

**Canon**



CT Clinical Brochure

***Aquilion ONE***

*Series*

Trauma and Acute Care  
with Area Detector CT



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### Reference for Radiation Dose Calculation

Calculation of the effective doses in this brochure is based on the conversion coefficients for patients given in the following publication:

American Association of Physicists in Medicine (AAPM) Report 96. "The Measurement, Reporting, and Management of Radiation Dose in CT." Report of AAPM Task Group 23 of the Diagnostic Imaging Council CT Committee. January 2008.

*“Our Aquilion ONE is the primary CT for our emergency care patients, as such, this system is available for 24 hours per day. During a high pressure trauma situation in the middle of the night, even our most junior CT technologists are able to easily position and scan patients with excellent results.”*



**Matthew Benbow**  
CT team leader,  
Royal Bournemouth Hospital,  
United Kingdom

*“In our Emergency department, we have an Aquilion ONE CT with direct access to the trauma evaluation and treatment room, providing a dedicated state-of-the-art facility. The speed of scanning and instantaneous reconstruction with InstaView technology on the Aquilion ONE ensure fast patient diagnosis.”*



**Willem Jan van der Woude**  
CT specialist radiographer,  
Radboud University Medical Center, Nijmegen,  
the Netherlands

*“The Aquilion ONE has made a huge impact upon our acute stroke and TIA\* imaging program. The ability to acquire whole brain perfusion has led to detection of both posterior fossa and high cortical infarcts in patients that would have been missed without whole brain coverage. This is the most advanced CT scanner available for stroke imaging.”*



**Mark Parsons**  
Professor,  
John Hunter Hospital,  
Australia

## Introduction

Emergency CT examinations are usually performed in the presence of the acute care team, whose entire focus is ensuring that the patient remains stable while obtaining a rapid diagnosis. This situation produces a high-pressure environment, particularly for the CT technologist, so the ease of use of the CT system, together with robust protocols, can greatly reduce anxiety in an effort to reduce the time to diagnosis and improving the patient's prognostic outcome.

### Aquilion ONE

Aquilion ONE technology is able to meet all the unique needs surrounding the diagnosis and care of emergency patients. As the world's first dynamic volume CT system, the Aquilion ONE is able to perform volumetric scans with 320 × 0.5 mm detector collimation in just one rotation with scan times as fast as 0.275 seconds. In addition, Ultra-Helical acquisition provides whole-body imaging with InstaView realtime image reconstruction, enabling rapid decision making for the acute care team.

### Ergonomics

The challenge in designing a volumetric CT system is to open up the tunnel that interferes with patient access. The Aquilion ONE features a wide 78 cm bore with a unique flared design that permits fast access to the patient from either side of the gantry. Coupled with a wide patient couch, a 2 meter scan range, and a 300 kg / 694 lbs weight capacity, the industrial design features of the Aquilion ONE set it apart from the competition. Many emergency departments enjoy the optional couch feature enabling lateral table movement. This feature makes positioning of trauma patients easy for the CT operator.

### The User Experience

The Aquilion ONE software streamlines workflow with protocol-driven automation. The entire trauma examination can be performed in a single easy-to-use protocol, which is preprogrammed with all reconstructions, eliminating the need for operator interaction. The operator simply plans the areas of interest and acquires the scan. Multiplanar images are automatically generated by hybrid soft tissue and lung reconstruction and bone kernels as required. In addition, these images are automatically distributed over the hospital enterprise, ensuring that the multidisciplinary team has instant access to vital, life-saving information.

\*Transient Ischaemic Attack



### Aquilion ONE—Transforming Your Emergency Department CT Solution

Emergency scanning often involves unforeseeable situations. With a wide range of dedicated tools in both software and CT design, the Aquilion ONE is always prepared to adapt to your needs in emergency scanning.

### Designed for rapid emergency assessment

#### Patient setup

- ▶ Easy access with a 78 cm flared gantry
- ▶ Reduced dose with 30 degree gantry tilt
- ▶ Easy patient positioning on the widest table with lateral table movement

#### Scanning

- ▶ Reduced motion with Ultra-Helical and Volume acquisitions
- ▶ Total-body scanning with a scan range of up to 2 meters
- ▶ Rapid scanning with fast trauma protocols and integrated AIDR\* 3D Enhanced reconstruction
- ▶ No scanogram needed with Area Finder and in-room scan control

#### Image review

- ▶ Instant access to images with InstaView
- ▶ MPR reformats readily available with automatic reconstructions
- ▶ Immediate review of lung and soft tissues with Hybrid FC kernels
- ▶ SEMAR—Single Energy Metal Artifact Reduction

\*Adaptive Iterative Dose Reduction

## Default Trauma Protocols

Trauma and Acute Care

Aquilion ONE CT systems have been installed at leading trauma centers worldwide. Through collaboration with our clinical partners, we have developed trauma protocols that are included as standard, ensuring that world-leading expertise is built into every Aquilion ONE.

These trauma protocols are easy to use and provide robust and rapid results, intended to reduce time in diagnostic decision making.

Abdominal protocols leverage the “Split Bolus” contrast infusion regime, allowing simultaneous arterial- and venous-phase abdominal images to be acquired in a single scan, which can help reduce the time to diagnosis and overall radiation dose.



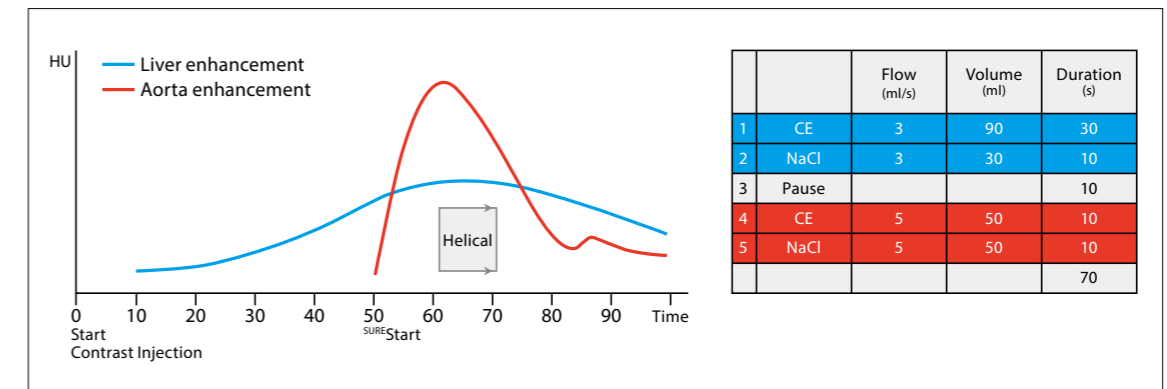
Dedicated trauma protocols are easily accessible in the Trauma tab.

## Split Bolus Contrast Injection

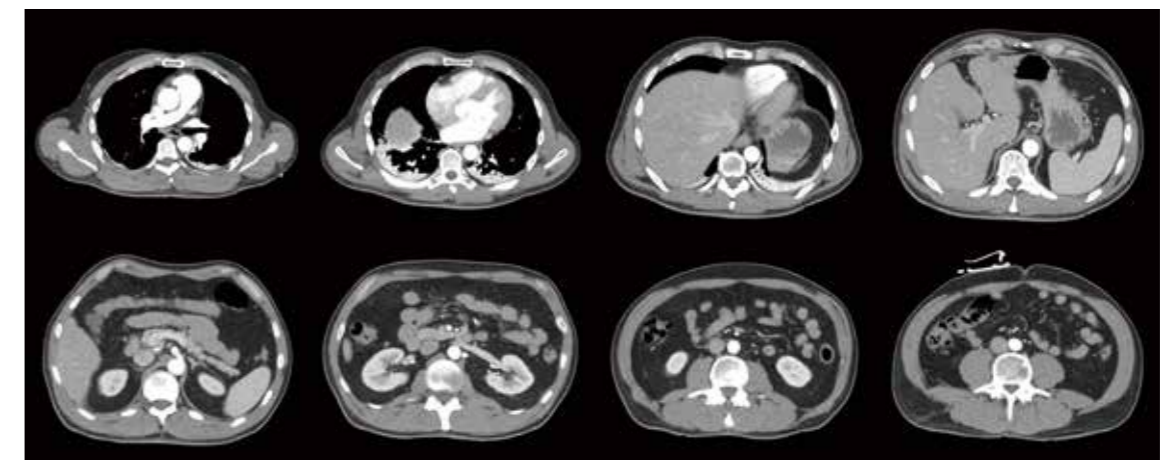
Arterial and venous phases in one helical scan

Benefits of the Split Bolus contrast infusion regime in emergency CT:

1. Single-phase imaging, fewer images to review for better workflow
2. Lower radiation dose, especially important for the relatively young trauma patient population
3. Improve detection of contrast extravasation in patients with internal hemorrhage
4. Easily applicable to a wide range of patients



The Split Bolus injection contrast volume can be adjusted depending on the weight and age of the patient. The first phase will contribute to portal venous enhancement, while the second phase (after a pause) provides pure arterial enhancement. By using <sup>SURE</sup>Start automatic bolus triggering, accurate timing is assured for every patient.



Example of the Split Bolus contrast infusion regime demonstrating simultaneous arterial and portal venous enhancement.

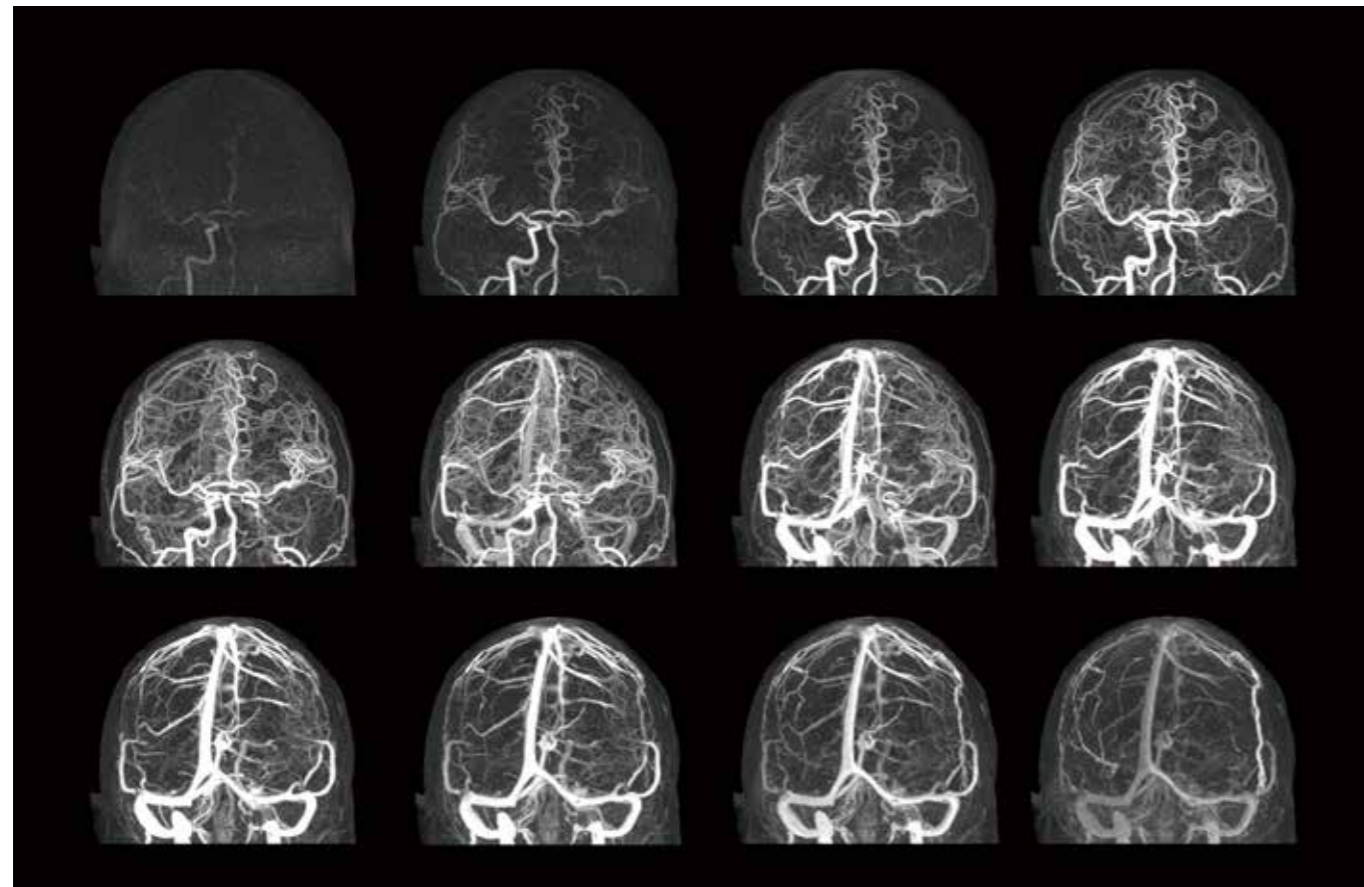
*Images courtesy of Radboud University Medical Center, the Netherlands.*

# Acute Whole-Brain Perfusion

## Patient History

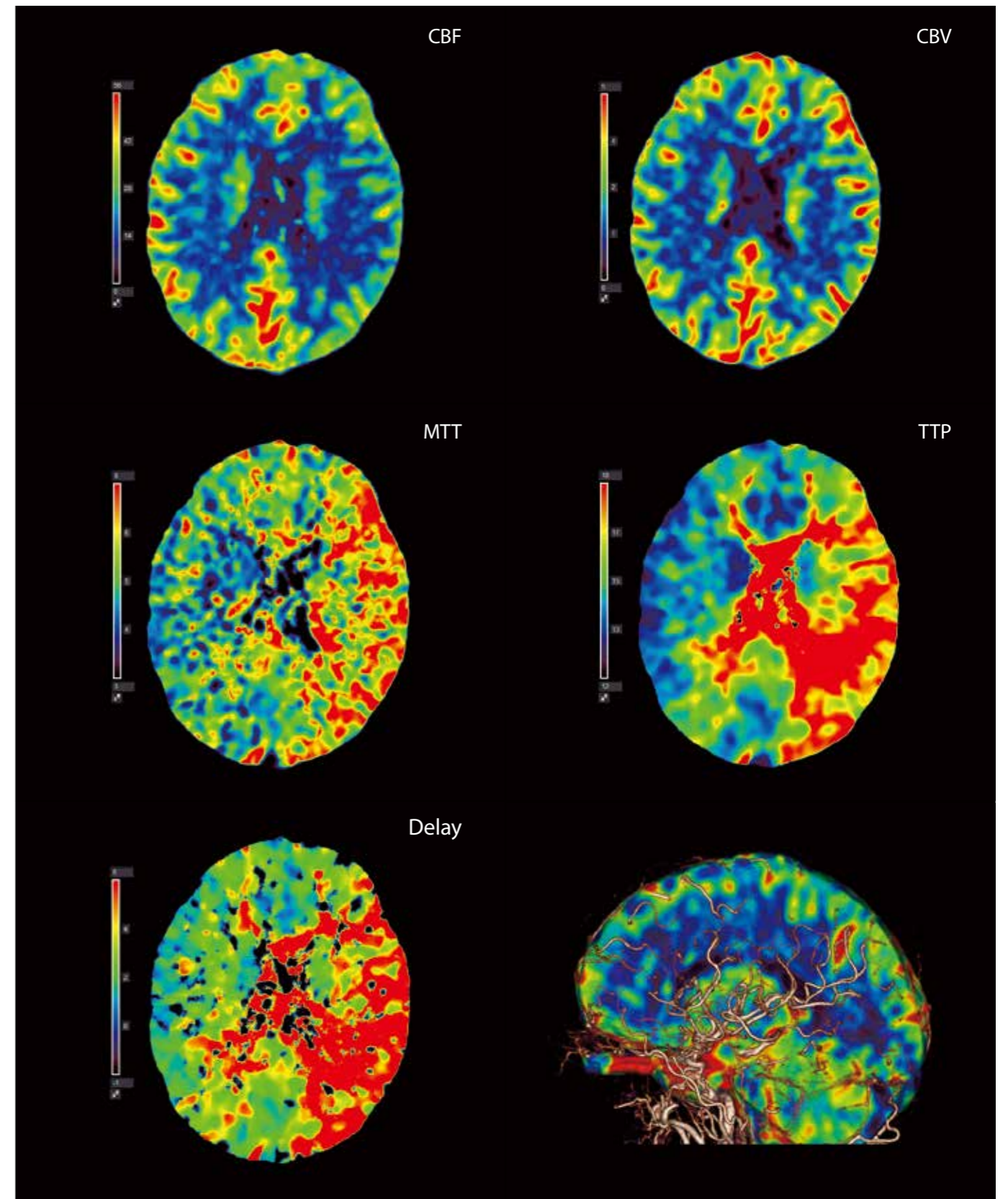
This 72-year-old man presented with symptoms associated with an acute cerebrovascular accident. A CT Perfusion scan was requested to evaluate blood flow to the brain.

Scan Mode	Contrast	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
Dynamic Volume	CE	0.5 mm x 320	n/a	80	Variable	0.75	160	AIDR 3D Standard	209.4	2932.5	6.1	0.0021



## Findings

There is an occlusion of the left internal carotid artery resulting in delayed blood flow to the left hemisphere via a patent circle of Willis. No significant infarct core was identified on the perfusion maps, TPA was therefore administered immediately. Aquilion ONE whole-brain perfusion provides a one stop shop for the diagnosis of acute stroke with perfusion and DSA in one examination.

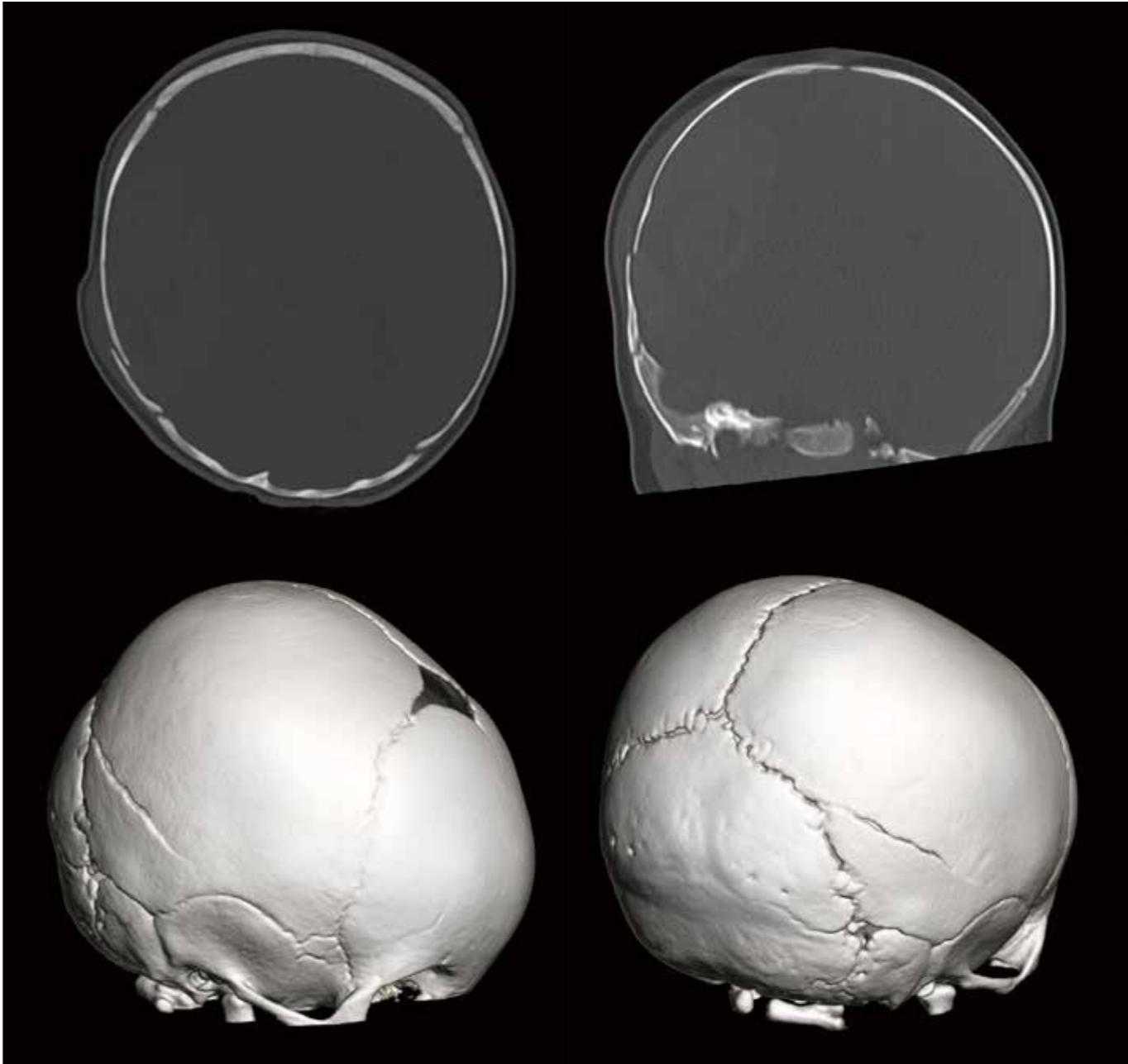
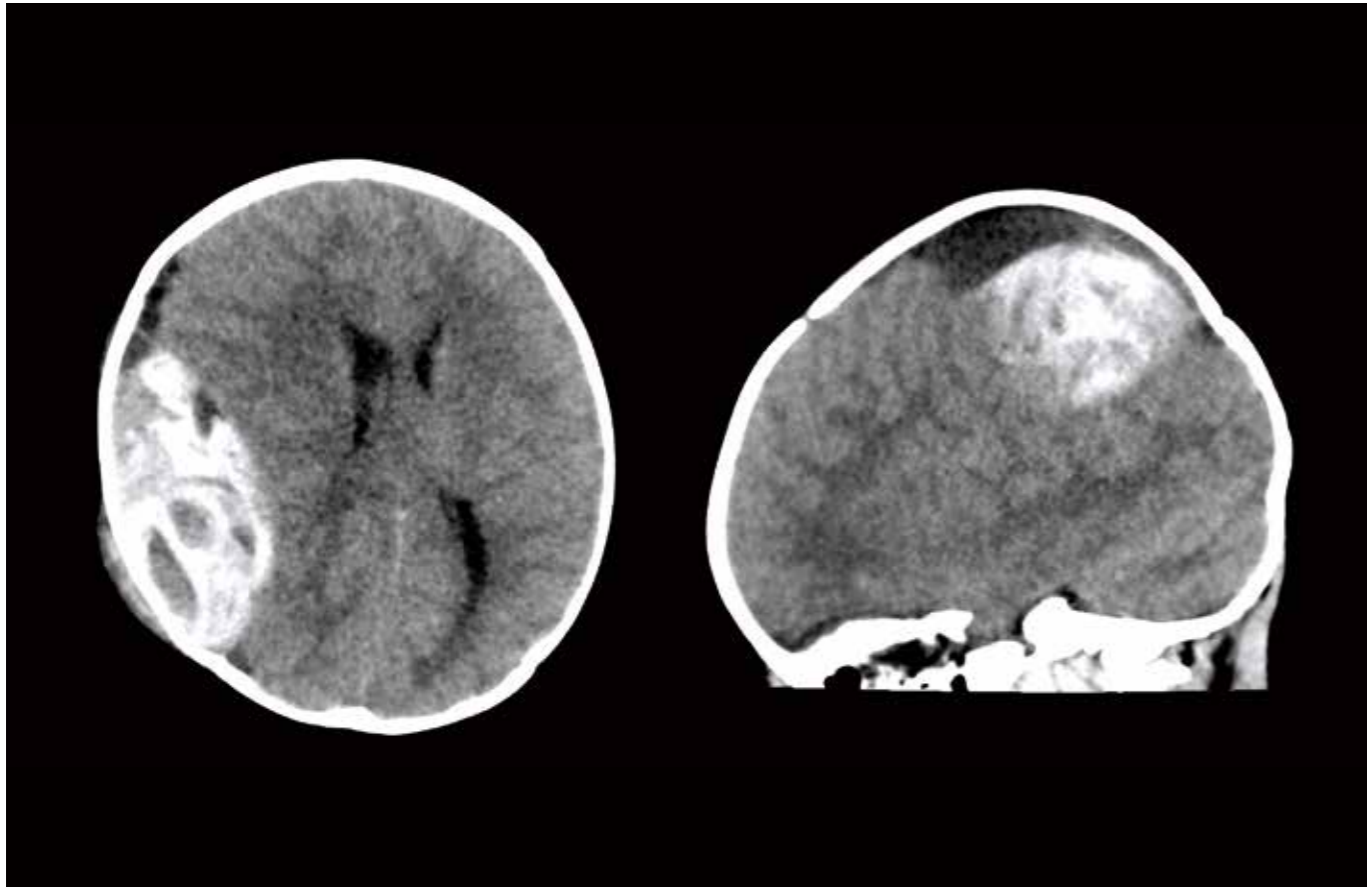


# ONE Volume Pediatric Brain Scan

**Patient History**

This 6-month-old baby presented with loss of consciousness following a fall. A CT scan of the head was performed using a single volumetric acquisition.

Scan Mode	Contrast	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
Volume	-	0.5 mm x 320	-	80	SURE Exposure 3D	0.75	160	AIDR 3D Standard	29.0	348.1	3.8	0.011



**Findings**

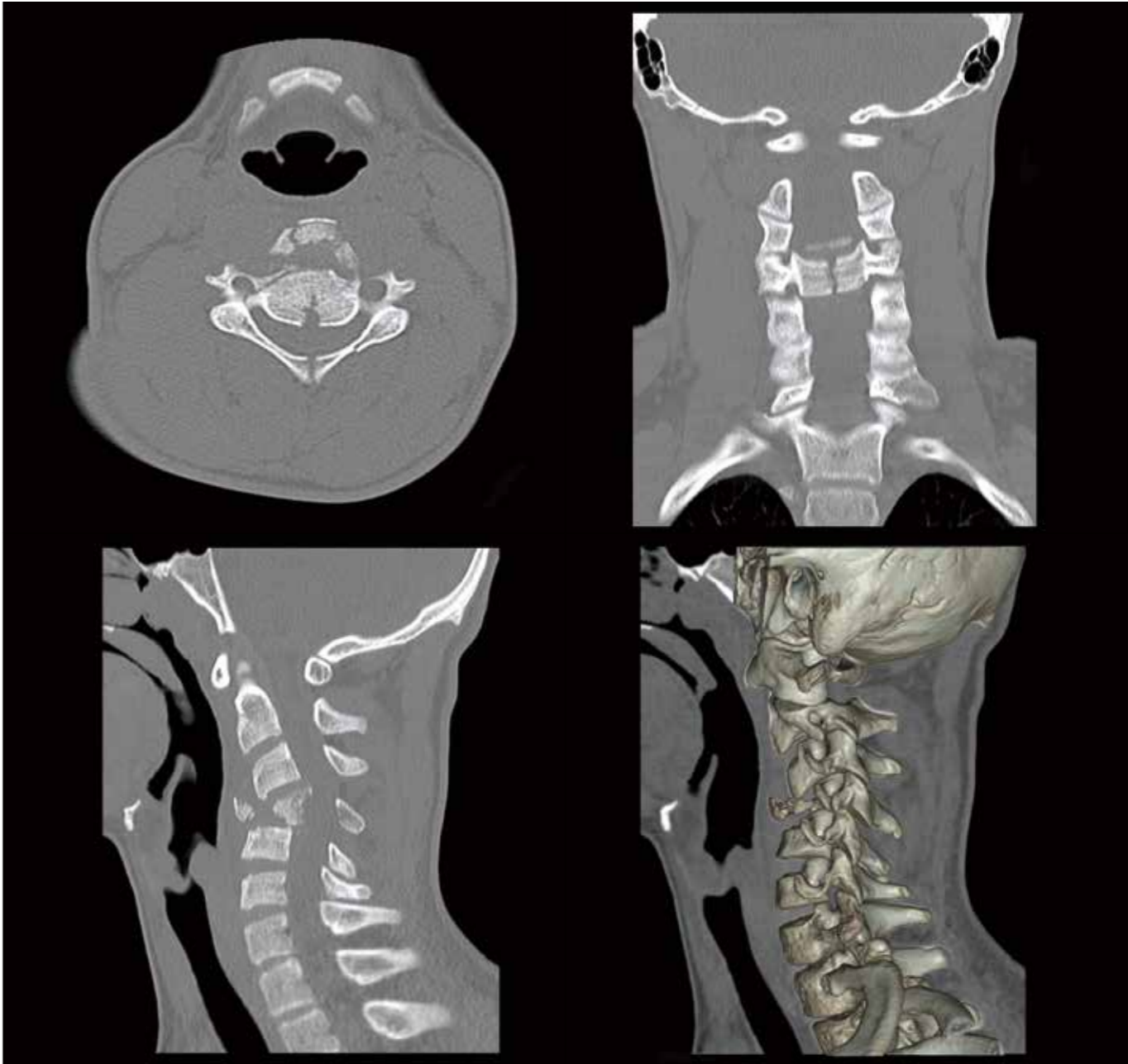
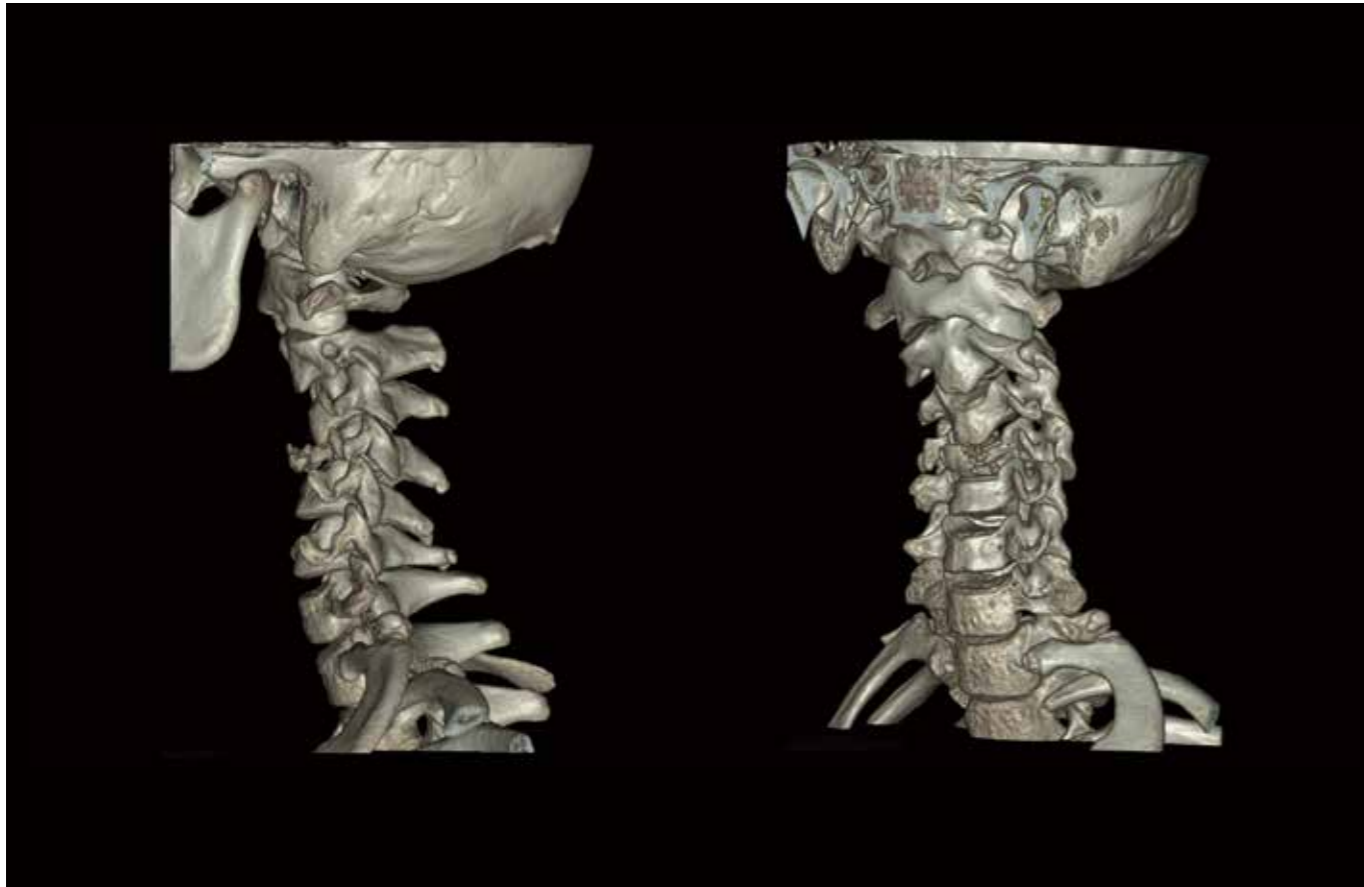
There is a fracture of the right parietal bone with an associated subdural hematoma and midline shift. With the Aquilion ONE, the whole brain can be imaged in a single rotation without table movement. The entire scan can be performed in a fraction of a second, all the time needed for motion-free imaging, and therefore can help minimize the use of sedation.

# Cervical Spine Fracture

**Patient History**

This 14-year-old boy was involved in a motor vehicle accident. He arrived at the emergency department by helicopter. There was a strong suspicion of a cervical spine fracture, and a CT scan was requested.

Scan Mode	Contrast	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
Ultra Helical	-	0.5 mm x 80	Detail	120	SURE Exposure 3D	0.5	192	AIDR 3D Standard	12.2	287.4	1.7	0.0059



**Findings**

A complex fracture of the 4th cervical vertebra is demonstrated. The vertebral body, right transverse process, right pedicle, left lamina, and spinous process are all fractured. The spinal canal is distorted, but not narrowed.

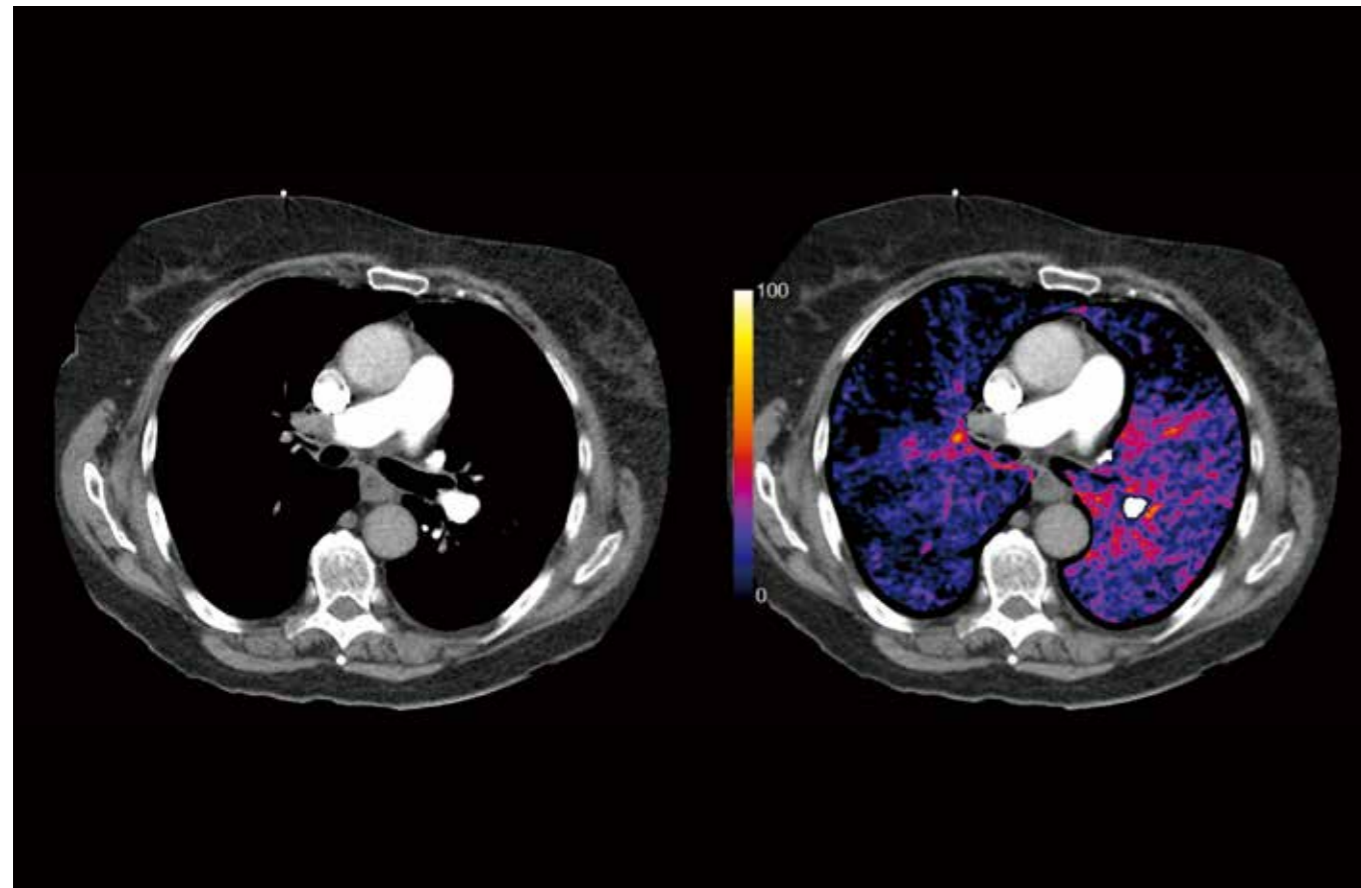


# SURE Subtraction Lung

## Patient History

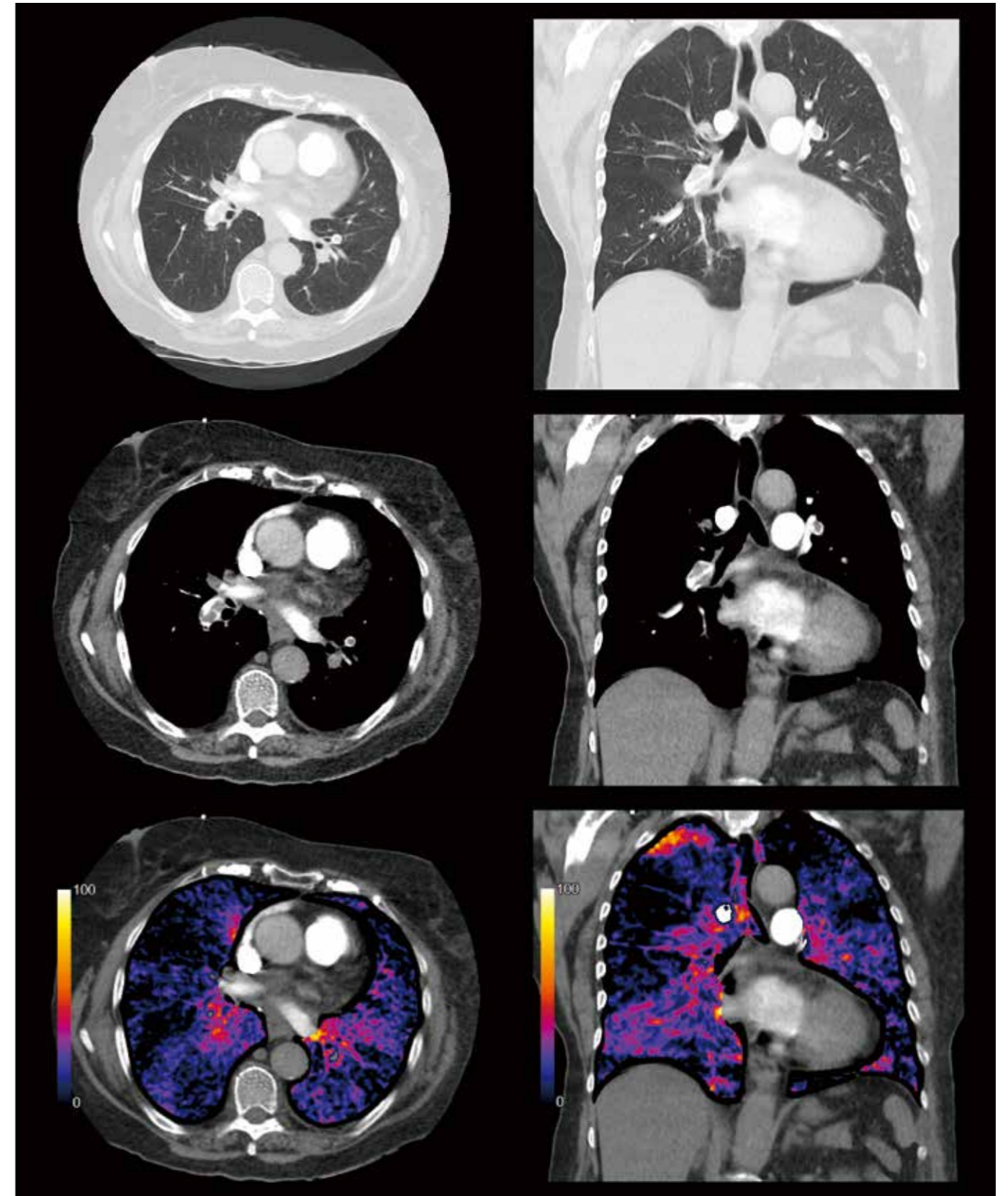
This 85-year-old woman with known venous thrombosis presented with acute shortness of breath. Pulmonary CTA of the chest with SURE Subtraction was requested to investigate suspected pulmonary emboli.

Scan Mode	Contrast	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy·cm)	Effective Dose (mSv)	k
Ultra Helical	-	0.5 mm x 80	Standard	100	SURE Exposure 3D	0.275	300	AIDR 3D Enhanced	1.8	61.6	0.8	0.014
Ultra Helical	CE	0.5 mm x 80	Standard	100	SURE Exposure 3D	0.275	300	AIDR 3D Enhanced	3.7	126.7	1.7	0.014



## Findings

Extensive pulmonary emboli are seen bilaterally, with associated wedge-shaped perfusion defects as shown in the iodine maps.

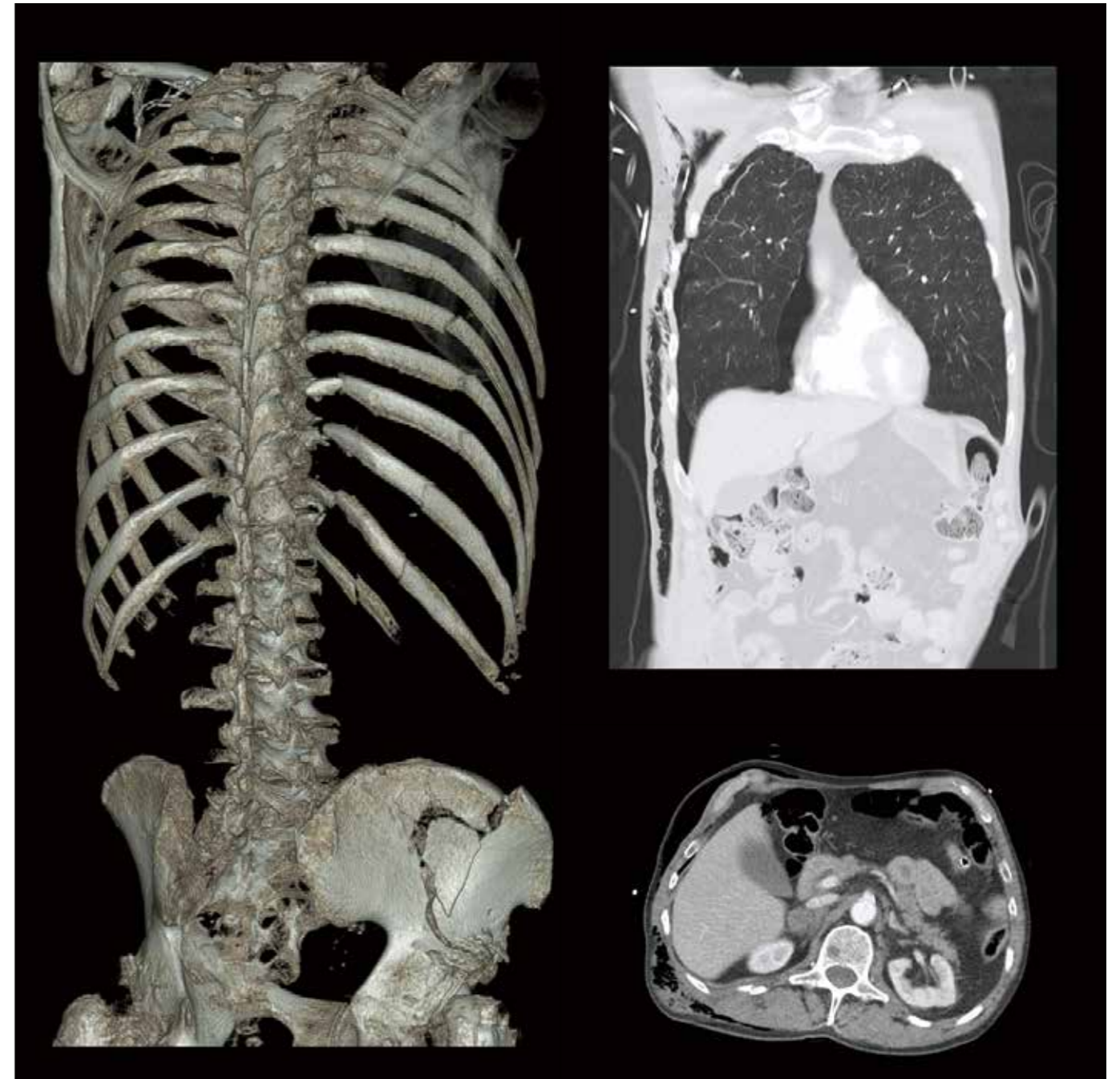


# Split Bolus Trauma Scan

## Patient History

This 75-year-old man presented to the emergency department after being involved in a motor vehicle accident. A CT scan of the chest, abdomen, and pelvis was requested to evaluate the extent of his injuries. The Split Bolus contrast infusion regime was used to visualize the arterial and venous phases in one scan, reducing the scan time and radiation dose.

Scan Mode	Contrast	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
Ultra Helical	Split Bolus	0.5 mm x 80	Standard	135	SURE Exposure 3D	0.275	700	AIDR 3D Enhanced	6.6	496.0	7.1	0.0145



## Findings

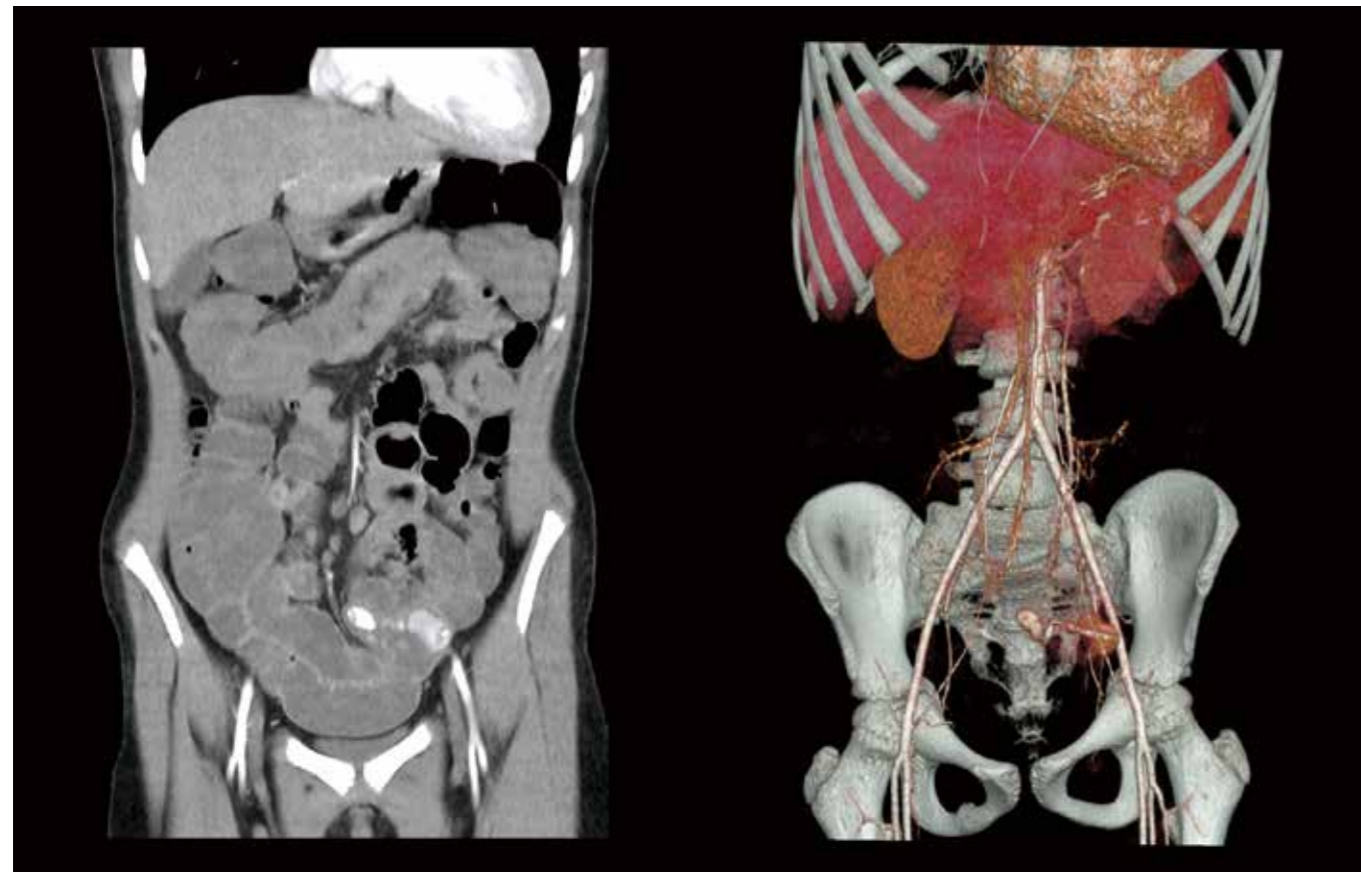
Extensive injuries are seen on the patient's entire right side. In the chest, multiple rib fractures are seen, with associated pneumothorax and subcutaneous emphysema. The abdominal organs and bilateral hip prostheses are normal, while fracture of the iliac bone is demonstrated in the pelvis.

# Acute Bowel Bleeding

## Patient History

This 13-year-old girl presented with abdominal pain. She had Hereditary Hemorrhagic Telangiectasia (HHT), also known as Osler–Weber–Rendu disease, which raised the suspicion of active abdominal bleeding. A CT scan of the abdomen in the arterial and late phases was requested.

Scan Mode	Contrast	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy·cm)	Effective Dose (mSv)	k
Ultra Helical	CE	0.5 mm × 80	Standard	100	SURE Exposure 3D	0.5	392	AIDR 3D Enhanced	2.5	110.6	1.6	0.015
Ultra Helical	CE	0.5 mm × 80	Standard	100	SURE Exposure 3D	0.5	192	AIDR 3D Enhanced	2.5	60.3	0.9	0.015



CE arterial phase  
20 s delay

CE late phase  
3 min delay



## Findings

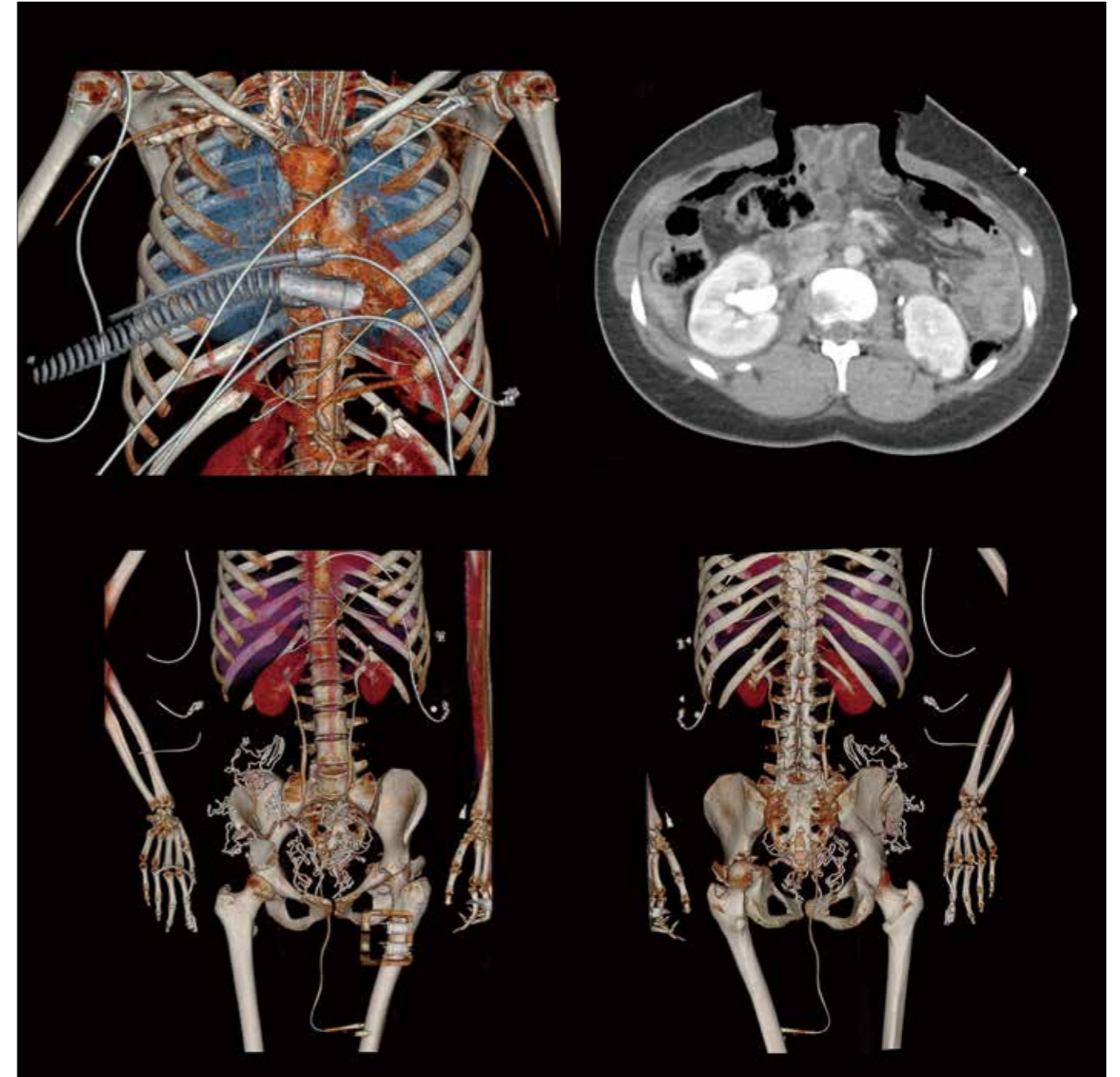
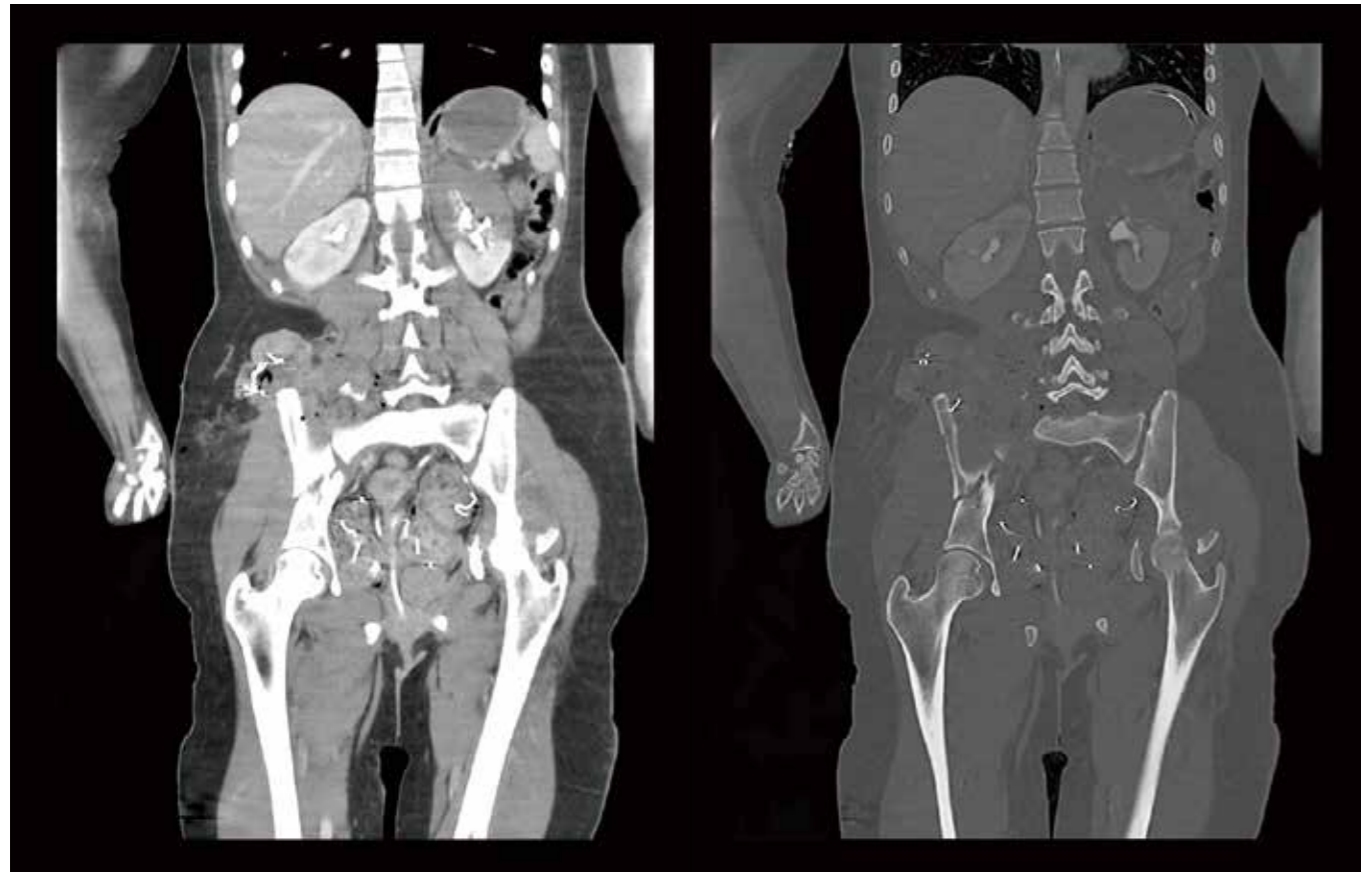
In the arterial phase, a contrast blush is seen in the distal ileum. In the delayed phase, the contrast blush has extended to include more of the bowel loops anterior to the bladder. These findings are consistent with active bleeding in the ileum, a known complication of Osler–Weber–Rendu disease.

# Motor Vehicle Accident

## Patient History

This 23-year-old woman was a pedestrian involved in a motor vehicle accident. A chest, abdomen, and pelvis scan was performed to assess the extent of her injuries. The patient was not able to position her arms above her head.

Scan Mode	Contrast	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy·cm)	Effective Dose (mSv)	k
Ultra Helical	CE	0.5 mm x 80	Standard	120	SURE Exposure 3D	0.5	304	AIDR 3D Standard	8.1	286.1	4.0	0.014
Ultra Helical	CE	0.5 mm x 80	Standard	120	SURE Exposure 3D	0.5	639	AIDR 3D Standard	8.6	592.5	8.8	0.015



## Findings

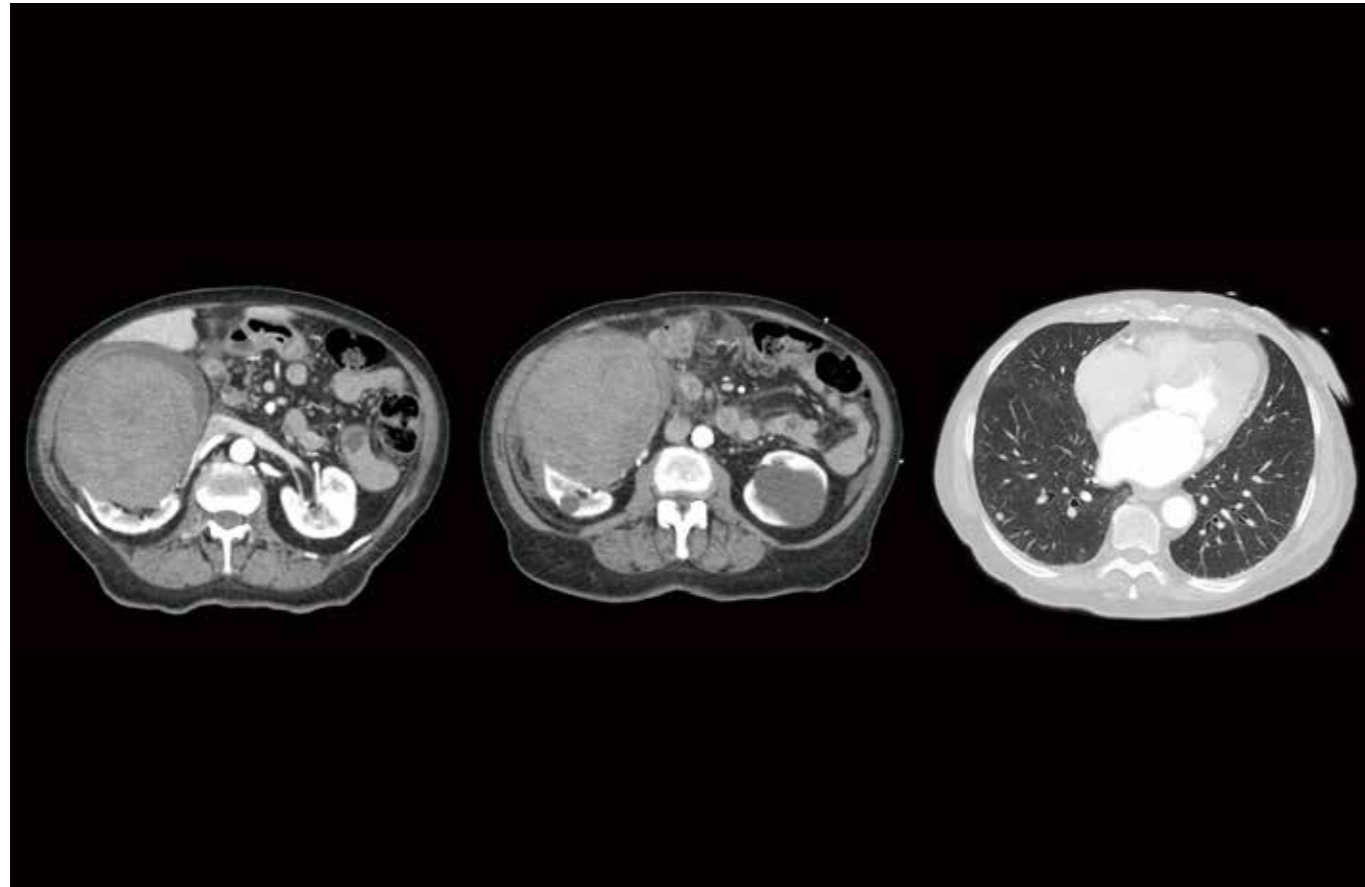
The cranial portion of the left kidney is unopacified, indicating renal infarction. There are extensive pelvic fractures involving the ilium, superior pubic ramus, and acetabulum, with dislocation of the hip and diastasis of the left sacroiliac joint. The abdomen had a surgical incision in the midline. On the right side, extensive packing material is seen throughout the pelvis. Excellent image quality was obtained despite the fact that both arms were placed next to the body.

# Hemorrhagic Mass

## Patient History

This 81-year-old woman fell on her right side 2 weeks previously. The patient felt unwell, with pain in the right abdomen. As she was on warfarin, there was a suspicion of abdominal bleeding. A CT scan of the chest, abdomen, and pelvis was requested for further investigation.

Scan Mode	Contrast	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
Ultra Helical	CE	0.5 mm x 80	Standard	120	SURE Exposure 3D	0.35	605	AIDR 3D Standard	9.5	636.9	9.2	0.0145



## Findings

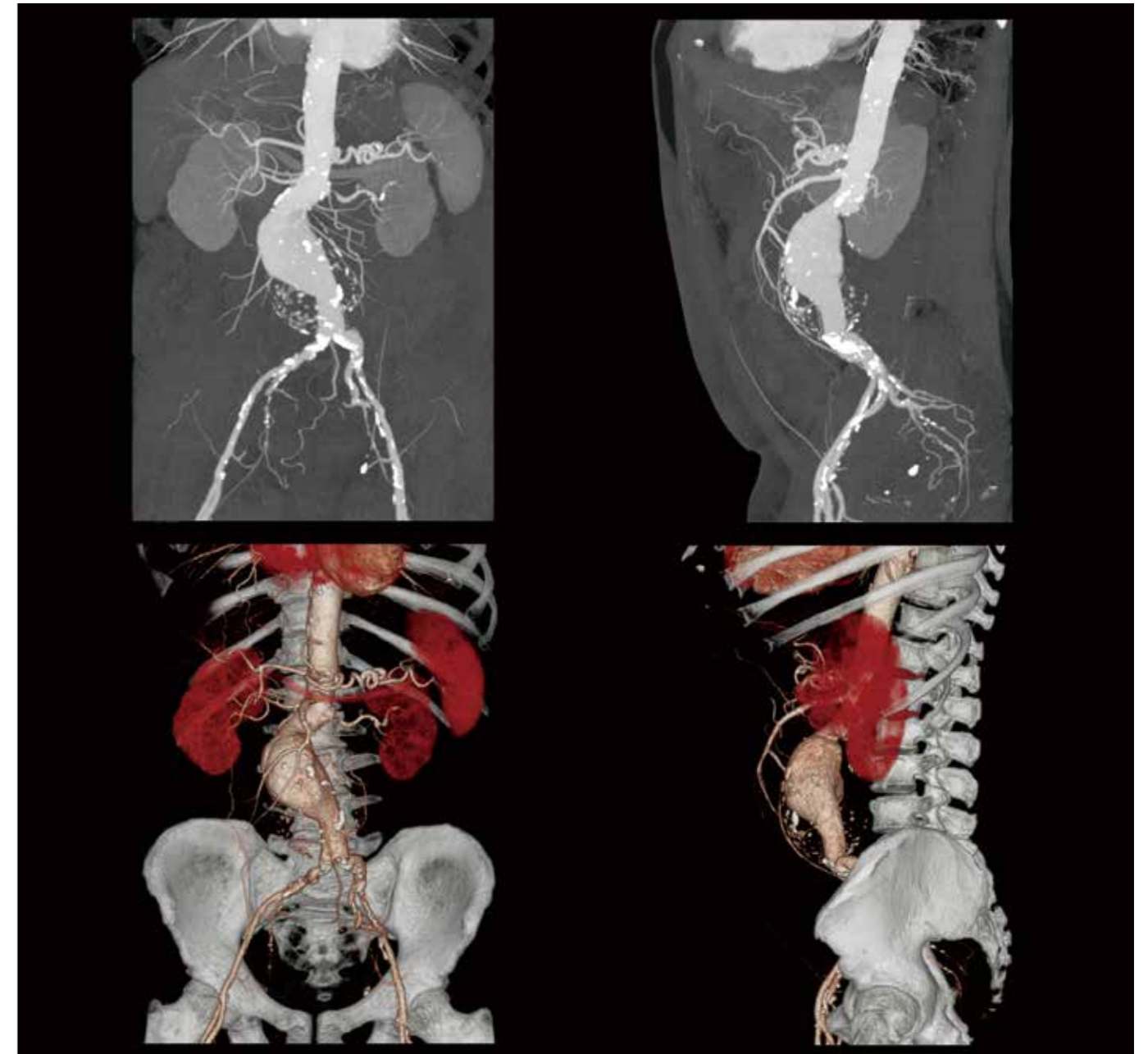
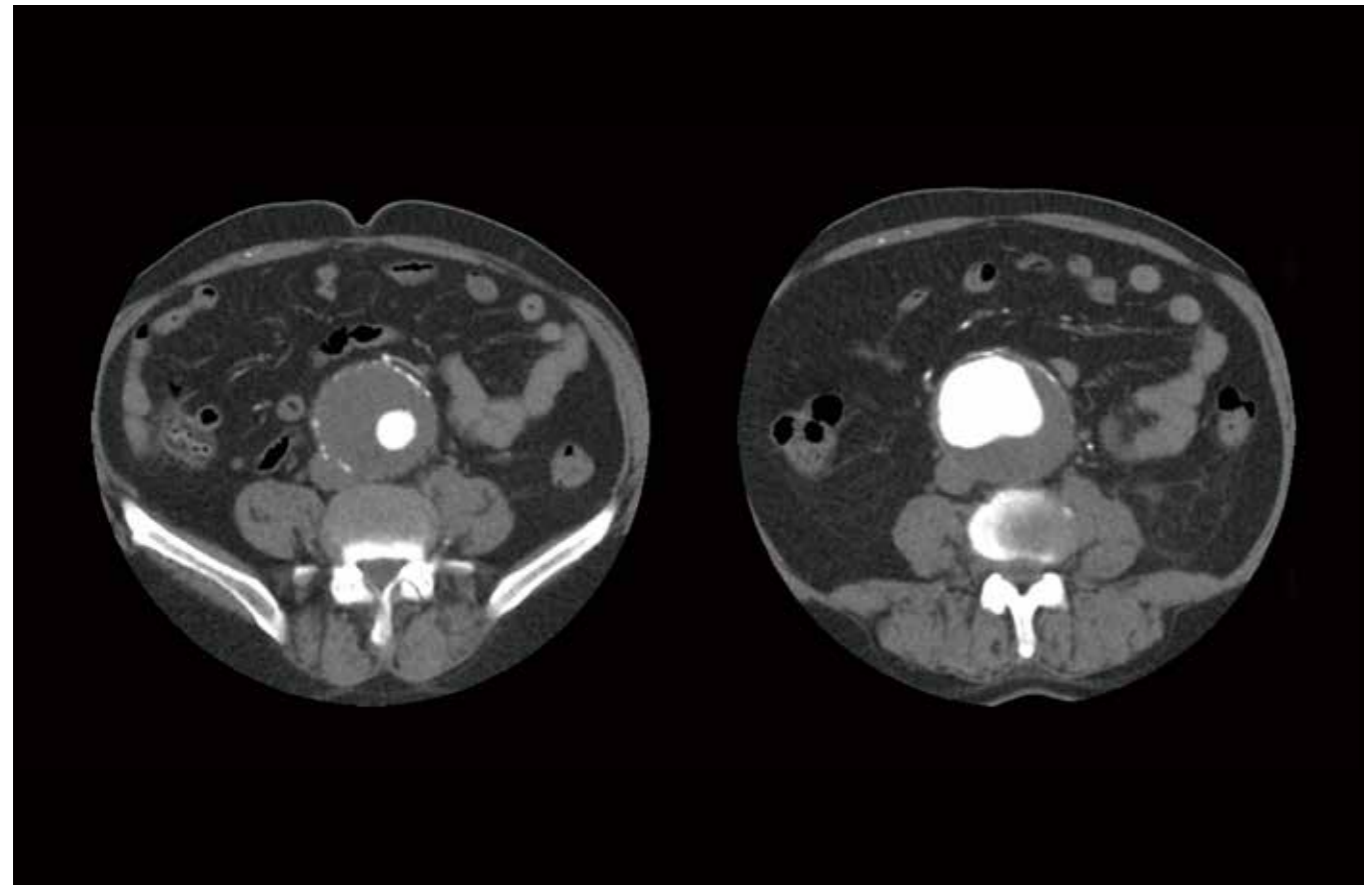
A large hemorrhagic mass is seen in the upper right kidney. The mass has smooth walls, suggesting that it is benign; however, pulmonary nodules are seen in the lungs, suggesting possible malignancy.

# Abdominal Aortic Aneurysm

## Patient History

This 68-year-old man presented with abdominal pain, hypotension, and a pulsatile mass in the abdomen. A CT angiogram of the abdomen was requested.

Scan Mode	Contrast	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy·cm)	Effective Dose (mSv)	k
Ultra Helical	CE	0.5 mm x 80	Standard	100	SURE Exposure 3D	0.5	398	AIDR 3D Standard	6.6	292	4.3	0.015



## Findings

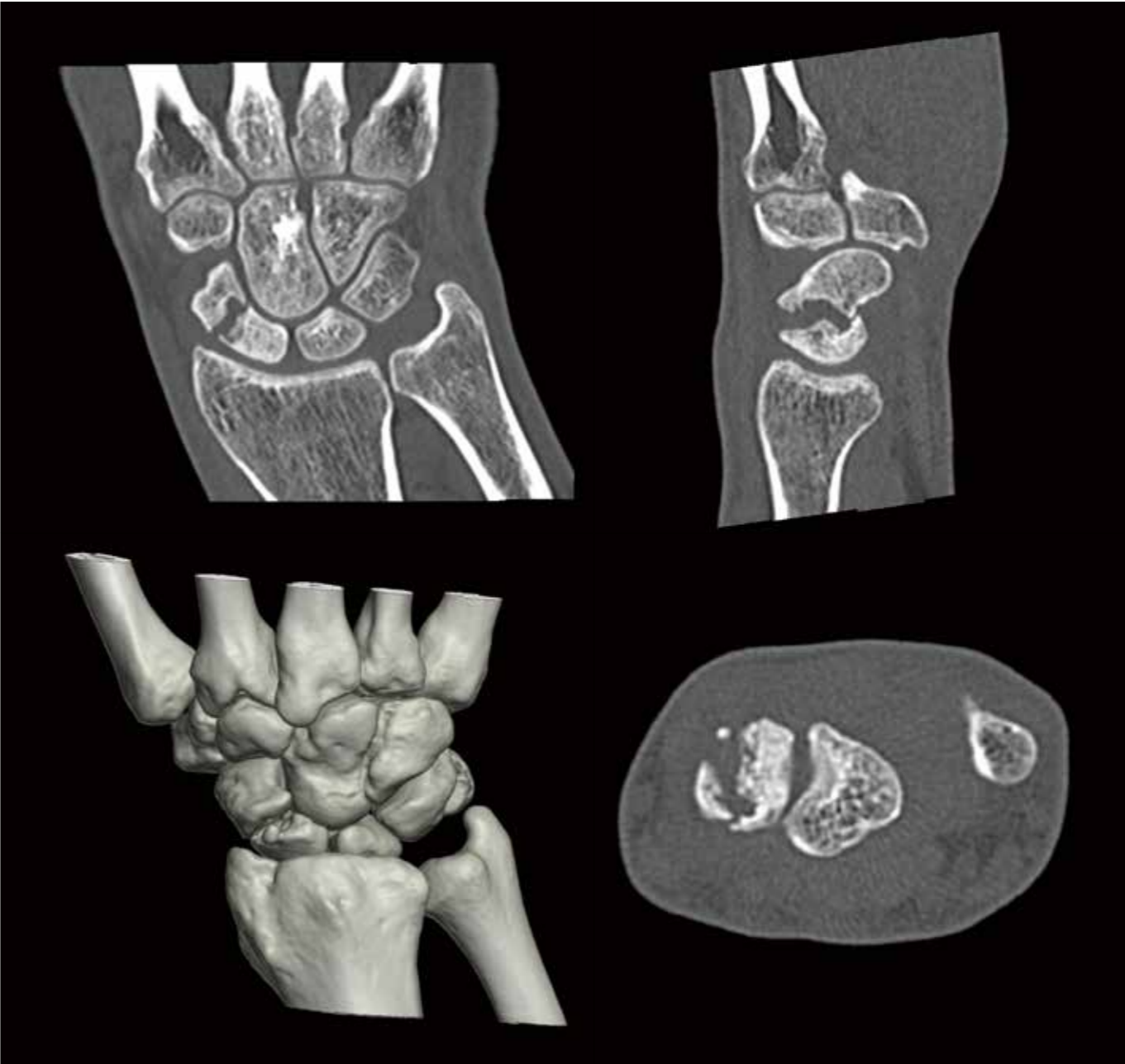
A fusiform aneurysm is seen in the infrarenal aorta. Thrombus is present within the aneurysm, but there is no contrast extravasation to indicate active rupture. A severe stenosis is seen at the origin of the left renal artery.

# ONE Volume Wrist

### Patient History

This 26-year-old man presented with pain in the anatomical snuffbox following a fall onto his outstretched hand. The Aquilion ONE / GENESIS Edition is equipped with a laser collimator\* that permits volumetric scans to be performed as quickly and easily as a conventional X-ray study, without the need for a localizing scanogram. The patient can be comfortably seated at the rear of the gantry.

Scan Mode	Contrast	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
Volume	-	0.5 mm x 160	-	100	SURE Exposure 3D	0.5	80	AIDR 3D Standard	2.6	20.6	0.01	0.0008



### Findings

A fracture of the scaphoid is seen, with separation of the fracture fragments.

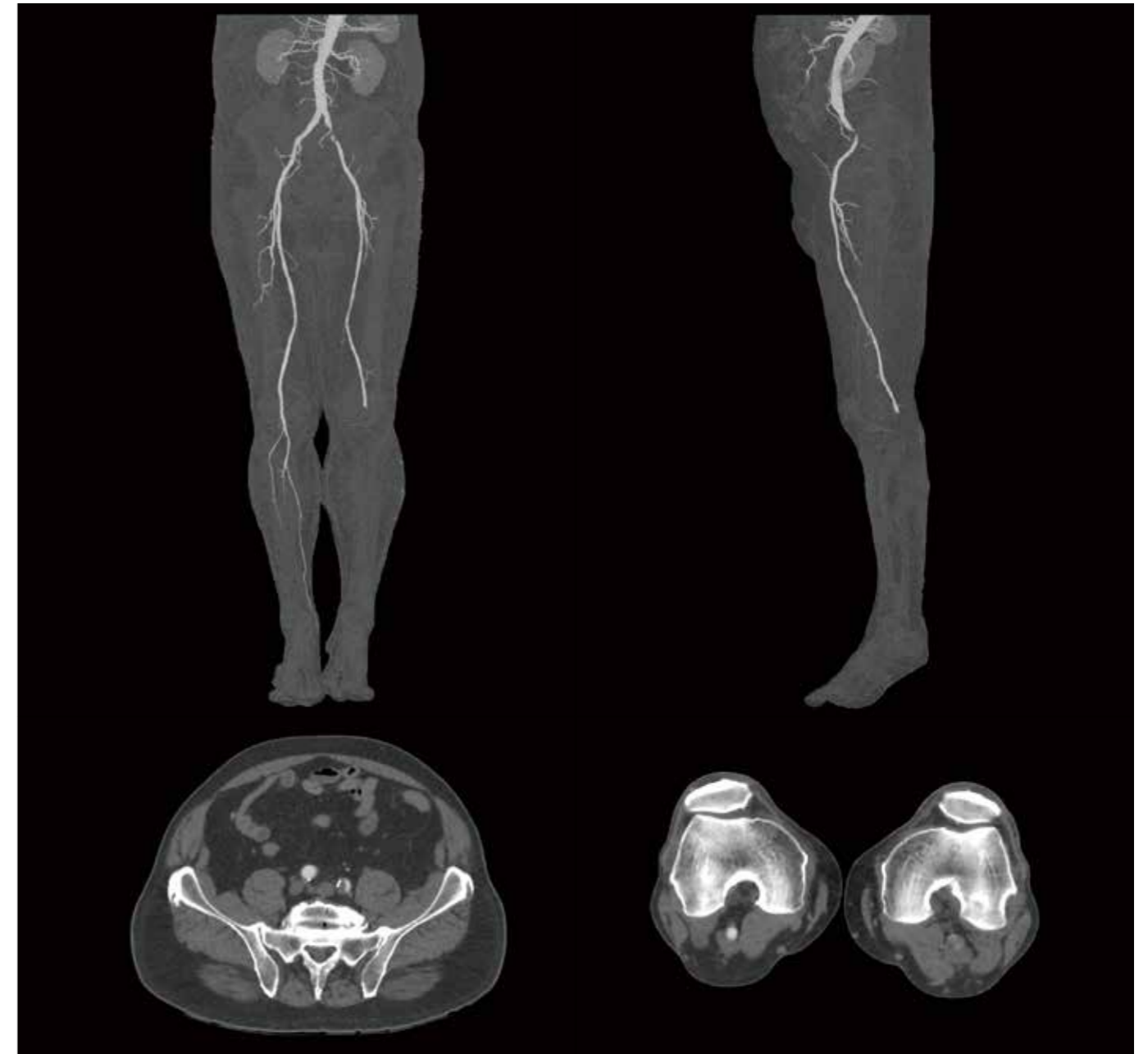
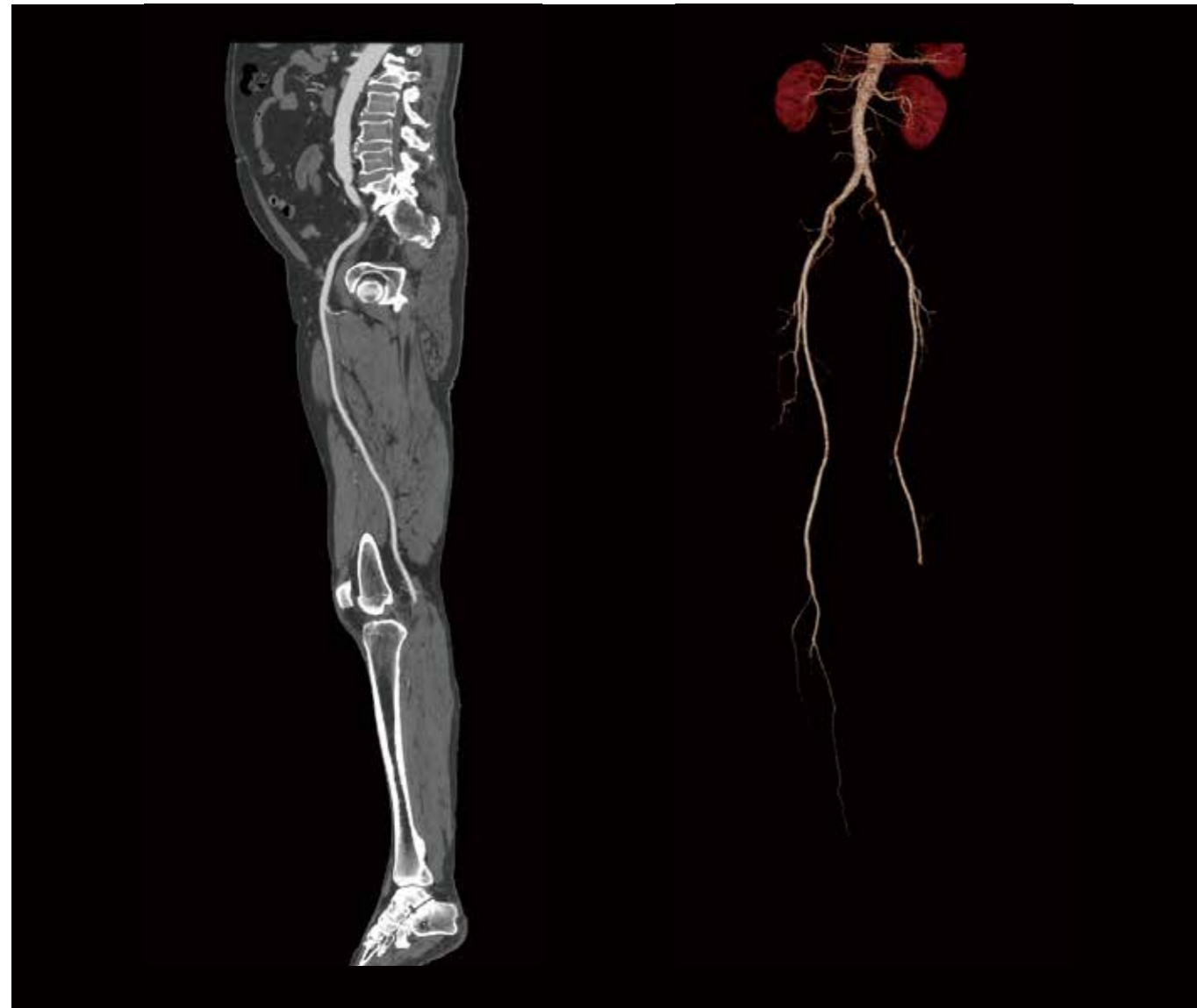
\* Option

# SURE Subtraction Runoff

## Patient History

This 70-year-old man presented with left "cold leg syndrome." He had a long history of smoking. A CT angiogram of the lower limbs was performed with SURE Subtraction.

Scan Mode	Contrast	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy·cm)	Effective Dose (mSv)	k
Ultra Helical	-	0.5 mm x 80	Standard	100	SURE Exposure 3D	0.5	1281	AIDR 3D Enhanced	1.7	218.7	0.8	0.00364
Ultra Helical	CE	0.5 mm x 80	Standard	100	SURE Exposure 3D	0.5	1281	AIDR 3D Enhanced	6.1	808.4	2.9	0.00364



## Findings

There is a stenosis of the left common iliac artery and occlusion of the popliteal artery at the level of the knee with no collateral filling of the distal vessels. CT angiography is an accurate, noninvasive technique for the imaging of peripheral vascular disease. SURE Subtraction automatically removes bones and calcified plaques for an excellent view of the arteries.

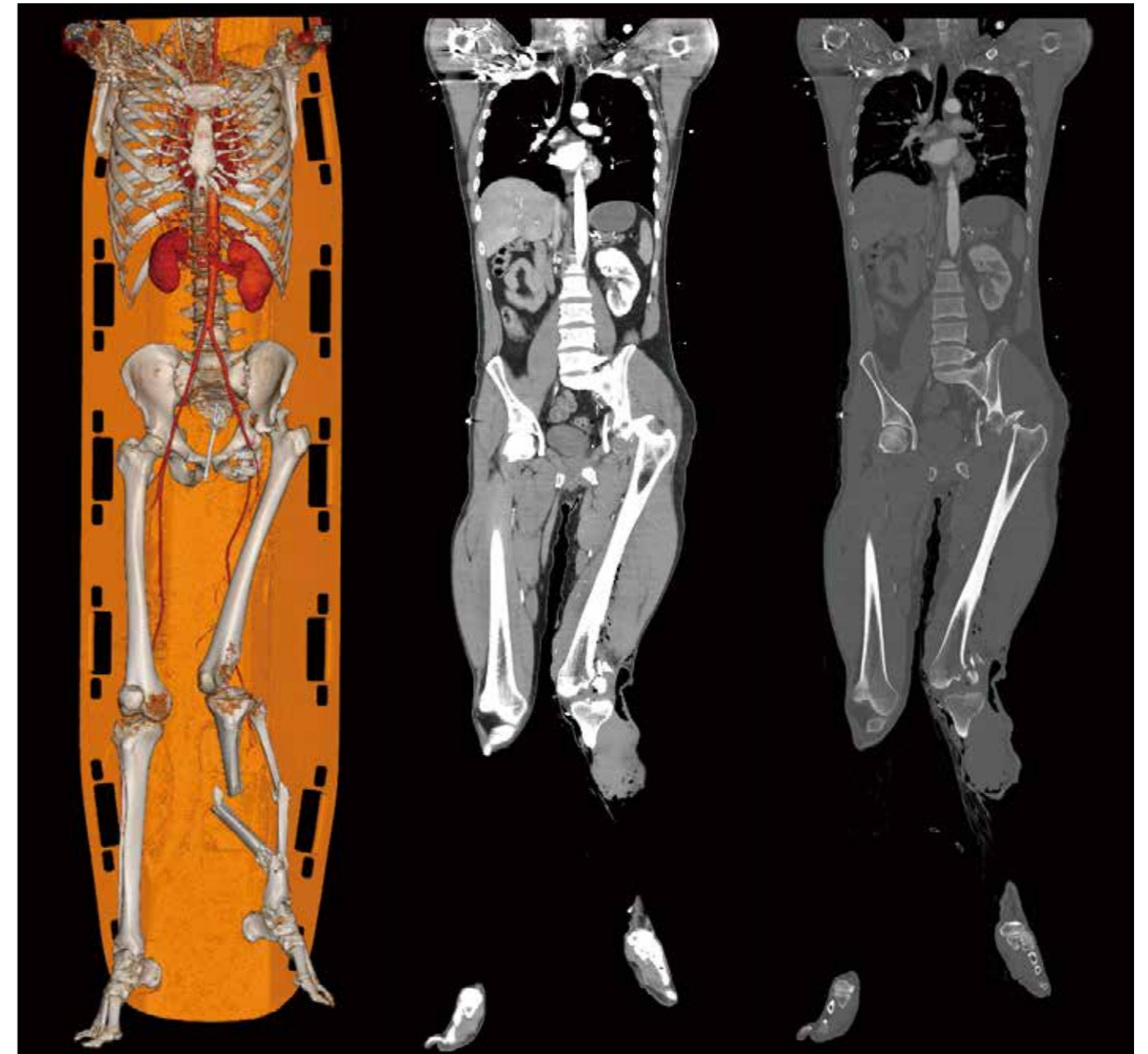


# vHP Whole-Body Scan

## Patient History

This 42-year-old man was involved in a motorcycle accident. He arrived at the hospital by helicopter. A total-body CT scan was performed to assess the extent of his injuries. A vHP (variable Helical Pitch) scan was performed from the chest to the feet at two different table speeds. The chest, abdomen, and pelvis were scanned with a standard pitch and the lower legs with a slow pitch to avoid outrunning the contrast.

Scan Mode	Contrast	Collimation	Pitch	kVp	mAs	Rotation Time (s)	Scan Range (mm)	Dose Reduction	CTDIvol (mGy)	DLP (mGy-cm)	Effective Dose (mSv)	k
vHP	Arterial	0.5 mm x 80	vHP	100	SURE Exposure 3D	0.75	1677	AIDR 3D Standard	8.0	1373	10.5	0.0145 (chest) 0.0008 (extremities)



## Findings

There is a comminuted fracture involving the left acetabulum, with posterior dislocation of the femoral head and diastasis of the pubic symphysis. There is a comminuted fracture involving the left lateral femoral condyle. The patella, fibular head, and tibial plateau on the left side are also fractured. There is a comminuted fracture involving the mid and distal shaft of the left tibia and fibula. Widespread soft tissue free gas is seen within the leg, with discontinuity of the skin on the medial aspect of the left leg.



**Disclaimer:** Any reference to X-ray exposure is intended as a reference guideline only. The guidelines in this document do not substitute for the judgment of a healthcare provider. Each scan requires medical judgment by the healthcare provider about exposing the patient to ionizing radiation. In clinical practice, the use of the AIDR 3D feature may reduce CT patient dose depending on the clinical task, patient size, anatomical location and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose to obtain diagnostic image quality for the particular clinical task.

Due to local regulatory processes, some of the products included in this brochure may not be available in each country. Please contact your sales representative for the most current information.

# ***Aquilion ONE***

**Canon**

CANON MEDICAL SYSTEMS CORPORATION

<https://global.medical.canon>

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Canon Medical Systems Corporation meets the Environmental Management System standard ISO 14001.

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***Made For life***