TOSHIBA

Texas Children's Hospital Successfully Completes First-of-its-Kind Conjoined Twin Separation with Help from Toshiba's Aquilion ONE

Situation: Texas Children's Hospital delivered Knatalye Hope and Adeline Faith Mata, conjoined twin girls who shared a chest wall, lungs, pericardial sac, diaphragm, liver, intestines, colon and pelvis, in April 2014. The hospital was facing one of the most challenging clinical situations in attempting to separate the Mata twins through a rare, uncertain and highly complex procedure never done before. To make the complex surgery possible, the hospital needed the ability to visualize their anatomy accurately in order to determine the feasibility of separating the twins and guide the surgeons during the procedure.

Solution: A multidisciplinary team at Texas Children's Hospital undertook months of intensive planning that included imaging with Toshiba's Aquilion™ ONE CT system. The system played a crucial role in visualizing the unique complexities and challenging anatomy by producing images that helped radiologists build detailed 3D models of the organs. After a 26-hour surgery, Texas Children's

Hospital successfully separated the Mata twins in late February 2015, completing one of the most difficult conjoined twin separations ever.

Benefits: The Aquilion ONE puts customers first with a large coverage area, quick speed and unique scan modes that assisted in the intensive surgical planning of the conjoined twin separation:

- **Dynamic volume imaging** can capture both anatomy and function
- **Large coverage area** with a single 640-slice rotation that can cover up to 16 cm
- **Fast acquisition speed** to image the anatomy with less motion artifacts, despite variable breathing and heart rates
- **Low radiation exposure** with a complete suite of dose reduction technology

Knatalye Hope and Adeline Faith Mata were conjoined twins born with shared anatomy from the neck down to the waist. Conjoined twins with this significant sharing of anatomy had never been successfully separated. However, Texas Children's Hospital in Houston, one of the largest pediatric health systems in the United States, took extraordinary measures to identify the right approach and technology to successfully conduct a very uncertain and highly complex procedure.

Visualizing a Miracle
The Mata twins' shared a chest wall, lungs, pericardial sac, diaphragm, liver, intestines, colon and pelvis. A multidisciplinary team conducted intensive planning, including the use of Toshiba's 640-slice Aquilion™ ONE CT system. The Aquilion ONE and its volume imaging capability captured the entire cardiovascular and visceral anatomy to assess how the twin's organs were shared and produced images that helped radiologists build detailed 3D models of the organs.
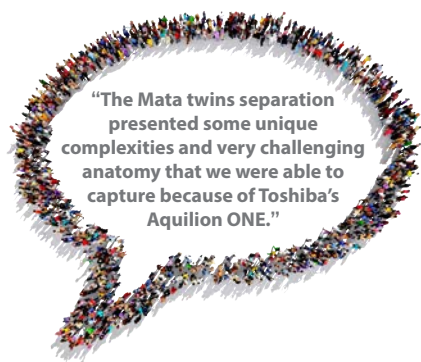
Texas Children's Hospital®

"The Mata twins separation presented some unique complexities and very challenging anatomy that we were able to capture because of Toshiba's Aquilion ONE."

— *Dr. Rajesh Krishnamurthy, section chief of radiology research and cardiac imaging at Texas Children's Hospital.*

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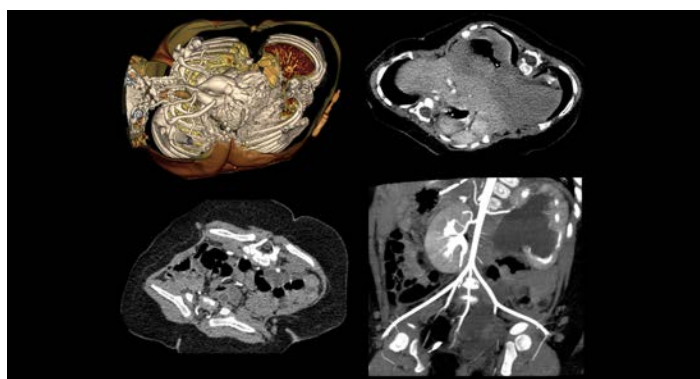
Chest, abdomen and pelvic CT angiography acquired on Aquilion ONE volumetric CT system
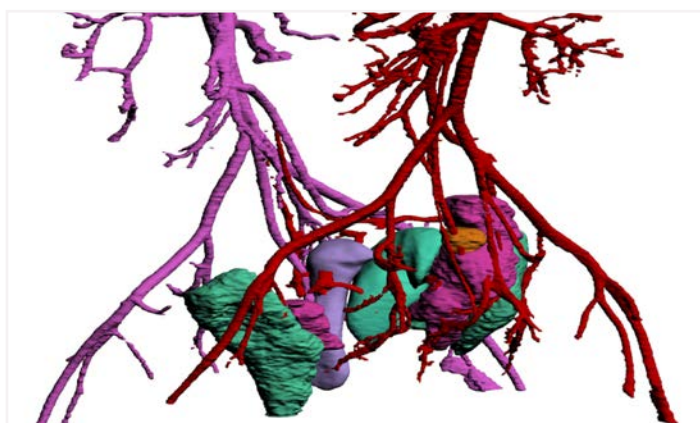
Multiplanar reconstruction and 3D images provided information for creating a vasculature model and surgical planning

The system's target CTA cardiac mode, which gives users control of when to trigger the X-ray, enabled Texas Children's to image the twins without the need for sedation, decreased artifacts and reduced radiation exposure. Additionally, the Aquilion ONE's ultrafast acquisition speed allowed the clinicians to image the anatomy with less motion artifact, despite variable breathing and heart rates.

"We used a target mode prospective EKG gated volumetric acquisition, using all 320 detector rows to elucidate the cardiovascular and coronary anatomy, and helical imaging with sequential and separate contrast injections into each twin to delineate the visceral anatomy and status of the abdominal and pelvic vasculature. A composite dataset was created by fusing information from all three acquisitions, which was used for segmentation of the organs and vasculature, 3D modeling and 3D printing," said Dr. Krishnamurthy.

Marathon Surgery Made Possible

Texas Children's Hospital successfully separated the Mata twins after a 26-hour surgery in late February 2015. A team of more than 26 clinicians including 12 surgeons, six anesthesiologists and eight surgical nurses, among others, worked together to complete one of the most challenging conjoined twin separations ever.

Texas Children's Hospital pediatric plastic surgeon Dr. Edward Buchanan and Dr. Oluyinka Olutoye embrace the family after successful separation surgery

Toshiba gives you a voice. What's yours?

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