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In Boston, a 3D power user raises the bar for pediatric imaging

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If you put a leading-edge 3D visualization platform in the hands of a fearlessly tech-forward radiologist, don't be surprised if some real innovation emerges.

That's one lesson to be drawn from a recent cross-subspecialty adaptation of a Fujifilm Synapse® 3D component called Sector MPR. The component was designed to let abdominal radiologists render CT slices of structures and lesions in the abdomen to match their appearance on ultrasound displays. Sanjay Prabhu, MBBS, FRCR, discovered he could use this tool to visualize, in much the same way, the brains of babies who receive neuroimaging with CT or MRI.

Sanjay Prabhu, MBBS, FRCR

A staff neuroradiologist at Boston Children's Hospital and an assistant professor of radiology at Harvard Medical School, Dr. Prabhu is founding director of the Advanced Image Analysis Lab at Boston Children's as well as clinical director of the hospital's in-house 3D print service, offered through its Simulator Program (SIMPeds). The abdomen-to-brain innovation is only one example of how he is using Synapse 3D in ways nobody else has even thought to try. It also stands out as an especially illustrative example of the whole being greater than the sum of its parts.

"Our clinicians are all at the top of their game, so we Boston Children's radiologists have to be at the top of every game," Dr. Prabhu says, noting Boston Children's current No. 1 position in the 2017-18 rankings of Best Children's Hospitals by U.S. News & World Report. Boston Children's is also nationally ranked in numerous pediatric subspecialties. The pressure to keep up "is a challenge for all members of our radiology faculty," Dr. Prabhu adds. "Having Synapse 3D in our toolbox helps us meet the challenge of answering clinical questions for all those super-specialized pediatric clinicians treating our patients."

There are around 40 radiologists in the department at Boston Children's, and all have access to Synapse 3D and other advanced visualization tools. So do many physicians working in patient-facing departments and offices throughout the enterprise. Dr. Prabhu says the shared viewing capabilities are crucial because

Boston Children's clinicians' level of sub-specialization is on par with that seen at leading academic medical centers serving adult patient populations. For example, the orthopedics department has at least one subspecialist concentrating on the hand, the hip, the spine and so on.

"The tools that we give our radiologists vary according to the clinicians they work with, along with how we approach those workflows," Dr. Prabhu explains. "That's why we have a department-wide system that is adaptable to each of those areas. That is really important to us."

3D improves young lives

Even more impressive than Boston Children's radiology's broad adoption of high-tech image processing may be the real-life clinical cases the technology has helped solve. Dr. Prabhu describes three in which he was personally involved:

- A child with a large and complex brain tumor who'd had chemotherapy needed to be tracked to determine if the tumor was slowly growing post-treatment. Using Synapse 3D to overlay multiple images taken over a period of months, Dr. Prabhu and his colleagues proved that the tumor was indeed growing, albeit so slowly that it would have been missed in standard imaging. The overlaid serial 3D images gave physicians on the tumor board full confidence in ordering another round of chemotherapy.
- A radiologist remotely logged in to Synapse 3D to consult a surgeon on whether or not invasive surgery was needed to remove a pencil that had gone through a little girl's eye. The images showed the pencil had pierced the brain without causing significant vascular injuries, allowing the surgeon to remove the pencil without operating.
- Boston Children's runs an epilepsy service that sends many patients for dysplasia-resection surgery. Dr. Prabhu, the lead radiologist for the service, created a workflow to overlay Synapse 3D postoperative MR images over their preoperative twins. "You can clearly see the change from time point A to time point B, like watching a time-lapse video, which part of the dysplasia—or the tumor, in the case of cancer—has been removed," Prabhu says. "And that guides the decision-making on whether or not you need to do more surgery."

"When you show the 3D overlay interpretation process to a tumor board or a group at a conference, everyone is amazed how clearly you can see what's going on with the tumor or the dysplasia," Prabhu adds. "It's good to see how confident the clinicians can be with their care decisions from that point on."

An all-in Synapse shop

Boston Children's first started using Synapse 3D in 2012. The selection team's choice of this 3D solution over others on the market owed largely to the satisfaction of the radiology department with Synapse PACS, which had been initially installed back in 2003.

"The key things we were looking for in a 3D solution were speed, access and accuracy," Dr. Prabhu recalls. "Most software tools for advanced visualization will meet the requirement we have for accuracy. They are all pretty much the same. But the key is ease of access: Can you quickly launch it from your PACS? Can users access it across the enterprise? And does it keep your costs down?"

Once Boston Children's confirmed that the answers to each of those questions was "yes," Synapse 3D never had any serious competition, Dr. Prabhu suggests.