum.”

Simplifying the procedure

XperCT aids in the planning and evaluation of treatment by providing CT-like soft tissue imaging in the X-ray angio suite. With XperCT clinicians can assess soft tissue and bone structure at any time during an intervention, often without the need to transport the patient to a separate CT room. XperCT soft-tissue information is available in the examination room within 90 seconds after acquisition. Complications can be addressed faster and corrective actions taken immediately. Follow-up XperCT scans assist with post-

interventional validation of procedural success, while the patient is still on the table.

Using his new Allura Xper FD20 X-ray angio system with XperCT, Dr. Racadio is able to accomplish in the angio suite, what previously would have involved two different modalities.

XperCT helps a second time

Upon identification of the leak location, surgeons wanted to place a drainage tube at the site of perforation. According to Dr. Racadio, “No one wanted to move this fragile patient to the OR. The three dimensional spatial understanding provided by XperCT made immediate intervention possible. So right there in the interventional suite, the surgeon just lifted up the left lobe of the liver and slid a drainage catheter down to where the leak was located.”



Contrast injection through the NG tube under fluoroscopy shows a vague increase in opacity near the lesser curve of the stomach, but no definite location of leak.



3D rendering from XperCT confirms extraluminal contrast at the lesser curve of the stomach. (Axial XperCT data not shown pinpoints the leak to be at the lesser curve just under the left lobe of the liver).

“We confirmed drain position with an additional XperCT to make certain the placement of the tube was correct,” says Dr. Racadio, “and found it to be in a good position, but too deep – so the tube was actually going through the hole into the stomach. With the drain all the way through the hole, there was no way for the stomach to heal.”

“Remarkably, using that post-procedural XperCT data we were able to, under fluoro, pull the tube back enough so that it was just outside the stomach, immediately adjacent to the perforation. The girl was finally able to heal well with the drainage catheter confirmed by XperCT to be in the perfect spot.”

Procedural efficiency

A primary advantage of XperCT is one of workflow simplification. Procedural efficiencies are realized and patient management affected when what might have been a two hour treatment is shortened to one.

“The case of the 15 year-old is an excellent demonstration of the impact of XperCT.”

This is readily apparent to Dr. Racadio. He elaborates, “The whole procedure, from assessment to placement of the drainage tube, took about an hour and avoided the patient having to go from fluoro to CT, to OR, to CT and back to OR (for the tube to be pulled back). With XperCT we were able to optimize this patient’s care. In fact, she might not have been able to withstand the alternative.”



Tomographic view from XperCT following drainage tube placement shows the drain to be at the site of leakage, but advanced to far, through the perforation, and into the gastric fundus crossing the NG tube and feeding tube.

A promising future

Dr. Racadio suggests XperCT is not a hard skill to master. “The learning curve is relatively easy,” he says. “It’s exactly the same technique as rotational angiography – the c-arm rotates around the patient. But instead of vessel volume, it acquires soft tissue volume. There’s simply nothing like the three dimensional spatial understanding it provides.”

He goes on to explain, “The case of the 15 year-old is an excellent demonstration of the impact of XperCT. It illustrates how the live, dynamic capabilities of 2D fluoroscopy and cross-sectional or 3D capabilities of CT can combine together in one room, one procedure, for a positive result.”



Under fluoroscopy the drainage tube has been withdrawn such that the tip of the tube is at the site of perforation, but outside of the stomach.

“It illustrates how the live, dynamic capabilities of 2D fluoroscopy and cross-sectional or 3D capabilities of CT can combine together in one room, one procedure, for a positive result.”

“I think XperCT is going to make us think differently about how we work,” Dr. Racadio concludes. “It’s going to require imagination and creativity when it comes to how we employ it in interventional radiology.”

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