

Canon

画論

31st

The Best Image

Best Image Awards Compilation

Ultrasound Category

CONTENTS

Blood vessels

[Outstanding Award]

Anastomotic pseudoaneurysm-inferior vena cava fistula following abdominal aortic graft replacement

Ohara HealthCare Foundation
Kurashiki Central Hospital, Okayama, Japan Risa Kusumoto ————— 3

[Outstanding Award]

Renal arteriovenous fistula in which ultrasound was useful for differential diagnosis from renal aneurysm

Yodogawa Christian Hospital, Osaka, Japan Takakazu Kinugawa ————— 4

Heart

[Outstanding Award]

Mass arising from the pulmonary vein and moving between the left ventricle and left atrium confirmed by the fireball sign

Kinki University Nara Hospital, Nara, Japan Atsushi Kotani ————— 5

[Outstanding Award]

Case in which transthoracic three-dimensional echocardiography was useful for evaluating the severity of tricuspid regurgitation and determining treatment effectiveness

Hokkaido University /
Hokkaido University Hospital, Hokkaido, Japan Michito Murayama ————— 6

Abdomen

[Grand Prize Award]

Usefulness of ultrasound in identifying the source of portal venous gas and determining the need for surgical treatment

Iizuka City Hospital, Fukuoka, Japan Masaharu Oodo ————— 7

[Outstanding Award]

Pancreaticobiliary maljunction found in an ultrasound examination performed to investigate the cause of acute pancreatitis

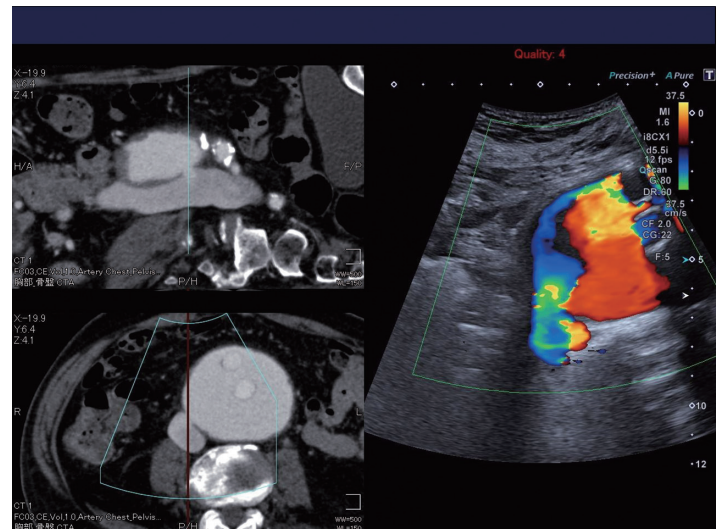
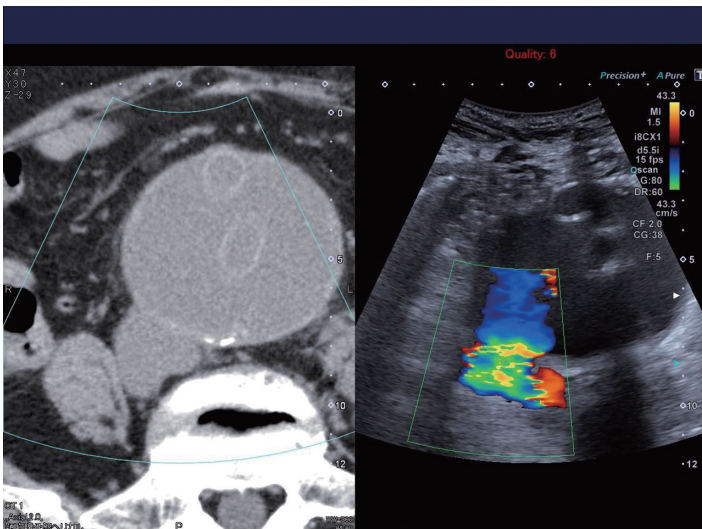
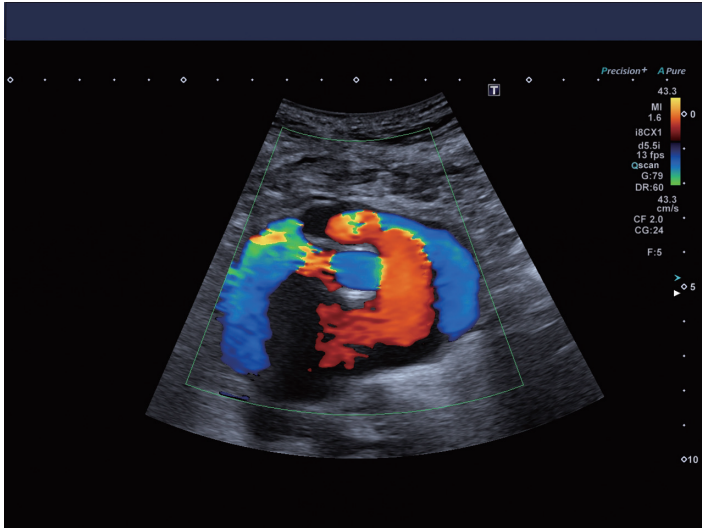
Kobe University Hospital, Hyogo, Japan Yuka Oishi ————— 8

Breast, thyroid, and superficial tissues

[Outstanding Award]

Testicular abnormality found in abdominal CT examination

Nara Medical University Hospital, Nara, Japan Namiko Yamashita ————— 9



a	b
c	d

Anastomotic pseudoaneurysm–inferior vena cava fistula following abdominal aortic graft replacement

Ohara HealthCare Foundation Kurashiki Central Hospital, Okayama, Japan
Risa Kusumoto

System used: Aplio i800

Reason for examination: This patient was admitted to our hospital for detailed evaluation of hemolytic anemia. He had previously undergone Y-graft replacement for a ruptured abdominal aortic aneurysm at another hospital. Routine CT examination showed that a pseudoaneurysm had formed around the graft. An abdominal murmur was heard in physical examination, and hematological examination showed damaged red blood cells. These findings were suggestive of mechanical hemolysis, and an abdominal aortic ultrasound examination was performed for detailed evaluation.

Image findings: A pseudoaneurysm with a maximum short diameter of about 75 mm was seen around the graft. High-velocity blood flow from the graft was observed in the anastomosis between the left leg of the graft and the

common iliac artery, with blood entering the area around the graft and forming a pseudoaneurysm. B-mode images showed low-intensity signals within the pseudoaneurysm, and color Doppler images showed blood flowing into the pseudoaneurysm. In addition, fusion images generated by combining ultrasound and CT images showed blood flowing from the pseudoaneurysm into the inferior vena cava, demonstrating that a fistula had formed between the pseudoaneurysm and the inferior vena cava.

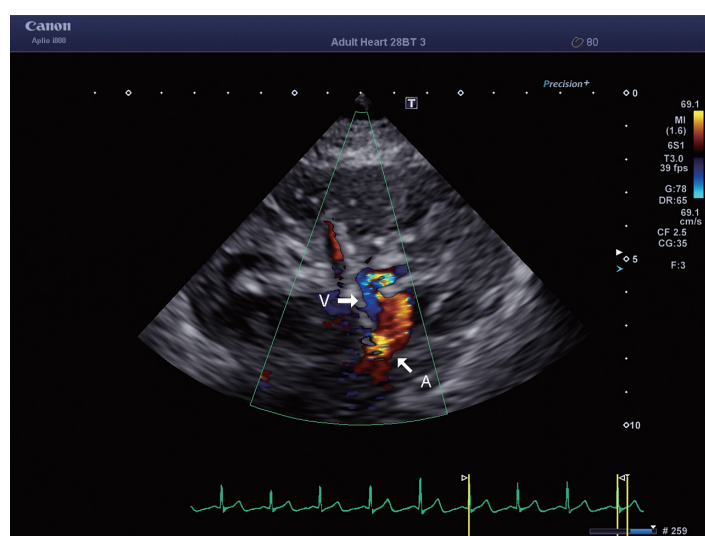
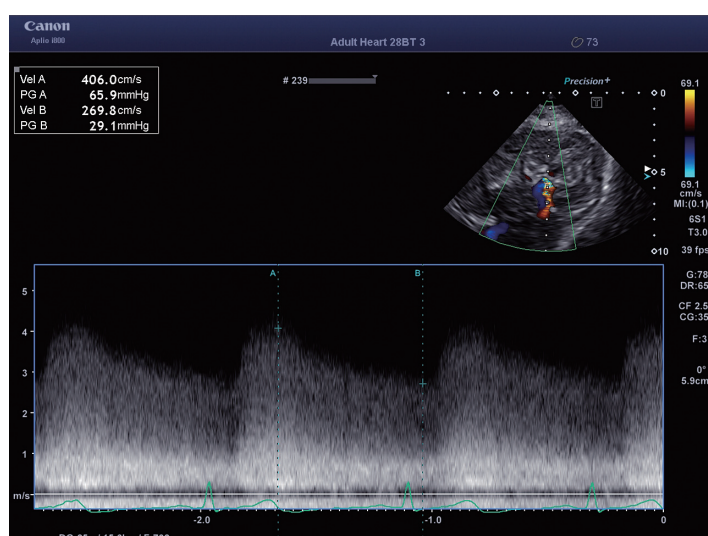
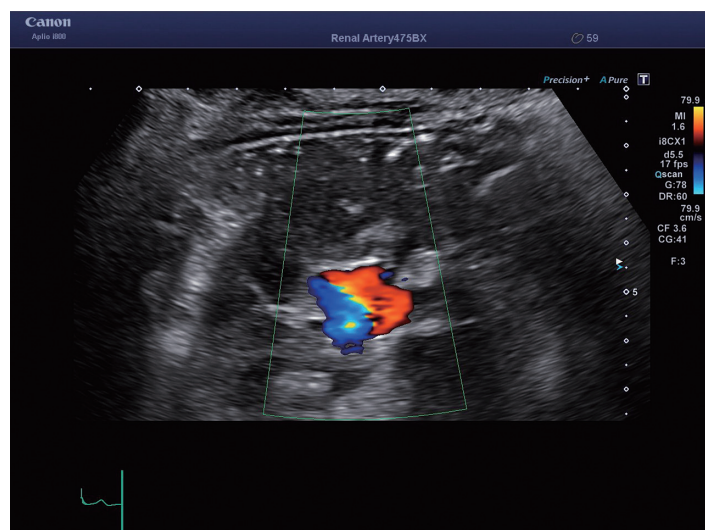
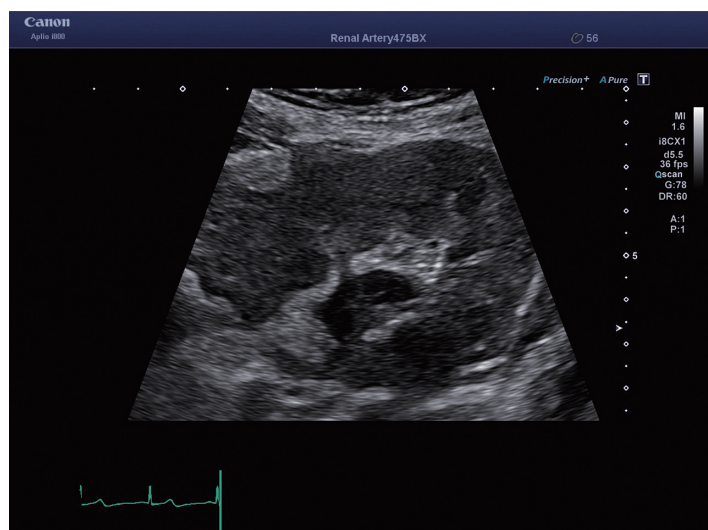
Clinical comments: Failure of the graft anastomosis was identified as the likely cause of mechanical hemolysis in this patient based on the finding of graft leakage with high-velocity blood flow. The ultrasound findings were immediately reported to the attending physician as pseudoaneurysm formation due to hemorrhage, with the pseudoaneurysm extending to an inferior vena cava fistula. Urgent consultations were held between physicians from various clinical departments, including hematologists, radiologists, cardiologists, and cardiovascular surgeons, who viewed the images and quickly formulated a treatment plan for graft anastomosis repair. The availability of minimally invasive real-time blood-flow evaluation was extremely helpful in ensuring that the patient could receive treatment without delay.

Technical comments: After leakage from the anastomosis was identified, the color scale was adjusted to display the

direction and velocity of blood flow in a single image. In addition, the presence of a fistula was suspected because the pseudoaneurysm could easily be deformed and compressed by simply placing the transducer on the abdominal wall, suggesting that an escape route was available for reducing internal pressure. Fusion images were generated by combining ultrasound and CT images, making it possible to clearly visualize the positional relationships between the pseudoaneurysm and the inferior vena cava, to evaluate blood flow into the inferior vena cava in real time, and to provide clinically valuable images to the physicians caring for this patient.

Comments on images: (a) Blood flow with a swirling pattern is seen inside the pseudoaneurysm. (b) High-velocity blood flow into the pseudoaneurysm is observed in the anastomosis between the left leg of the graft and the left common iliac artery. (c) The pseudoaneurysm and the inferior vena cava are adjacent to each other, and blood flow with a mosaic pattern is observed at their shared border. Blood flow from the pseudoaneurysm into the inferior vena cava can be confirmed. (d) Blood flow from the pseudoaneurysm into the inferior vena cava is seen in a fusion image generated by combining ultrasound and contrast CT images. Both the pseudoaneurysm and the fistula of the inferior vena cava are clearly depicted.

Sex	Age
Male	70+ years



a	b
c	d

Renal arteriovenous fistula in which ultrasound was useful for differential diagnosis from renal aneurysm

Yodogawa Christian Hospital, Osaka, Japan
Takakazu Kinugawa

System used: Aplio i800

Reason for examination: This patient was in good health and had no remarkable medical history until 1 year previously. At that time, abdominal ultrasound examination performed as part of a routine medical checkup showed a vascular dilatation measuring 15 mm in diameter in the hilum of the right kidney. A renal aneurysm was suspected. MRI was performed for detailed evaluation, but image quality was insufficient for definitive diagnosis. Detailed evaluation by renal artery ultrasound was therefore requested.

Image findings: A vascular dilatation measuring 15 mm in diameter was observed in the hilum of the right kidney, confirming the findings of the ultrasound examination performed in the earlier medical checkup. The image findings were initially thought to be suggestive of a renal aneurysm. However, when color Doppler was performed in

combination, strong blood flow signals were observed and the blood flow in the vascular dilatation showed a mosaic pattern. These findings did not support the diagnosis of a renal aneurysm. Blood flow analysis demonstrated continuity of the blood flow waveforms, and an arteriovenous fistula was therefore suspected. In addition, arteriovenous vascular continuity was observed from various angles.

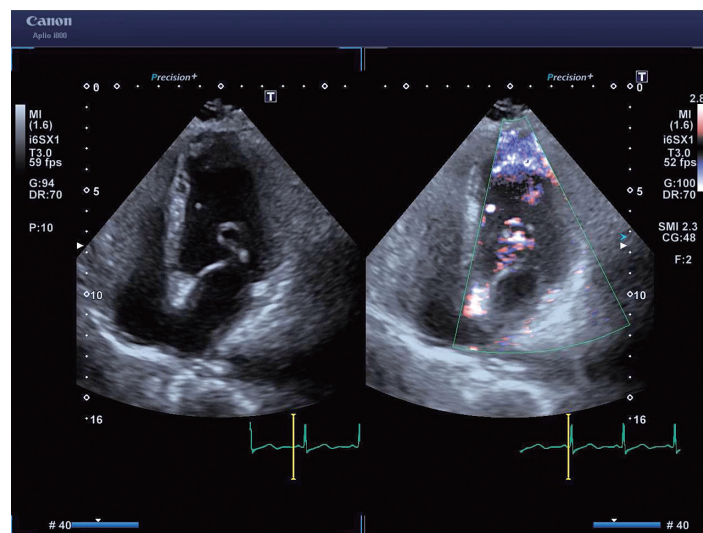
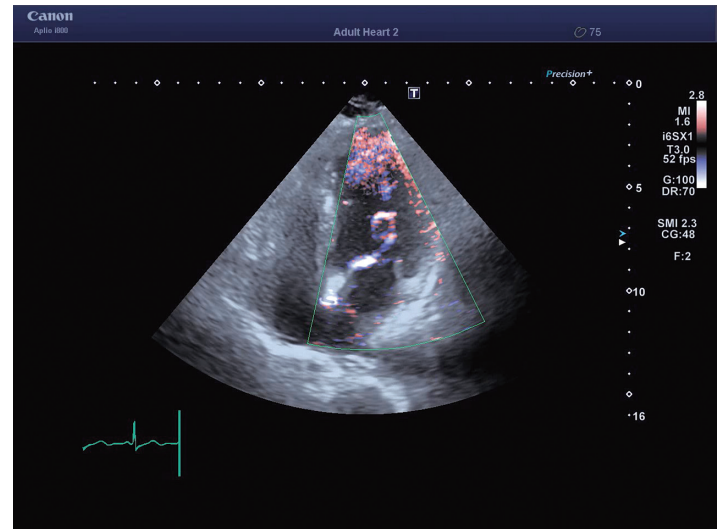
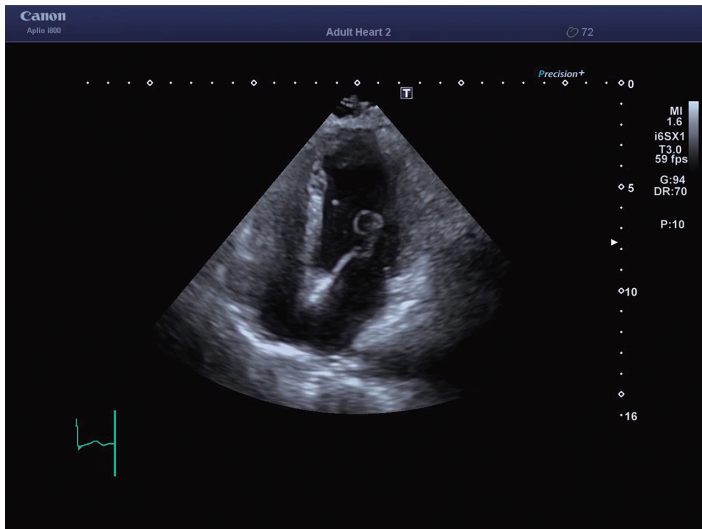
Clinical comments: In this patient, a suspected renal aneurysm was seen in an abdominal ultrasound examination performed during a medical checkup, but the lesion was later found to be a renal arteriovenous fistula. Because aneurysms and arteriovenous fistulas have different possible complications and require different therapeutic approaches, accurate differential diagnosis is essential. Many patients with renal aneurysms do not require treatment, and the initial plan for managing this patient was follow-up observation. However, when the lesion was later identified as a renal arteriovenous fistula, it was decided that treatment should be performed as soon as possible in order to minimize the load placed on the heart. The ultrasound findings were key in formulating the optimal treatment plan in this case.

Technical comments: A convex transducer is normally used for renal artery ultrasound examinations, but in this case, evaluation was performed using a sector transducer as well as a linear transducer according to the particular

diagnostic objectives. In addition, the observation of arteriovenous vascular continuity and blood flow showing a mosaic pattern inside the phymatoid dilatation in multiple image planes made it possible to obtain more clinically useful dynamic and still images, resulting in a greater degree of diagnostic confidence. Despite the suspected diagnosis based on previous findings, examination could be performed with greater flexibility while carefully considering the possibility of other medical conditions.

Comments on images: (a) Confirming the findings of an abdominal ultrasound examination performed during a medical checkup, a phymatoid dilatation is observed near the hilum of the right kidney. (b) Strong blood flow signals are seen inside the dilatation, and blood flow showing a mosaic pattern is observed in some areas. (c) The blood flow waveforms obtained using pulsed Doppler showed high flow velocity, so a sector transducer was used instead. The blood flow waveforms obtained by continuous wave Doppler showed continuity of the Doppler waveforms, suggesting the presence of an arteriovenous fistula. (d) The lesion was then examined using the sector transducer. Arterial waveform signals are observed upstream to the area of blood flow showing a mosaic pattern, and venous waveform signals are observed downstream.

Sex	Age
Female	50-60 years



a b
c

Mass arising from the pulmonary vein and moving between the left ventricle and left atrium confirmed by the fireball sign

Kinki University Nara Hospital, Nara, Japan
Atsushi Kotani

System used: Aplio i800

Reason for examination: To evaluate a shadow defect (tumorous shadow) observed in the range between the pulmonary vein and left atrium by CT.

Image findings: A parasternal long-axis view confirmed the presence of a mobile, string-like mass in the area near the mitral valve. However, due to its rapid movement and length, the entire mass could not be clearly visualized. An apical 4-chamber view showed a flexible, string-like mass near the mitral valve that moved quickly toward the left atrium during systole and toward the left ventricle during

diastole. It was depicted as a low-intensity, string-like mass extending from the left pulmonary vein and measuring approximately 5 to 6 cm in total length.

Clinical comments: In early 2000's, this patient was diagnosed with endometrial stromal sarcoma and underwent hysterectomy and oophorectomy followed by chemotherapy. One year later, metastasis of the tumor to both lungs was found. Transthoracic echocardiography confirmed the presence of a mobile, low-intensity, string-like mass between the left atrium and the left ventricle extending from the pulmonary vein. Superb Micro-vascular Imaging (SMI) was used to accurately evaluate this quickly moving mass. This diagnostic approach was found to be clinically useful because it allowed the mass in the cardiac chambers to be accurately depicted and its movements to be clearly observed.

Technical comments: Due to the effects of movement in the transverse direction, the parasternal long-axis view was not particularly useful for evaluating the entire length of the low-intensity, string-like mass as it moved rapidly back and forth through the mitral valve during the cardiac

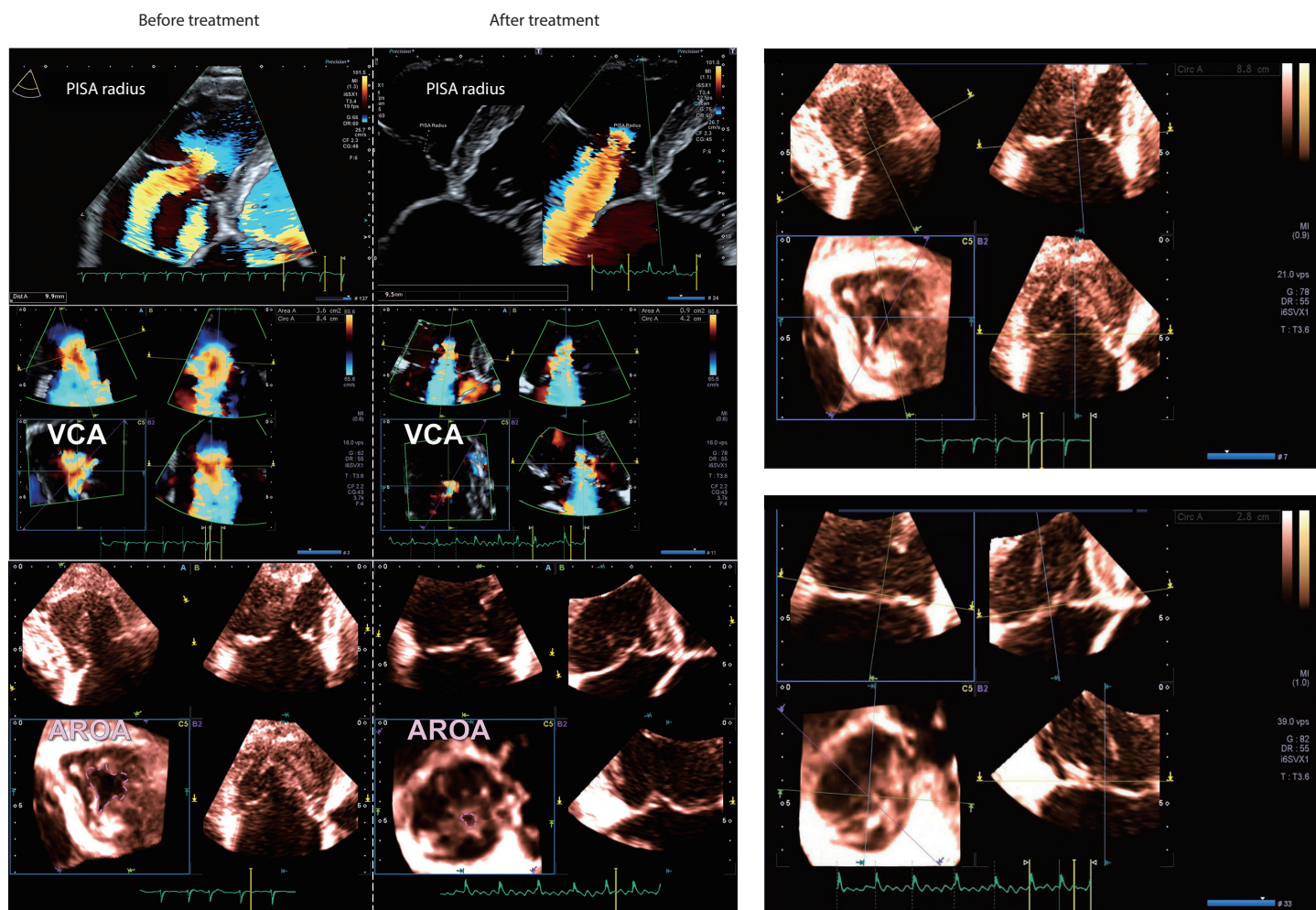
cycle. However, by employing an apical approach, it was possible to clearly visualize the entire mass as it moved in the distance direction. Furthermore, when SMI was used, the low-intensity, string-like mass exhibited the fireball sign¹⁾, which could be clearly observed together with the B-mode image.

Comments on images: (a) An apical 4-chamber view shows a flexible, string-like mass moving in the distance direction from the mitral valve toward the left atrium during systole and toward the left ventricle during diastole. The string-like mass shows low intensity. It extends from the left pulmonary vein and measures approximately 5 to 6 cm in total length. (b) An apical 4-chamber view using SMI shows a low-intensity, string-like mass that clearly exhibits the fireball sign¹⁾. (c) Observing the B-mode image and SMI image together further improves diagnostic accuracy.

Reference

1) Demura Y: Eur Heart J Case Rep. 2022.

Sex	Age
Female	50-60 years



a b
c

Case in which transthoracic three-dimensional echocardiography was useful for evaluating the severity of tricuspid regurgitation and determining treatment effectiveness

Hokkaido University / Hokkaido University Hospital,
Hokkaido, Japan
Michito Murayama

System used: Aplio i900

Reason for examination: This case is a man in his 30s who presented with pulmonary hypertension due to severe atrial functional mitral regurgitation (MR). He was scheduled to undergo bone marrow transplantation for treatment of a hematologic malignancy, and the possibility of performing mitral valve repair using a MitraClip® before starting treatment was considered. Due to the presence of torrential tricuspid regurgitation (TR) and the risk of a right-to-left shunt through the puncture site in the atrial septum following MitraClip® mitral valve repair, the patient

required careful management of fluid volume and TR before the procedure. Weight loss of 7 kg was achieved, and repeat evaluation of TR was requested.

Image findings: The radius of the proximal isovelocity surface area (PISA) was 9.9 mm before fluid volume and TR management (figure (a), upper left) and 9.5 mm after management (figure (a), upper right), which was not a significant difference. It was therefore difficult to evaluate the changes in the severity of TR using two-dimensional color Doppler. On the other hand, three-dimensional echocardiography clearly showed that the vena contracta area (VCA) was reduced from 360 mm² (figure (a), center left) to 90 mm² (figure (a), center right) and that the anatomical regurgitant orifice area (AROA) of the tricuspid valve was also markedly reduced from 376 mm² (figure (a), lower left) to 60 mm² (figure (a), lower right). These findings made it possible to obtain an accurate objective understanding of the changes in TR severity.

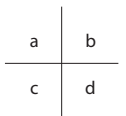
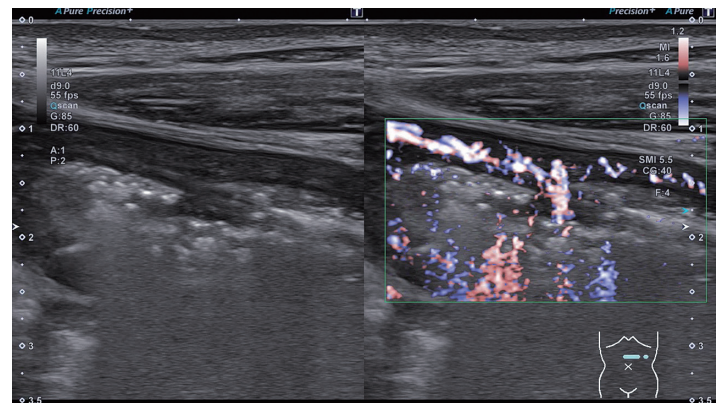
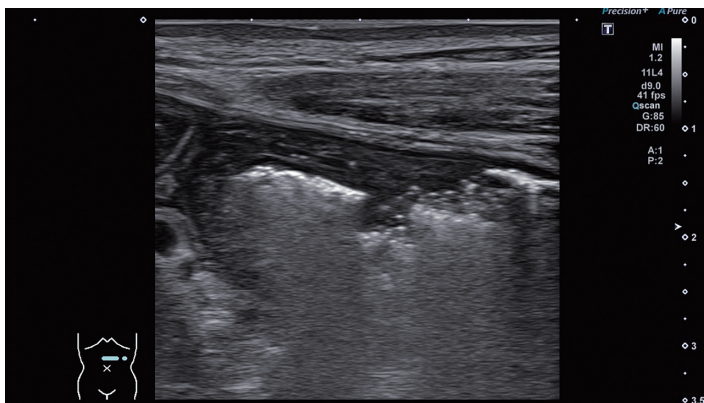
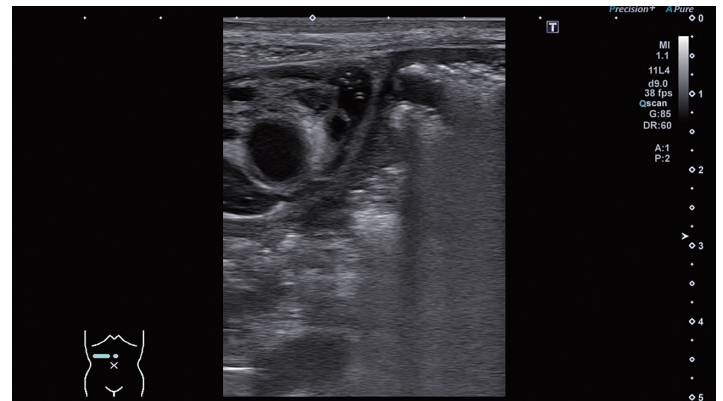
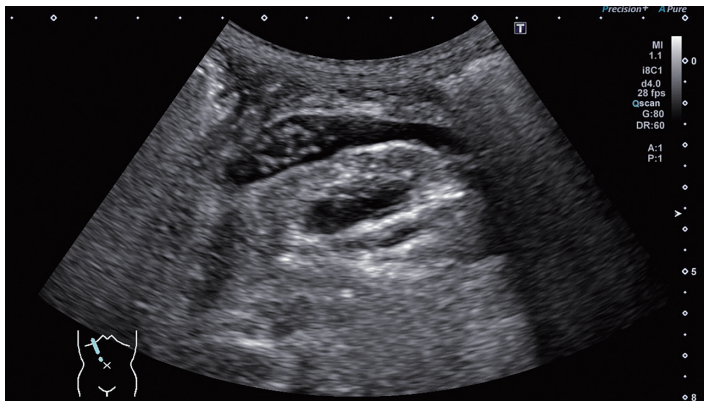
Clinical comments: In patients with juvenile atrial functional MR complicated by extremely severe TR, in whom there is a high risk of right-to-left shunt following MitraClip® mitral valve repair, it is essential to accurately evaluate TR after fluid volume optimization. Evaluation using 3D

echocardiography provided objective information demonstrating a significant reduction in TR (from torrential to severe), and these findings could be shared with the cardiology team to minimize the risk of right-to-left shunt following MitraClip® mitral valve repair.

Technical comments: In VCA measurement, a 3D dynamic image of one cardiac cycle was generated by reconstructing 3D data collected over four cardiac cycles with a narrow angle of view so that the volume rate was higher than 15 vps. Because the patient had atrial fibrillation both before and after treatment, images were recorded in cardiac cycles with consistent RR intervals. In addition to the above special measures, data was acquired with a shallower field depth for AROA measurement so that the volume rate was higher than 20 vps. The images were obtained from a location near the sternum so that the tricuspid valve was positioned close to the transducer.

Comments on images: (a) PISA radius of TR before and after treatment (upper row), VCA measurements obtained by 3D color Doppler (middle row), and AROA measurements obtained in an image plane parallel to the tricuspid valve orifice (lower row). (b) AROA of the tricuspid valve before treatment. (c) AROA of the tricuspid valve after treatment.

Sex	Age
Male	30-40 years



Usefulness of ultrasound in identifying the source of portal venous gas and determining the need for surgical treatment

Iizuka City Hospital, Fukuoka, Japan
Masaharu Oodo

System used: Aplio i600

Reason for examination: The number of cases of portal venous gas (PVG) is increasing. Most cases of PVG are diagnosed by CT, but it has been reported that ultrasound (US) is also useful for the diagnosis of PVG based on findings such as the "flaming portal vein sign"¹⁾ and a "time-lapse appearance"²⁾. In the present case, B-mode scanning was used to confirm the presence of PVG. The movement of the gas was traced back from the intrahepatic portal vein to the superior mesenteric vein, the mesentery, and the intestinal wall, making it possible to identify the part of the intestinal tract that was the source of the gas. SMI was used to evaluate blood flow in the intestinal wall, and based on the SMI findings, it was decided that conservative treatment with preservation of the intestine was indicated in this case.

Clinical comments: The most common cause of PVG is ischemic intestinal disease. Up to the present time, most reported cases of PVG have been diagnosed by contrast-enhanced CT, but in the case discussed here, the presence of PVG and the part of the intestine that was the source of the gas were identified by B-mode US. In addition, intestinal wall blood flow was evaluated using SMI to determine the degree of reversible ischemia or irreversible necrosis at the site. Both US and CT findings obtained without the use of contrast agent confirmed that conservative treatment was indicated in this case.

Technical comments: The diagnosis of PVG was based on the findings of diffuse high-intensity changes in the liver and high-intensity spots in the portal vein exhibiting hepatopetal flow. Examination from the portal vein to the superior mesenteric vein showed a borderline between areas with larger and smaller volumes of PVG. The transducer was then moved toward the mesentery to trace the PVG back to the intestinal wall in order to identify the part of the intestine that was the source of the gas. A linear transducer was used to precisely observe the movement of the gas within the intestinal wall. SMI was employed to evaluate intestinal wall blood flow, to determine the degree of intestinal ischemia, and to distinguish between reversible ischemia and irreversible necrosis. This case illustrates the importance of performing repeat evaluation of intestinal

wall blood flow over time rather than basing the diagnosis on the findings of a single examination.

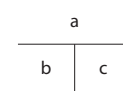
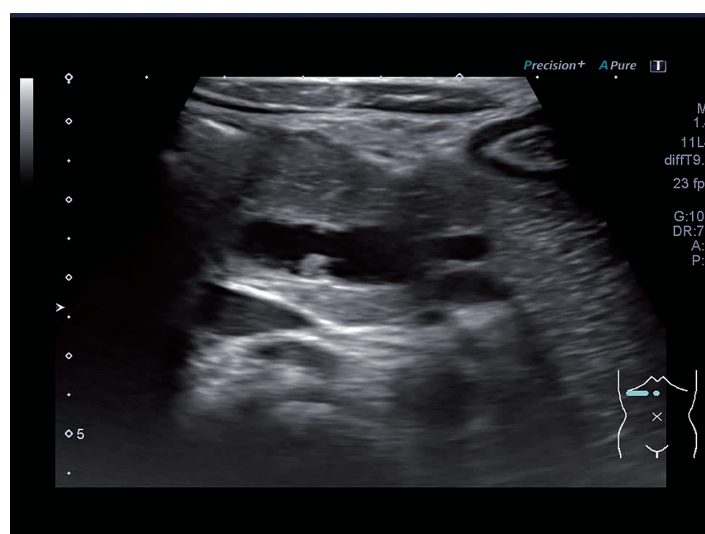
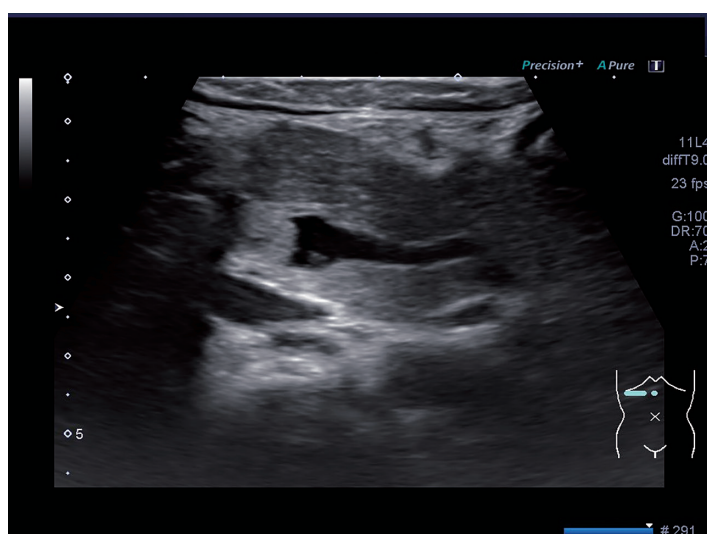
Comments on images: The presence of PVG was confirmed by visualizing high-intensity spots exhibiting hepatopetal flow in the portal vein and by observing the flaming portal vein sign, in which the portal vein is seen to have a flamelike appearance in color Doppler images. The gas was traced back from the portal vein to the superior mesenteric vein, the mesentery, and the intestinal wall, making it possible to accurately identify the source of the gas. Intestinal wall blood flow at the site was then evaluated using SMI. The findings showed reversible ischemia, and it was therefore determined that nonsurgical treatment was indicated in this case.

- (a) Gas in the main portal vein
- (b) Mesenteric gas
- (c) Gas in the intestinal wall
- (d) Gas in the intestinal wall (SMI)

References

- 1) Hiroyasu Ijuin et al. J Med Ultrasonics, 2008; 35: 119-123
- 2) Yui Hoshino et al. Jpn J Med Ultrasonics, 2021; 48: 395-396

Sex	Age
Male	60-70 years



Pancreaticobiliary maljunction found in an ultrasound examination performed to investigate the cause of acute pancreatitis

Kobe University Hospital, Hyogo, Japan
Yuka Oishi

System used: Aplio 500

Reason for examination: This infant was taken to a local physician for abdominal pain and was referred to our hospital with a diagnosis of acute pancreatitis based on the findings of medical evaluation. The patient's biliary enzymes were found to be elevated, and ultrasound examination was requested to investigate the cause of acute pancreatitis and to perform detailed evaluation of the biliary system.

Image findings: Enlargement of the pancreas was observed, with no obvious fluid retention noted in surrounding areas. The intrahepatic bile ducts were markedly dilated

out to the common bile duct, and the dilated common bile duct and the main pancreatic duct joined together in the head of the pancreas, forming a conjoined duct measuring approximately 14 mm in length. Multiple isointensity areas suspected to be protein plugs were observed in the lumen of the conjoined duct, with a large plug seen to be impacted immediately proximal to the papilla of Vater.

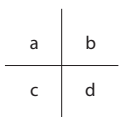
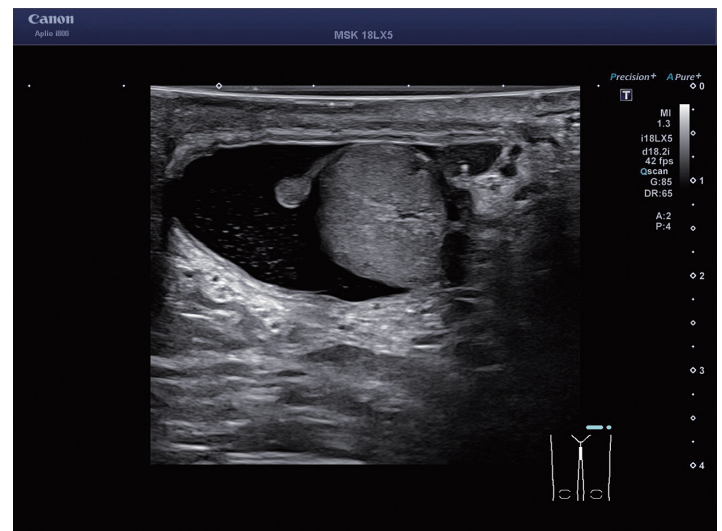
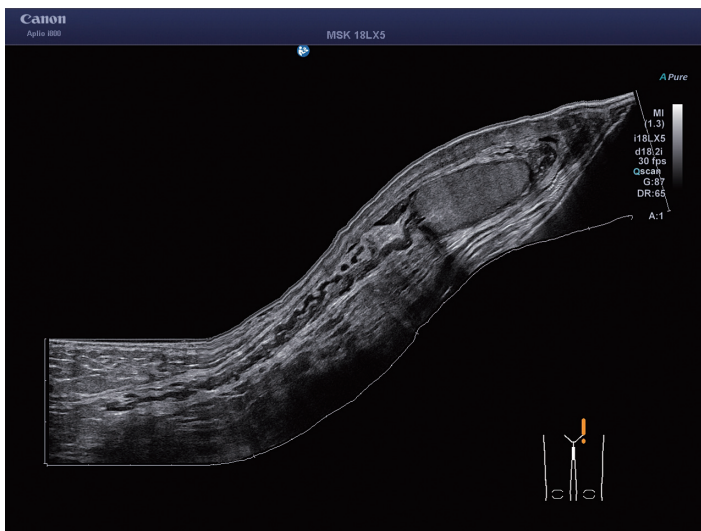
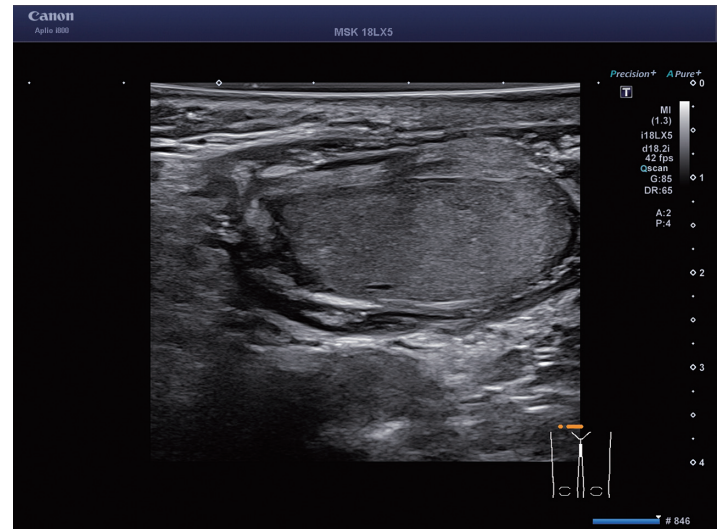
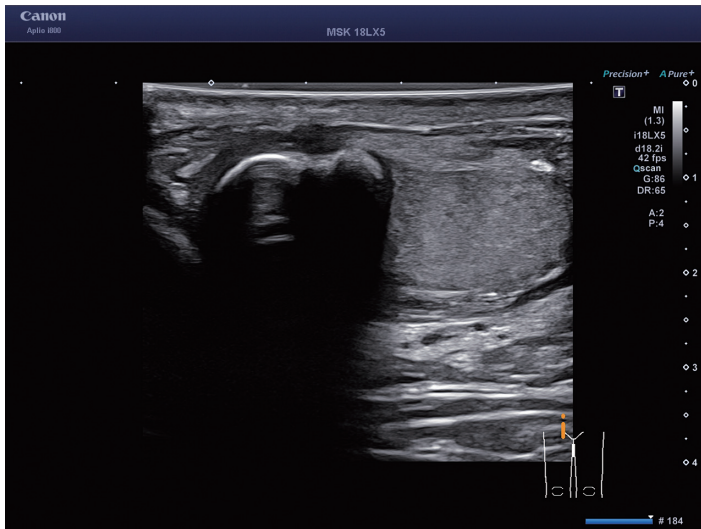
Clinical comments: Because the patient was a child, ultrasound was selected as the imaging modality of choice due to its noninvasiveness. Ultrasound examination suggested a diagnosis of acute pancreatitis with elevated biliary enzymes due to an impacted protein plug associated with pancreaticobiliary maljunction. Based on the ultrasound findings, magnetic resonance cholangiopancreatography (MRCP) was performed, and the results showed the presence of a conjoined duct and stones in the common bile duct. Endoscopic retrograde cholangiopancreatography (ERCP) was then performed to remove the protein plugs in the common bile duct and the conjoined duct. Detailed evaluation of the common bile duct and the conjoined pancreatic duct made it possible to identify the cause and perform appropriate treatment.

Technical comments: The finding of an anatomical abnormality in which the main pancreatic duct and the common bile duct join together outside the duodenal wall is indispensable for the definitive diagnosis of pancreaticobiliary maljunction, as illustrated by this case. Infants tend to have a thin abdominal wall with a small amount of subcutaneous fat, so a linear transducer with a frequency of 9 MHz* (which is commonly used for carotid ultrasound examinations in adults) was used to examine the biliary system in this pediatric patient. This transducer provided valuable information for evaluating the conjoined bile duct and pancreatic duct.

Comments on images: (a) The intrahepatic bile ducts are markedly dilated. (b) The common bile duct is dilated and joins the main pancreatic duct in the head of the pancreas. Multiple isointensity areas with the appearance of protein plugs are seen in the conjoined duct. (c) A dynamic image shows the conjoined common bile duct and main pancreatic duct.

*Typical frequency value when used in combination with Aplio 500.

Sex	Age
Female	Infant (0-6 years)



Testicular abnormality found in abdominal CT examination

Nara Medical University Hospital, Nara, Japan
Namiko Yamashita

System used: Aplio i800

Reason for examination: This patient was being followed for an aneurysm of the aortic arch. Thoracic and abdominal CT scanning performed during follow-up revealed an abnormal finding in the right testicle. Ultrasound examination was performed for detailed evaluation.

Image findings: The right testicle measured 30×12 mm and the left testicle measured 37×16 mm. The parenchyma of both testicles was isoechoic, with no evidence of a tumor in the testicles. The lesion found in CT examination was visualized as a large calcification at the upper pole of the testicle. Irregular thickening of the right testicular sheath was observed, but there were no signs of increased blood flow in the testicular sheath. Fluid retention showing fine echogenicity was noted in the left scrotum. The left spermatic cord vein was seen to be dilated and tortuous,

and vasodilation and increased blood flow were observed during the Valsalva maneuver.

Clinical comments: The spermatic cord veins form the pampiniform venous plexus, and dilatation of these veins can lead to the development of a varicocele. It is widely known that the presence of a varicocele can have a negative effect on spermatogenesis and is one of the most common causes of male infertility. An important advantage of ultrasound is that it allows real-time examination for evaluating target structures while changing the patient's position (lying or standing) as well as for observing vasodilation and changes in blood flow in the veins during the Valsalva maneuver. Ultrasound is therefore considered to be a very useful imaging modality for the evaluation of varicoceles.

Technical comments: A testicular tumor was suspected based on CT findings, but ultrasound examination, which can provide real-time images from multiple angles, showed that the calcification was extratesticular. Thickening of the right testicular sheath was clearly visualized by using a high-frequency transducer. Examination of the opposite side showed that the spermatic cord veins were dilated and tortuous, and fluid retention with fine echogenicity was noted in the scrotum. The use of Panoramic

View mode allowed the entire area from the groin to the scrotum to be clearly visualized, but scanning of this uneven surface over a wide range required the use of a large amount of ultrasound gel (hard type) and precise manipulation of the transducer. In the present case, Aplio i800's Panoramic View mode helped to ensure a smooth examination and made it possible to obtain high-quality images over the full range from groin to scrotum.

Comments on images: (a) A large calcification with acoustic shadowing is observed at the upper pole of the right testicle. Ultrasound findings indicate that the calcification is extratesticular. (b) The parenchyma of the right testicle is seen to be isoechoic, with no microcalculi or tumorous changes seen in the testicle. Thickening of the testicular sheath is observed. (c) The left spermatic cord vein is dilated and tortuous. A wide range from the groin to the scrotum was scanned in Panoramic View mode, making it easier to obtain a clear overall understanding of the entire region. (d) Fluid retention is noted in the left scrotum. Scanning with a high-frequency transducer clearly depicts fluid retention with fine echogenicity. The appendix testis is also clearly visualized.

Sex	Age
Male	70+ years

Memo

Memo



CANON MEDICAL SYSTEMS CORPORATION

<https://global.medical.canon>

©Canon Medical Systems Corporation 2024. All rights reserved.
Design and specifications are subject to change without notice.
Model number: TUS-AI900, TUS-AI800, TUS-AI600, TUS-A500
MCAUS0398EA 2024-08 CMSC/MET/Produced in Japan

Canon Medical Systems Corporation meets internationally recognized standards for Quality Management System ISO 9001, ISO 13485. Canon Medical Systems Corporation meets the Environmental Management System standard ISO 14001.

MitraClip is a registered trademark of the Abbott Group of Companies.

The results in this document are the findings of the contributors.
Clinical outcomes may vary dependent upon clinical use and environment.

Disclaimer: Some features presented in this brochure may not be commercially available on all systems shown or may require the purchase of additional options. Please contact your local representative from Canon Medical Systems for details.

Made For life