

Canon

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32nd

The Best Image

Best Image Awards Compilation

Ultrasound Category

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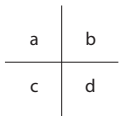
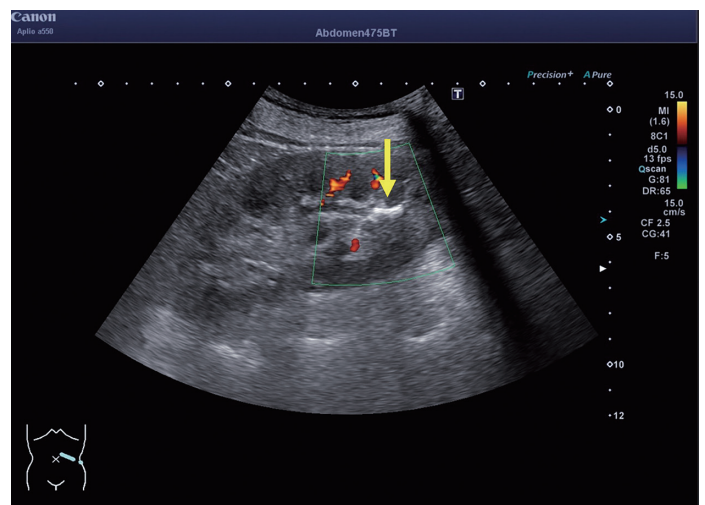
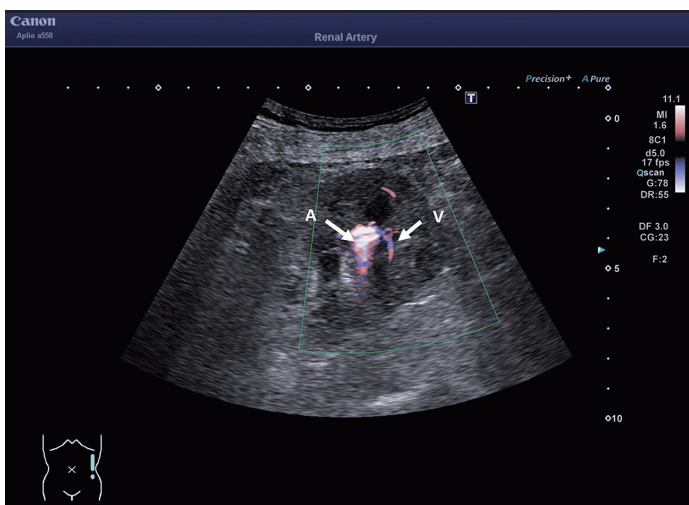
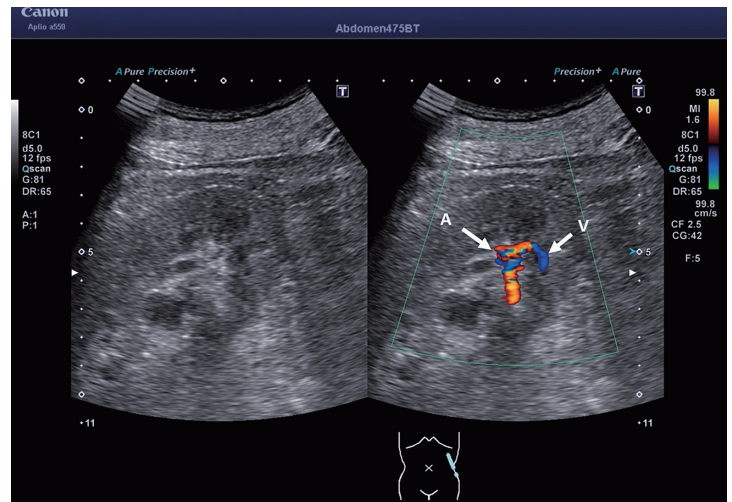
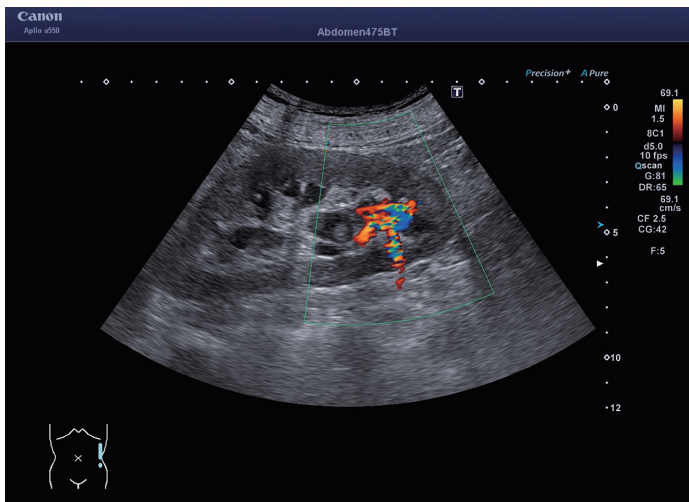
5-day-old neonate with intestinal obstruction due to a Meckel's diverticulum band in whom ultrasound was used to determine the need for emergency surgery

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[Outstanding Award]

Early hepatic venous outflow of contrast agent from focal nodular hyperplasia (FNH) observed using the contrast low-MI method

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Arteriovenous fistula after renal biopsy

Toho University Sakura Hospital, Chiba, Japan
Tsuayoshi Tabata

System used: Aplio a550

Reason for examination: This patient developed acute renal dysfunction after undergoing surgery for cancer of the ascending colon, and biopsy of the left kidney was performed for suspected interstitial nephritis. Persistent gross hematuria was observed after the biopsy procedure, and detailed ultrasound examination of the kidney was requested.

Image findings: Color Doppler examination showed blood flow with a mosaic pattern in the inferior pole of the left kidney. A loop-shaped vascular structure was visualized by adjusting the velocity range, and the findings were considered to be strongly suggestive of an arteriovenous fistula. Coil embolization was performed, after which disappearance of the mosaic pattern was confirmed.

Clinical comments: Formation of an arteriovenous fistula in the kidney is one of the most frequent complications following renal biopsy procedures. In the present case, persistent gross hematuria was observed after renal biopsy, and ultrasound examination was requested. An arteriovenous fistula was strongly suspected based on the find-

ing of blood flow with a mosaic pattern in a color Doppler study, the visualization of a loop-shaped vascular structure in an Advanced Dynamic Flow (ADF) study, and the detection of additional abnormalities in a Pulsed Wave Doppler study. The lesion was confirmed to be an arteriovenous fistula by contrast CT scanning, and coil embolization was performed. Ultrasound examination allowed the arteriovenous fistula to be quickly identified after the biopsy procedure, providing the attending physician with essential information for formulating an appropriate treatment plan. Ultrasound was also useful for evaluating the effectiveness of coil embolization.

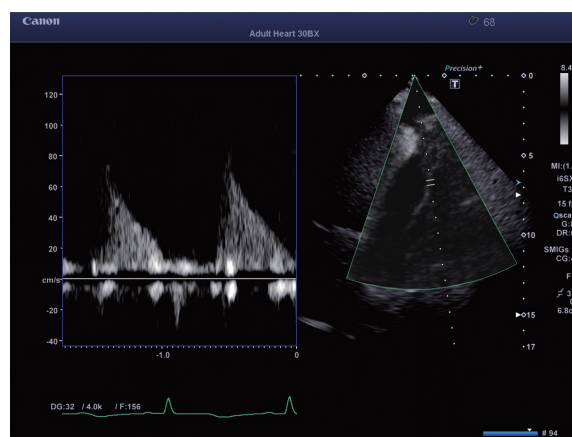
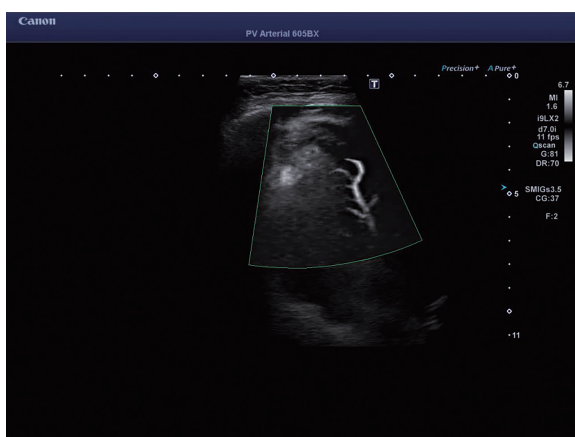
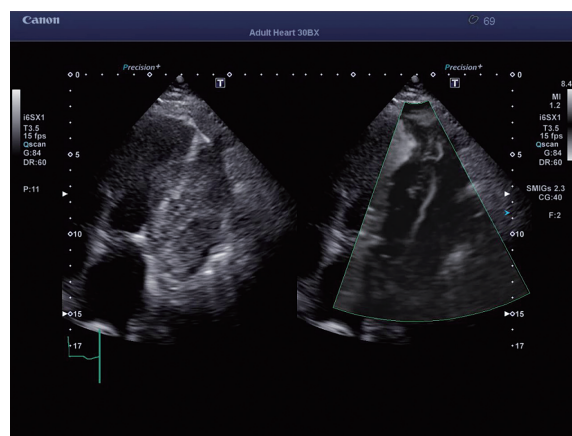
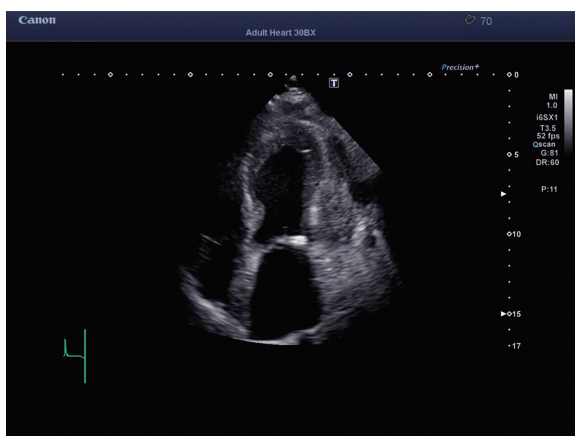
Technical comments: Visualization of normal blood flow was suppressed in the color Doppler study by increasing the velocity range setting from 69.1 cm/sec to 99.8 cm/sec, making it possible to selectively observe the abnormal blood flow in the inferior pole of the kidney. In addition, ADF allowed the loop-shaped vascular structure to be clearly depicted with minimal degradation of blood flow display, and Pulsed Wave Doppler allowed the accelerated blood flow on the arterial side of the fistula and the pulsatile blood flow on the venous side of the fistula to be observed separately.

Comments on images: a: Ultrasound examination of the left kidney before the renal biopsy procedure did not show blood flow with a mosaic pattern, but a color Doppler study after biopsy showed a mosaic pattern in the inferior pole of the left kidney. b: A loop-shaped vascular structure that could not be clearly observed in B-mode images was

accurately confirmed when the velocity range was adjusted for the areas containing blood flow with a mosaic pattern (A: artery, V: vein). c: ADF allowed clear visualization of the loop-shaped vascular structure with minimal degradation of blood flow display (A: artery, V: vein). d: Ultrasound examination after coil embolization showed a high-intensity echo (yellow arrow) in the inferior pole of the left kidney, and the blood flow with a mosaic pattern that was observed before embolization was no longer present.

Comments of judges: In the case discussed here, abdominal vascular ultrasound was performed for follow-up evaluation of gross hematuria after renal biopsy, and detailed examination of the inferior pole of the left kidney led to the diagnosis of an arteriovenous fistula. Although such fistulas are a frequently reported complication after renal biopsy, it can be difficult to clearly visualize intrarenal blood flow because it tends to be affected by respiratory motion, body position, and body type. In the present case, for detailed examination of the area where blood flow with a mosaic pattern was observed, the patient was placed in the right lateral decubitus position, a dorsal approach was selected, and examination was performed with precise adjustment of the flow velocity range and the use of ADF to clearly visualize the fine arteriovenous fistula. The use of such sophisticated techniques clearly demonstrates the examiner's extensive experience in the detailed examination of the renal arteries and veins.

Sex	Age
Female	70+ years



a	b
c	d

Echocardiographic Assessment of ST Elevation in a Lung Cancer Patient with Pericardial and Myocardial Metastases

Kobe City Medical Center General Hospital, Hyogo, Japan
Yuta Torii

System used: Aplio i700

Reason for examination: The patient had a history of lung cancer treated with radiotherapy. At that time, chest CT revealed pericardial effusion, pericardial thickening, and tumor invasion into the lateral wall of the left ventricle, leading to a diagnosis of cardiac metastasis of lung cancer and malignant pericarditis. The pericardial effusion was drained, and the patient was managed with a best supportive care (BSC) approach. Subsequently, the patient developed chest pain and presented to the emergency department. ST elevation was observed in the lateral and inferior leads on a 12-lead electrocardiogram (ECG), suggesting acute myocardial infarction. Echocardiography was performed to assess cardiac function, evaluate coronary arteries, and investigate cardiac metastasis.

Image findings: An irregular mass with internal hypoechoic areas was observed extending from the lateral wall to the inferior wall of the left ventricle. Portions of the mass had indistinct margins with the pericardium and myocardium. Given the patient's medical history, the findings were consistent with pericardial and myocardial metastasis of lung cancer. Wall motion was reduced in the area of tumor infiltration, spanning from the lateral to the inferior wall, and wall thickening was also noted in this region. Within the tumor, accelerated blood flow (0.9 m/sec) was primarily observed during the diastolic phase, with perfusion maintained by peripheral branches of the coronary

arteries. Based on these findings, the ST elevation observed on ECG was attributed to microcirculatory disturbances associated with metastasis rather than coronary artery pathology.

Clinical comments: The patient developed chest pain and presented to the emergency department. ECG findings suggested acute myocardial infarction due to ST elevation. Tumor infiltration into the lateral to inferior wall of the left ventricle was confirmed, raising concerns about possible coronary artery stenosis or occlusion due to tumor expansion. However, echocardiography clearly visualized the coronary artery traversing the tumor, with preserved blood flow distal to the tumor, making coronary artery pathology unlikely. The ST elevation was therefore attributed to microcirculatory disturbances secondary to tumor infiltration.

Technical comments: Because the margins between the tumor and the pericardium and myocardium of the left ventricle were indistinct, the lesion was considered to be metastatic. Wall motion was reduced in the region extending from the lateral to the inferior wall of the left ventricle, with associated wall thickening. These findings suggested impaired wall motion due to tumor infiltration. By utilizing SMI Gen4* and adjusting the velocity range filter, the coronary artery passing through the tumor was clearly visualized. As perfusion was preserved in epicardial regions distal to the tumor, significant coronary artery stenosis was deemed unlikely. Additionally, blood flow waveforms exhibited a low diastolic regression velocity, suggestive of microcirculatory disturbances due to tumor infiltration.

Comments on images:

(a) Apical four-chamber view: An irregular mass adherent to the cardiac wall extends from the base of the lateral wall of the left ventricle to the apex. Reduced wall motion is noted in the lateral to inferior wall region, with associated wall thickening. Additionally, the pericardium is indistinct in the midsection of the left ventricle, suggesting pericar-

dial and myocardial metastasis.

(b) SMI Gen4 apical four-chamber view: The left circumflex artery is visualized traversing the tumor. Mild narrowing and variations in arterial diameter are noted, but no significant stenosis is observed. Multiple feeder arteries originating from the coronary artery are seen within the tumor.

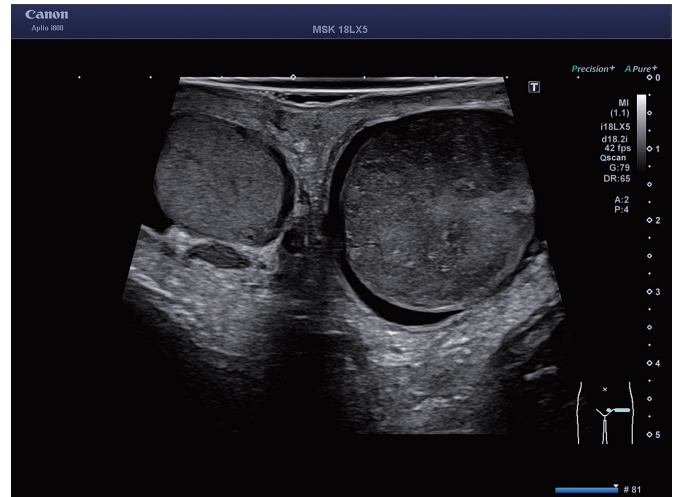
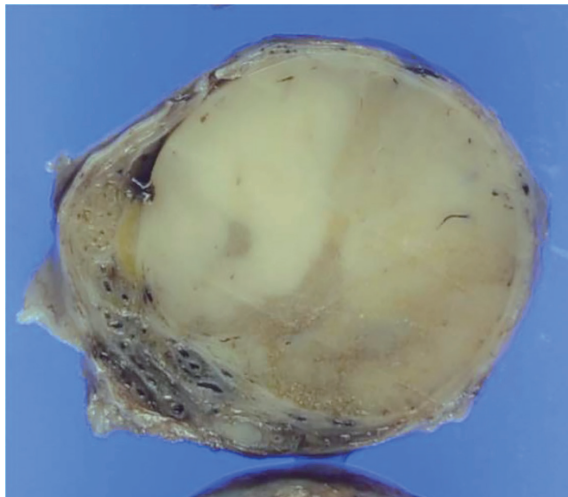
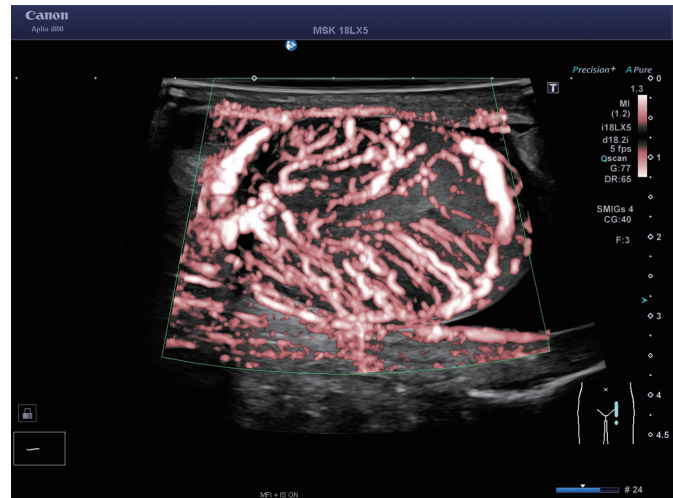
(c) SMI Gen4 apical four-chamber view (focused at the apex): The use of SMI Gen4 with a linear transducer enables a more precise evaluation of the vasculature, confirming maintained perfusion in epicardial areas distal to the tumor.

(d) Coronary artery blood flow waveforms (left circumflex branch): Blood flow waveforms demonstrate diastolic dominance (velocity: 0.9 m/sec). Since the velocity proximal to the tumor is 0.6 m/sec, significant stenosis is unlikely. The additional finding of a low diastolic regression velocity suggests microcirculatory disturbances due to tumor infiltration.

Comments of judges: This case underscores the continued value of echocardiography in evaluating coronary artery blood flow. Although coronary CT has largely replaced echocardiography for this purpose in recent years, echocardiography was historically widely utilized. Additionally, the ability to detect coronary artery lesions during echocardiographic examinations remains clinically valuable in specific cases. This report describes a patient with advanced lung cancer who presented with chest pain, ST elevation, and elevated myocardial biomarkers, raising suspicion for acute coronary syndrome. The left circumflex branch, considered the responsible vessel, was clearly visualized using SMI Gen4, demonstrating no significant coronary artery abnormalities and attributing the patient's symptoms to tumor infiltration. This case exemplifies how echocardiographic assessment of coronary artery blood flow can benefit patient management, rather than relying solely on coronary CT.

*SMI (Superb Micro-vascular Imaging) Generation 4

Sex	Age
Female	70+ years



a b
c d

Recurrent malignant lymphoma of the testis

Nara Medical University Hospital, Nara, Japan
Namiko Yamashita

System used: Aplio i800

Reason for examination: This patient was found to have enlarged left submandibular lymph nodes in the 2010s. Biopsy performed at that time led to a diagnosis of diffuse large B-cell lymphoma (DLBCL). The patient received chemotherapy and remained in remission until PET-CT examination performed in the 2020s, which showed high accumulation in the left testis suggestive of either recurrent malignant lymphoma or testicular cancer. Ultrasound examination was performed for detailed evaluation.

Image findings: FDG PET/CT showed high accumulation with $SUV_{max} = 20.5$ in the left testis. B-mode ultrasound showed enlargement of the left testis compared to the right. A hypoechoic area with poorly defined borders was observed in the parenchyma of the left testis. Examination with cSMI* showed fine but abundant blood flow in the same area as the hypoechoic area noted in PET-CT. No abnormalities were observed in the right testis. The left testis was resected and found to contain solid white components that corresponded to the hypoechoic area seen in the B-mode images.

nents that corresponded to the hypoechoic area seen in the B-mode images.

Clinical comments: Malignant lymphoma of the testis is relatively rare, accounting for only 1% to 7% of all testicular tumors. However, in the field of urology, the testis is the most frequently reported site for malignant lymphoma. Ultrasound examination is extremely useful for detailed evaluation of lesions in the testis because it is a noninvasive method that allows high-resolution images to be observed in real-time from multiple angles.

Technical comments: The hypoechoic area in the testis could be clearly visualized using the high-frequency linear transducer PLI-1205BX. In addition, cSMI showed abundant blood flow in the hypoechoic area. Following dynamic cSMI scanning, addition processing was performed to obtain a summed image (MFI) that more clearly depicted the vascular structures in the hypoechoic area, providing a much more diagnostically useful image.

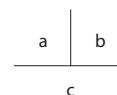
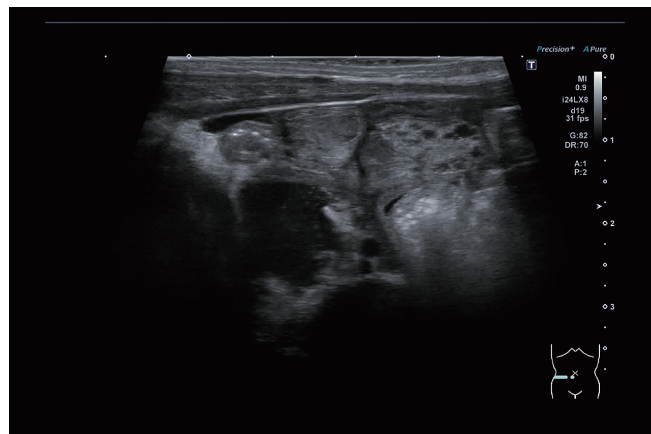
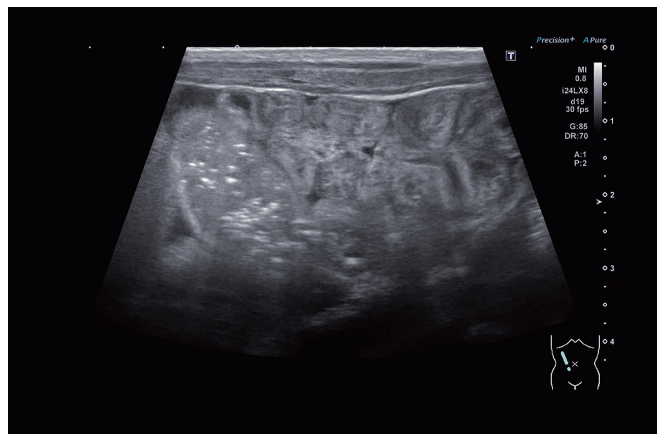
Comments on images: a: Longitudinal B-mode image of the left testis. Fluid is present in the scrotum. A hypoechoic area with unclear margins is seen in the parenchyma of the testis. b: Longitudinal section of the left testis. After a dynamic cSMI image was acquired, MFI processing was performed to generate a summed image which was stored as a still image. With MFI processing, the vascular structures in the hypoechoic area of the testis are even more clearly depicted, providing a more diagnostically useful image. c:

Resected left testis. Solid white components are present in the resected testis, showing good agreement with the hypoechoic area seen in the B-mode image. d: Transverse B-mode image of the testes. The left testis is enlarged, and a small amount of fluid is noted in the scrotum. The parenchyma of the right testis appears isoechoic.

Comments of judges: Although several different diagnoses were possible for this tumor showing accumulation in PET-CT, the ultrasound findings allowed the tumor to be diagnosed as a malignant lymphoma. The examiner paid careful attention to the image quality settings in order to provide images of the greatest possible diagnostic usefulness to the clinician. The MSK preset was used to set imaging parameters that clearly depicted the invasion of surrounding tissues and the irregular hypoechoic area in the testis. Excessive changes in the image quality settings may lead to distortion of the acquired images, so it is important to estimate the tissue characteristics of the target and carefully adjust the image quality settings to ensure accurate visualization. The judges are extremely impressed with the skill of the examiner, who did not simply perform routine scanning, but carefully considered the best way to acquire and convey the essential diagnostic information in this case.

*cSMI (color-coded Superb Micro-vascular Imaging)

Sex	Age
Male	70+ years



5-day-old neonate with intestinal obstruction due to a Meckel's diverticulum band in whom ultrasound was used to determine the need for emergency surgery

Ibaraki Children's Hospital, Ibaraki, Japan
Koji Hirono

System used: Aplio i800

Reason for examination: This baby was delivered at 39 weeks and 2 days gestation with a birth weight of 2978 g. Resuscitation was not required, and the baby was able to suckle and defecate. He was discharged from the maternity hospital at 5 days of age, but was later readmitted for persistent vomiting. The patient's vomiting failed to improve, and he was transferred to our hospital. X-ray examination after transfer showed diffuse intestinal dilatation. Bilious drainage from the gastric tube suggested the presence of an obstruction, and ultrasound examination was requested for detailed evaluation of the cause of vomiting.

Image findings: Examination performed at the time of admission showed changes in the diameter of the small intestine, a band-like structure at the same location, diffuse severe dilatation of the small intestine proximal to the band, and marked collapse of the small intestine distal to the band. Collapse of the entire colon was also observed, and the presence of a lesion causing intestinal obstruction was suspected. Based on evaluation of various diagnostic findings, including the characteristics of the ascites, portal venous gas, intestinal peristalsis, intramural emphysema, and extraintestinal gas, it was considered that there was sufficient time to closely monitor the patient's condition. The image findings also ruled out upper intestinal obstruction, such as midgut volvulus.

tion, such as midgut volvulus.

Clinical comments: The baby was able to suckle and defecate. However, the findings of bilious gastric fluid and obvious intestinal dilatation necessitated prompt and accurate diagnosis to detect intestinal strangulation and to determine the need for immediate surgical intervention. Due to special challenges in the examination of neonates, such as body movement and the advisability of avoiding radiation exposure, sedation, and contrast agents, it was decided that examination should be performed using imaging modalities other than CT. Detailed evaluation was performed repeatedly using ultrasound, which showed clear evidence of intestinal obstruction. These findings led to the decision to perform immediate surgical intervention. At surgery, the patient was found to have intestinal obstruction due to the presence of a Meckel's diverticulum band.

Technical comments: The patient was crying intensely and showed marked abdominal distention. Scanning was therefore performed mainly from the dorsal and lateral directions, avoiding the anterior abdomen where the presence of gas would interfere with scanning. This allowed the examination to be conducted while applying almost no pressure with the probe. Detailed examination was possible using a 24-MHz high-frequency probe*, which is generally unsuitable for intestinal examinations in adult patients due to their thicker abdominal walls. The characteristics of the ascites and intestinal peristalsis were evaluated and a stenotic lesion with a change in diameter was identified, supporting the decision to perform surgical intervention.

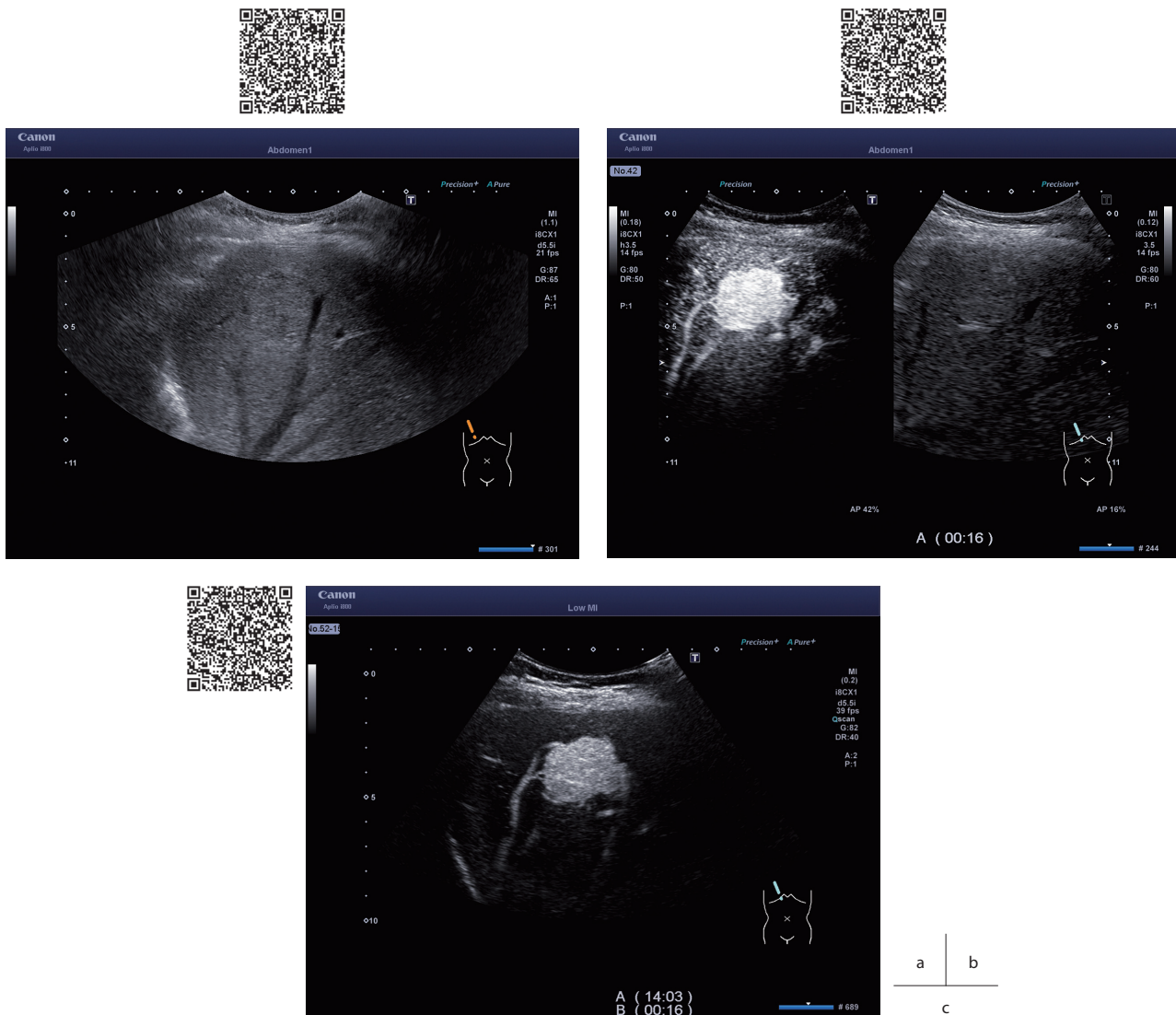
* Typical frequency when used in combination with Aplio i800.

Comments on images: a: Image acquired 12 hours after admission, following gastric tube drainage, fasting, and an enema. The findings of a collapsed ileum without milk residue distally and intestinal dilatation proximally are the

same as those at the time of admission, and the changes in intestinal diameter strongly suggest the presence of a lesion causing intestinal obstruction. The mesentery appears to be converging toward the stenotic lesion. b: Image acquired at the time of admission. Intestinal collapse and dilatation are observed in the distal ileum, with changes in diameter. The dilated intestine is seen to contain milk residue, which is not observed distally. A band-like structure can be confirmed at the same location where a change in diameter is observed. c: Segments distal to the ascending colon had already collapsed at the time of admission, strongly suggesting the presence of a lesion causing intestinal obstruction or impaired intestinal peristalsis.

Comments of judges: This is a case of neonatal intestinal obstruction due to a Meckel's diverticulum band in which ultrasound examination was extremely useful for diagnosing a patient in whom preoperative evaluation was particularly challenging. The use of ultrasound led to life-saving treatment in this patient, and the method described here is judged to be of great clinical value. Examination of this patient was extremely difficult because he was crying intensely and also due to the presence of intestinal gas caused by intestinal obstruction, but the lesion could be clearly depicted by carefully selecting the acoustic windows and employing a 24-MHz high-frequency transducer. In addition, thanks to the ease of use and noninvasiveness of ultrasound, changes in the patient's condition could be closely monitored during the day to check for signs of intestinal necrosis or clinical deterioration until the decision was made to perform open abdominal surgery. The manner in which ultrasound was employed in this case is highly evaluated by the judges. Its advantages over other imaging modalities were fully exploited to obtain clinically valuable and impactful images.

Sex	Age
Male	Neonate 0-6 years



Early hepatic venous outflow of contrast agent from focal nodular hyperplasia (FNH) observed using the contrast low-MI method

Toho University Omori Hospital, Tokyo, Japan
Tomoya Uchimura

System used: Aplio i800

Reason for examination: This woman in her 40s was found to have a gallbladder polyp in a mass screening examination and visited a local physician. Abdominal ultrasound examination performed by the local physician revealed a tumorous lesion in liver S8, and the patient was referred to our hospital for further evaluation. Contrast-enhanced ultrasound (CEUS) was used to examine the tumor, and the low-MI method (in which CEUS is performed with a lower MI setting than in standard B-mode imaging) was employed for detailed evaluation of its vascular characteristics.

Image findings: A tumorous lesion measuring 32×32 mm was found in liver S8. The tumor was round, had clear margins, showed internal heterogeneity, and appeared isoechoic to hyperechoic compared to normal hepatic parenchyma. Color Doppler Imaging and SMI showed weak blood flow signals near the margins of the tumor. The tumor showed hyperenhancement relatively quickly during the arterial phase compared to the surrounding hepatic parenchyma, and hypoenhancement was observed in parts of the tumor during the portal venous phase. Contrast enhancement of the tumor was nearly equivalent to that of the hepatic parenchyma during the post-vascular

phase. CEUS employing the low-MI method showed earlier hyperenhancement of the tumor compared to the hepatic parenchyma and an earlier outflow of contrast agent into the hepatic veins.

Clinical comments: In contrast mode, the finding of hypoenhancement during the portal venous phase was suggestive of central scarring, and no enhancement defect was observed during the post-vascular phase. The lesion was therefore suspected to be focal nodular hyperplasia (FNH). However, the images did not clearly show the distinctive spoke-wheel pattern seen in FNH, which is characterized by contrast enhancement for a brief period during the arterial phase. Use of the low-MI method made it possible to confirm the early outflow of contrast agent into the hepatic veins during the arterial phase, allowing the lesion to be confidently identified as FNH. In the clinical diagnosis of hypervascular hepatic tumors, the combined use of standard contrast mode and the low-MI method is extremely helpful because it makes it easier to clearly understand the tumor's vascular characteristics.

Technical comments: In the low-MI method, unlike standard contrast mode, contrast enhancement is performed with a background B-mode image, resulting in extremely high spatial and temporal resolution for accurate evaluation of contrast enhancement dynamics. With the use of iBeam+ in this case, it was possible to observe contrast enhancement with Full Focus and with a high frame rate, clearly demonstrating the early outflow of contrast agent into the hepatic veins during the arterial phase. By narrowing the dynamic range to 40, the margins between the enhanced tumor and the surrounding hepatic parenchyma could be clearly depicted.

Comments on images: a: Scanning via a right intercostal window. A tumorous lesion was seen in liver S8. The round

tumor measured 32×32 mm and showed clear margins and internal heterogeneity. b: Images acquired using standard contrast mode. The entire tumor was hyperenhancing earlier during the vascular phase (arterial phase) compared to normal hepatic parenchyma. c: Contrast agent was administered again for scanning with the low-MI method. Differences in contrast intensity between the hepatic parenchyma and the tumor could be more clearly seen than in standard contrast mode. In addition, earlier outflow of the microbubbles from the tumor into the hepatic veins could be accurately confirmed.

Comments of judges: B-mode ultrasound is known to be of great value in the diagnosis of hepatic tumors, but CEUS also plays an important role in differential diagnosis. The differential diagnosis of hypervascular tumors focuses mainly on their enhancement patterns and vascular characteristics, but it is essential to not only observe the inflow into the tumor but also the outflow into the veins. In benign tumors, the contrast agent flows out to the hepatic veins, but in hepatocellular carcinomas, the contrast agent flows out to the portal vein. In the present case, the MI value in B-mode was carefully adjusted to clearly observe the early outflow of contrast agent into the hepatic veins. In CEUS, good contrast could be achieved by adjusting the B-mode settings without being limited to contrast mode. But due to advances in ultrasound equipment, images with high temporal and spatial resolution could be obtained in this case by performing CEUS with iBeam+ and Full Focus. In particular, the B-mode images clearly showed the outflow of contrast agent from the tumor into multiple hepatic veins during the arterial phase. This case demonstrates that improvements in B-mode image quality have helped to further increase the clinical value of CEUS.

Sex	Age
Female	40-50 years



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