

Canon

画論

31st

The Best Image

Best Image Awards Compilation

MRI Category

Judging Panel

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Kenichi Yokoyama (Professor and Chairman, Department of Radiological, Kyorin University, School of Medicine)

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[Outstanding Award]

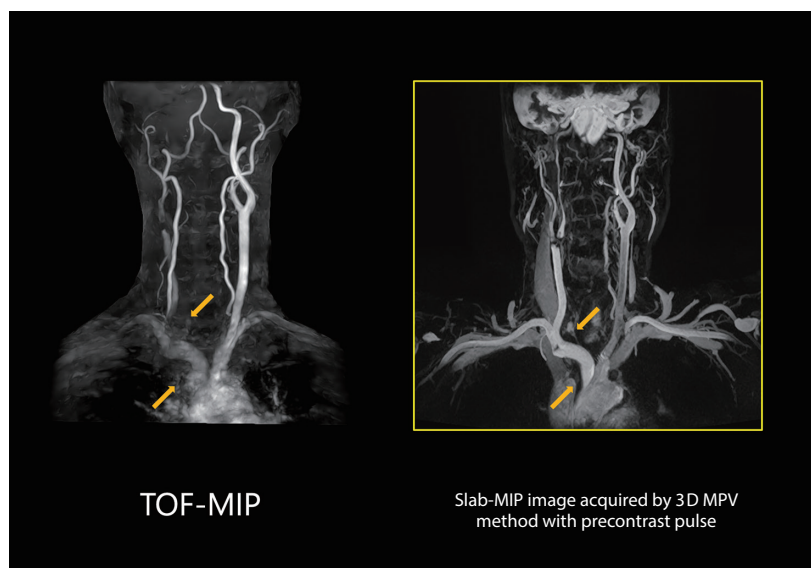
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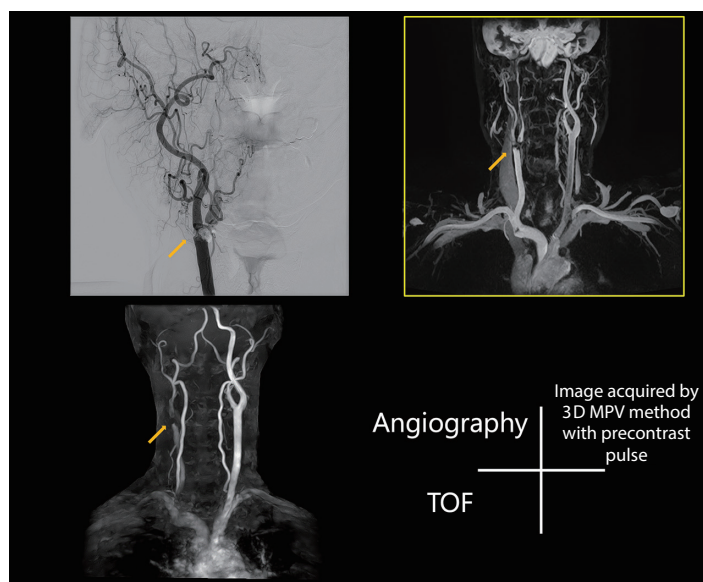
[Clinical Update Award]

Left internal carotid artery dissection

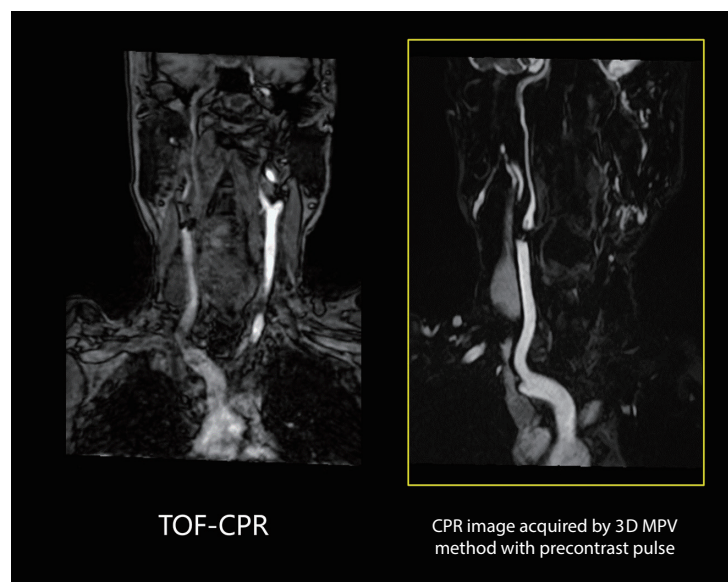
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(a) TOF-MIP image and 3D MPV Slab-MIP image



(b) Comparison with DSA image



(c) CPR images

Neurosurgery

Internal carotid artery stenosis

Jichi Medical University Saitama Medical Center, Saitama, Japan
Nobuyoshi Omi

System used: Vantage Orian

Reason for examination: This is an 84-year-old man with severe stenosis of the right internal carotid artery. Carotid artery MRA was requested for follow-up evaluation and for planning future endovascular treatment.

Clinical comments: The time-of-flight (TOF) technique is widely employed and is considered the gold standard for carotid artery MRA examination. However, evaluation can often be quite challenging in areas around the origins of the carotid arteries near the aortic arch due to poor visualization of blood vessels running parallel to the imaging slice and the effects of respiratory motion. Even when visu-

alization is relatively poor, such as in this case, the technique employed here allows areas around the origins of the carotid arteries near the aortic arch to be clearly depicted. In addition, the scan time was approximately 4 minutes in this case. Such short scan times can be expected to improve clinical workflow.

Technical comments: In this case, a sufficient inflow effect could not be ensured, so the examination focused on the difference in T2 values between arterial blood and venous blood, and a precontrast pulse was applied in the 3D FASE technique to clearly depict the arteries. 3D MPV was selected as the imaging sequence so the precontrast pulse could be applied, and a T1 sweep pattern was employed to visualize the blood vessels with bright blood imaging using an acquisition technique similar to the FASE method. Because the null point is shifted due to the influence of the precontrast pulse when IR pulses are applied to suppress background signals, a contrast pulse of 100 ms and a TI of 80 ms were set, which were the optimal settings determined in a previous study. In addition, Exsper was set to 2 to suppress folding of the image slice at the cranial and caudal ends.

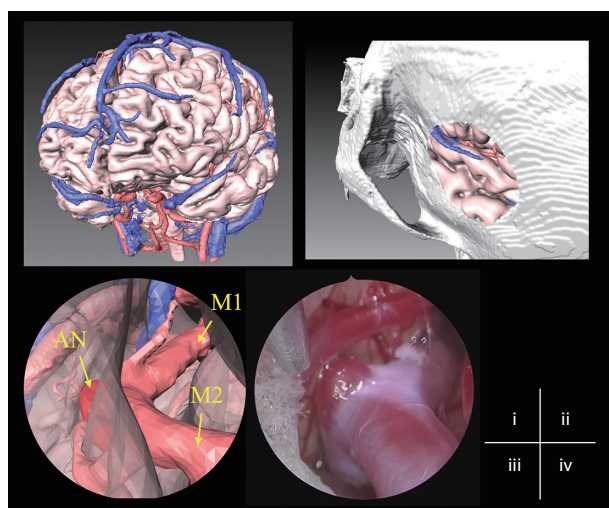
Comments on images: (a) In the TOF image, flow proximal to the internal carotid artery stenosis is slower and the inflow effect is reduced, resulting in poor visualization of the origins of the innominate artery and right common carotid artery. On the other hand, the 3D MPV image acquired with a precontrast pulse clearly depicts these vessels. (b) The stenotic section seen in the right internal carotid artery shows good agreement with the DSA image, suggesting that this method may be useful for evaluating stenosis. (c) Another objective of this examination was to plan future endovascular treatment, and it is possible that use of the 3D MPV method combined with a precontrast pulse may be useful for evaluating and confirming the access route.

Comments of judges: The method employed in this case is highly evaluated because it allowed the optimal conditions for the precontrast pulse to be determined, resulting in effective suppression of venous signals and clear visualization of areas around the aortic arch. This method can clearly depict low flow velocities and blood vessels running along the image plane, which can be challenging when the TOF method is used.

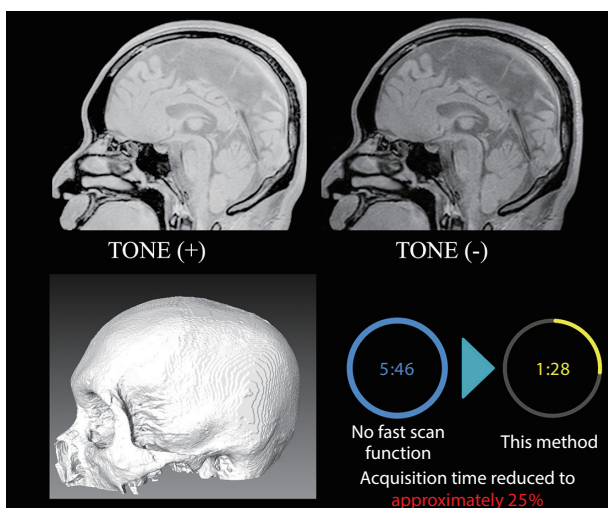
Sex	Age	Weight	Software version	Fasting	Contrast medium
Male	70+ years		V9.0		
Dose	Injection rate	Administration method	Workstation		

Acquisition conditions for 3D MPV	FASE3D MPV: T1, TR: 2550, TE: 81, FA/Flop: 90/180, TI: 80, Gating: peripheral pulse gating, Exsper PE 2, FOV / No Wrap: 30 x 30 / 1, PE matrix x RO matrix: 224 x 288, slice thickness / number of slices: 2 mm / 45, number of acquisitions: 1, AICE*: used/d03e2.0, scan time: 4:10
Coils used	Atlas SPEEDER Head/Neck

*Advanced intelligent Clear-IQ Engine (AICE)



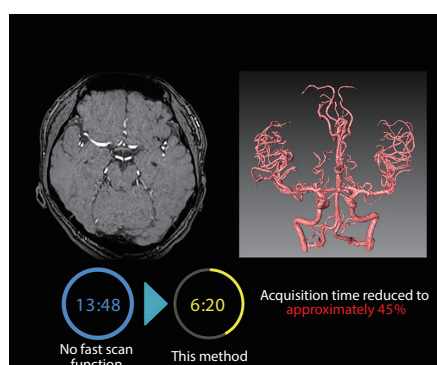
(a) 3D images generated using Amira software and intraoperative photograph of the surgical site



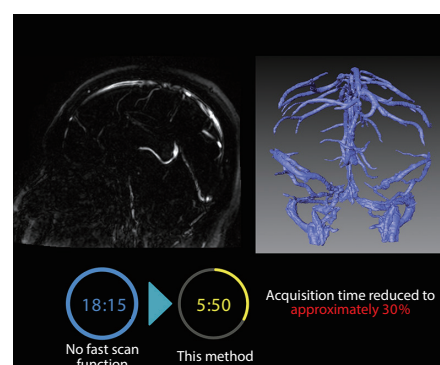
(b) Bone images



(c) Images of brain parenchyma



(d) Images of arteries



(e) Images of veins

Neurosurgery

MCA aneurysm

Fujita Health University Bantane Hospital, Aichi, Japan
Kazuya Takeda

System used: Vantage Orian

Reason for examination: This patient underwent scanning to obtain 3D images for surgical support prior to a clipping procedure for an MCA aneurysm. Contrast CT is usually performed in combination with MRI to obtain such 3D images, but this requires radiation exposure and the administration of contrast medium. In addition, the use of multiple modalities increases both the physical stress and financial burden on the patient and also complicates scheduling and increases the workload on hospital staff. To avoid these problems, the objective in this case was to obtain clinically useful 3D images using noncontrast MRI alone.

Clinical comments: Preoperative 3D imaging is essential for obtaining a detailed understanding of the anatomy, such as the courses of blood vessels, in order to formulate a safe and effective therapeutic plan. Although images are acquired using only non-contrast MRI in the method described here, the precise positional relationships between the brain parenchyma, bones, blood vessels, and aneurysm can be accurately confirmed, and images comparable to those acquired by contrast CT can be obtained. Because no contrast medium is used in this method, examinations can be performed safely even in patients who are allergic to contrast medium and cannot undergo contrast studies.

Technical comments: Because all of the images are acquired using MRI, image registration can be performed more easily, reducing the workload on the radiologic technologists. Moreover, efforts are made to substantially shorten the examination time in order to minimize positional errors caused by patient motion. SPEEDER and Fast 3D mode are employed for high-speed imaging, allowing the conventional scan time of approximately 45 minutes to be shortened to approximately 15 minutes. The scan speed is much faster because the k-space filling factor is increased by employing the Fast 3D mode Wheel method, but some loss of high-frequency components is unavoidable. The scan conditions are therefore optimized to minimize any degradation in image quality. Tone processing is applied to the bone sequence, which increases contrast between the brain parenchyma and the cranial bones and allows the bones to be extracted more precisely and efficiently.

Comments on images: (a-i, a-ii) The bones, brain parenchyma, and blood vessels are clearly depicted. The surgical procedure can be simulated by removing parts of the cranial bones in images of the craniotomy site. (a-iii) The positional relationships between the brain parenchyma, blood vessels, and aneurysm can be precisely evaluated. (a-iv) A photograph of the surgical site obtained during the procedure shows excellent positional agreement between (a-iii) and (a-iv), demonstrating the high accuracy of the generated image. (b) SPEEDER and the Fast 3D mode Wheel method are used to achieve high-speed imaging, allowing the conventional scan time of 5 minutes and 46 seconds to be shortened to only 1 minute and 28 seconds in this case. In addition to adjusting the parameters so that the bones are shown with low signal intensity, Tone processing is applied to increase contrast between the brain parenchyma and the cranial bones for precise bone extraction. (c) In addition to using SPEEDER and the Fast 3D mode Multiple method, the TR is shortened to further increase the scan speed. Because the primary objective of this scanning method is to visualize the brain surface, precise images can be acquired even with a short TR by using fat suppression in combination to ensure that the CSF shows high signal intensity. This approach allows imaging to be performed in a short scan time, which was only 1 minute and 52 seconds in this case. (d) SPEEDER and the Fast 3D mode Wheel method are used to achieve high-speed imaging, allowing the conventional scan time of 13 minutes and 48 seconds to be shortened to 6 minutes and 20 seconds in this case. The scan speed becomes faster as the factor is increased in the Fast 3D mode Wheel method, but some loss of high-frequency components is unavoidable. The scan conditions are therefore optimized to minimize any degradation in visualization of the vessels. (e) SPEEDER is also used in the slice direction to achieve high-speed imaging, allowing the conventional scan time of 18 minutes and 15 seconds to be shortened to 5 minutes and 50 seconds in this case.

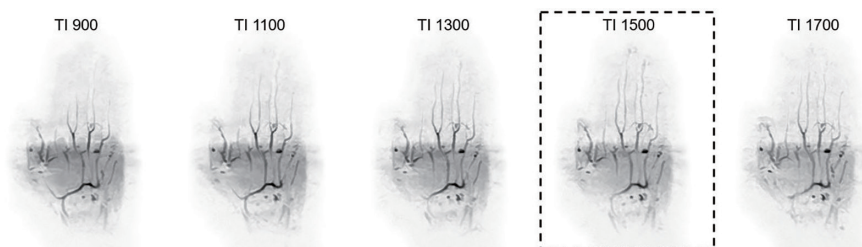
Comments of judges: One-stop examination was performed using non-contrast MRI alone to obtain images for surgical support prior to a clipping procedure for an MCA aneurysm. The method employed in this case is highly evaluated because it takes full advantage of Fast 3D mode and AiCE, allowing the total scan time to be reduced while maintaining good image quality. Special efforts were also made to improve contrast of the cranial bones by applying Tone processing.

Sex	Age	Weight	Software version	Fasting	Contrast medium
Male	30-40 years	70-80 kg	V8.0	Not required	Not used
Dose	Injection rate	Administration method	Workstation		
			Amira™		

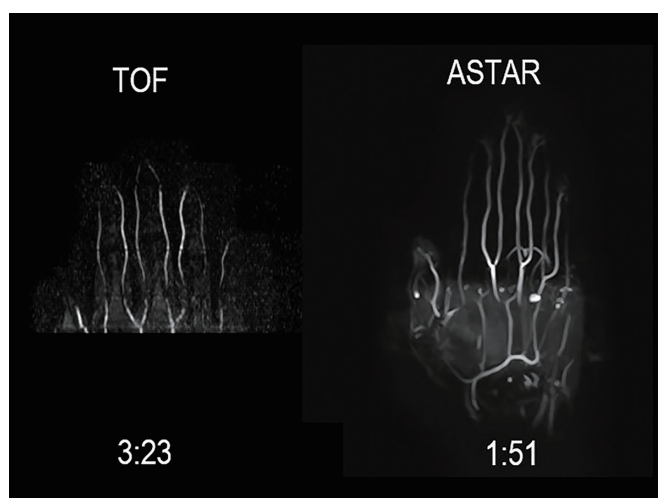
Acquisition conditions for (b)	FE3D, TR: 8.4, TE: 4.2, FA: 5, SPEEDER Factor: PE 2.0, FOV: 23×20, PE matrix × RO matrix: 208×192, slice thickness / number of slices: 1.1 mm / 180, number of acquisitions: 1, AiCE: used/d03:1.5, scan time: 1:28
Acquisition conditions for (c)	FASE3D, TR: 1300, TE: 250, FA/Flop: 90/180, fat suppression: FatSat Strong, SPEEDER Factor: PE 2.0 / SE 1.8, FOV: 24×24, PE matrix × RO matrix: 192×192, slice thickness / number of slices: 1.6 mm / 110, number of shots: 2, number of acquisitions: 1, AiCE: used/d02:1.0, scan time: 1:52
Acquisition conditions for (d)	MRA3D, TR: 16, TE: 6.8, FA: 16, SPEEDER Factor: PE 2.0, FOV: 20×20, PE matrix × RO matrix: 192×256, slice thickness / number of slices: 1 mm / 162, number of acquisitions: 1, AiCE: used/d02:1.0, scan time: 6:20
Acquisition conditions for (e)	PSMRA3D, TR: 20.2, TE: 7.0, FA: 20, SPEEDER Factor: PE 2.0 / SE 1.6, FOV: 23×20, PE matrix × RO matrix: 184×208, slice thickness / number of slices: 3.0 mm / 56, number of acquisitions: 1, AiCE: not used, scan time: 5:50
Coils used	Atlas SPEEDER Head/Neck



(a) MIP image acquired with ASTAR



(b) Comparison of different TI values



(c) Comparison of TOF and ASTAR methods

Peripheral vessels

Ischemic pain

Hasuda Hospital, Saitama, Japan
Takashi Yamada

System used: Vantage Orian

Reason for examination: Detailed examination was performed for suspected ischemia in the fingers of the right hand.

Clinical comments: The blood flow velocity in peripheral blood vessels is low, and it can be difficult to visualize these blood vessels due to low signal intensity and discontinuities in the depiction of the arteries and veins. ASTAR is an imaging method which was originally developed for

examination of the cerebral blood vessels, and the ASL and mASTAR methods are also available. The case described here was examined using this scanning method. The optimal TI value was determined by Prep imaging, FFE was changed to SSFP, and NAQ was set to 4 (a multiple of 2) for differential processing. The peripheral arteries were selectively visualized at high signal intensity without gating. The ASTAR method was used to evaluate the blood vessels in the fingers by employing a novel scanning method based on noncontrast MRA imaging without gating.

Technical comments: Scanning was performed to obtain a Prep image, which was then used to create a simple 4D image. Because Fast 3D mode (which is useful for shortening the scan time) also affects the visualization of peripheral blood vessels, Fast 3D mode was selectively employed for Prep imaging, but not for this scan. In head imaging, "Selective" is usually set for ControlIR, but in this case, "Non-Selective" was set in order to optimize the tag label-

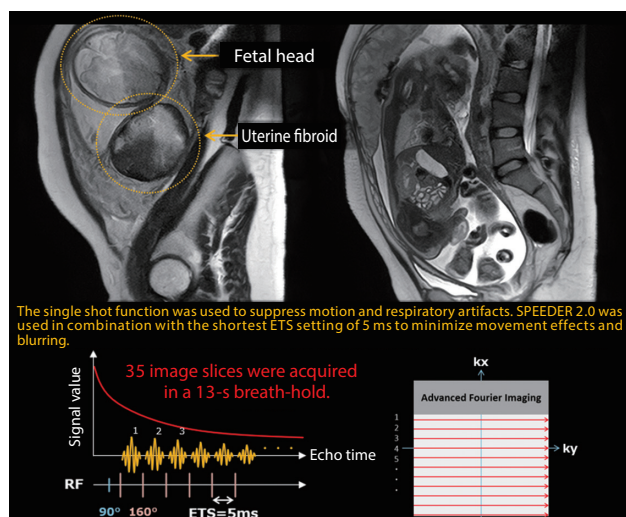
ing effect (Move-in).

Comments on images: (a), (b), and (c) The palmar digital artery on the ulnar side of the little finger is not visualized in images acquired using the TOF method. However, the image obtained using the ASTAR method shows that blood flow is present in this vessel, but with reduced velocity. An arcuate arterial anastomosis is also seen between the middle finger and the ring finger. The clinical condition of these vessels can be more accurately assessed in the ASTAR images than in the TOF images.

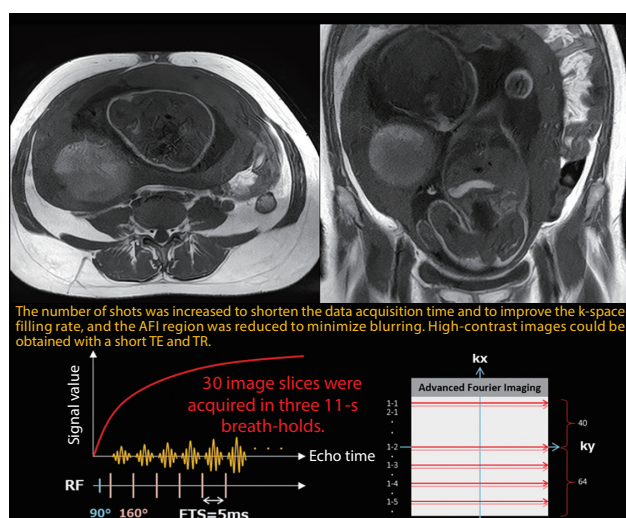
Comments of judges: The ASTAR method can clearly depict reduced blood flow in the palmar digital arteries, which are difficult to evaluate using the TOF method. In the case described here, the scan parameters were carefully selected and the scanning method was optimized to minimize the scan time.

Sex	Age	Weight	Software version	Fasting	Contrast medium
			V7.0		
Dose	Injection rate	Administration method	Workstation		

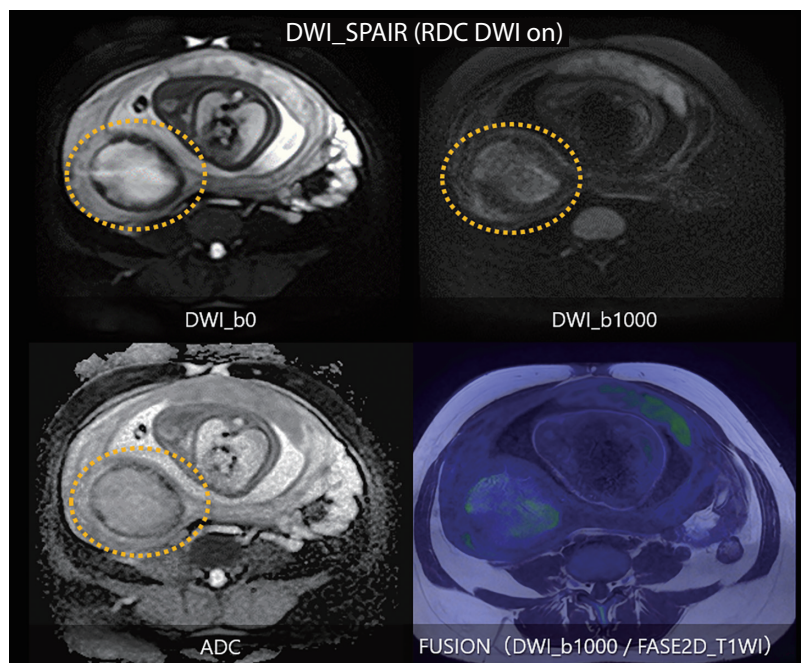
Acquisition conditions for (a) and (c)	SSFP3D: ASTAR2, TR: 4, TE: 2, FA: 120, TI: 1500, fat suppression: FatSAT, gating: none, SPEEDER factor PE: 2.0, FOV: 23.1 × 23.1, matrix: 192 × 192, slice thickness / number of slices: 1.5 mm / 10, number of segments: 1, number of acquisitions: 4, AICE: used/d05e1.0, scan time: 1:51
Acquisition conditions for (b)	SSFP3D: ASTAR2, TR: 4, TE: 2, FA: 120, TI: 1500, fat suppression: FatSAT, gating: none, SPEEDER factor PE: 2.0, FOV: 23.1 × 23.1, matrix: 192 × 192, slice thickness / number of slices: 3 mm / 8, number of segments: 1, number of acquisitions: 2, AICE: used/d05e1.0, scan time: 0:24



(a) T2WI (FASE2D)



(b) T1WI (FASE2D)



(c) DWI (with RDC DWI) and fusion image

Pelvis

Breath-hold FASE scanning in a pregnant patient with uterine fibroids

Toho University Omori Hospital, Tokyo, Japan
Takuya Hatakeyama

System used: Vantage Orian

Reason for examination: MRI was requested for this pregnant patient with uterine fibroids in order to select the optimal delivery method based on careful assessment of the risk of fetal compression and obstructed labor. Additional objectives were to accurately determine the status, size, and number of fibroids as well as to evaluate the risk of atonic hemorrhage.

Clinical comments: The patient was examined at 33 weeks of pregnancy. The fetus was in the breech position. No remarkable abnormalities were observed. A fibroid measuring 9 cm in diameter was seen as a high-intensity mass on the right wall of the uterus in T1WI and as a marginal low-

intensity mass in T2WI, which are findings suggestive of red degeneration. Due to the high levels of blood flow in the uterus during pregnancy and the increased risk of atonic postpartum hemorrhage in patients with uterine fibroids, the patient's baby was delivered without performing myomectomy.

Technical Comments: When a pregnant patient is scanned, placing the patient in the supine position for a prolonged period may lead to hypotension due to compression of the inferior vena cava. Examinations should therefore be performed with the patient in a comfortable position and in the shortest possible time. In the present case, the FASE sequence was employed with the parameters adjusted to allow a short breath-hold time and a small number of acquisitions. For T2WI, the number of shots was set to 1, allowing 35 image slices to be acquired in a single 13-s breath-hold, and for T1WI, the number of shots was set to 20, allowing 30 image slices to be acquired in three 11-s breath-holds. High-contrast, high-resolution images were obtained. Although it was necessary to closely monitor the patient's condition during the examination, the total examination time was only about 12 minutes.

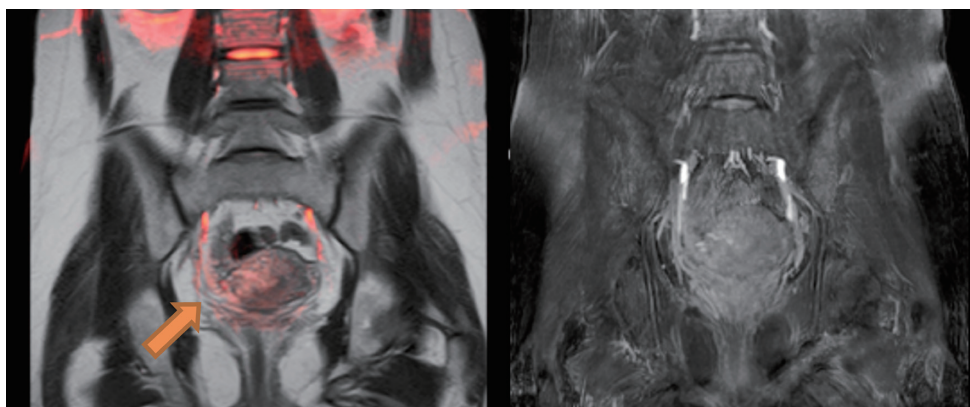
Comments on images: (a) Because scanning was per-

formed as a single shot in T2WI using FASE2D, the acquired images contain minimal motion artifacts. Compared to FSE, motion and respiratory artifacts are significantly reduced. The parameters were adjusted to allow a short breath-hold time of 15 s or less. (b) In T1WI acquired with FASE2D, the parameters were adjusted to ensure high contrast while shortening the breath-hold time. Because the k-space is divided and filled, body movement effects may be observed due to the larger number of shots, but shortening the breath-hold time makes it possible to obtain high-resolution, high-contrast images. (c) The use of RDC DWI allowed images with low levels of distortion to be obtained over an imaging range as wide as 35 cm in the axial direction, and hematomas can be clearly visualized in a fusion image generated from T1WI acquired using FASE2D.

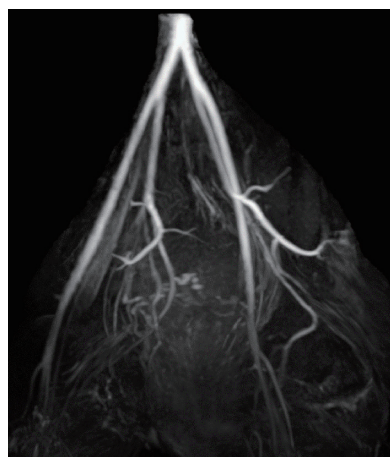
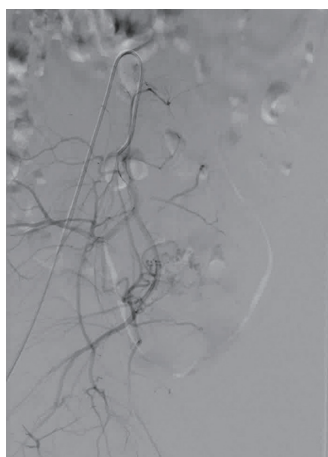
Comments of judges: Because scanning of pregnant patients can easily be affected by body movement, FASE was used instead of FSE and AiCE was used in combination to obtain clear images. Clinically useful images could be acquired by DWI without distortion and accurate ADC maps could be obtained by RDC DWI.

Sex	Age	Weight	Software version	Fasting	Contrast medium
Female	30-40 years	70-80 kg	V8.0	Not required	
Dose	Injection rate	Administration method	Workstation		

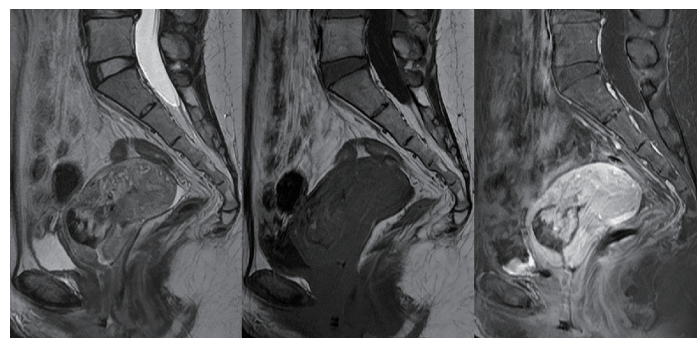
Acquisition conditions for (a)	FASE2D+5, TR: 14361, TE: 80.0, FA/Flop: 90/160, SPEEDER Factor PE: 2, FOV / No Wrap: 33×33 / 1, PE matrix × RO matrix: 256×320, slice thickness / number of slices: 6.5 mm / 35, number of shots: 1, number of acquisitions: 1, AiCE: used/d04e2.2, scan time: 0:13
Acquisition conditions for (b)	FASE2D+5, TR: 500, TE: 10.0, FA/Flop: 90/160, SPEEDER Factor PE: 2, FOV / No Wrap: 33×33 / 2, PE matrix × RO matrix: 256×320, slice thickness / number of slices: 6.5 mm / 30, number of shots: 20, number of acquisitions: 1, AiCE: used/d04e2.2, scan time: 0:33 (0:11×3)
Acquisition conditions for (c)	SEEP/2D+0.52, TR: 7291, TE: 60.0, FA/Flop: 90/180, fat suppression: SPAIR, b-factor: 1000, SPEEDER Factor PE: 2, FOV / No Wrap: 30×35 / 1.0, PE matrix × RO matrix: 128×128, slice thickness / number of slices: 6.0 mm / 35, number of acquisitions: b0=1, b1000=2, AiCE: used/d02e1.4, scan time: 2:26
Coils used	Atlas SPEEDER Body and Atlas SPEEDER Spine



(a) Non-contrast Time-SLIP + T2WI fusion image and 3D T1 FatSAT dynamic image



(b) DSA image and Time-SLIP (MIP image) obtained during uterine artery embolization (UAE)



(c) Comparison of T2WI, T1WI, and contrast-enhanced T1WI FatSAT images

Pelvis

Retained placenta

University of Teikyo Hospital, Tokyo, Japan
Shizuho Shikama

System used: Vantage Galan 3T

Reason for examination: Detailed examination was performed prior to uterine artery embolization for retained placenta. MRI was requested for precise evaluation of the vascular anatomy and blood flow in the placenta.

Clinical comments: A mass measuring 29×29×29 mm was found within the body of the uterus. The mass was thought to be associated with a previously identified retained placenta. Abundant blood flow was observed, and contrast-enhanced images suggested that the blood flow was predominantly on the right side. Time-SLIP images also showed right-dominant blood flow. Blood flow other than that in the uterine artery was also seen the early

phase, making it difficult to distinguish between the arteries and veins. However, the images acquired using Time-SLIP (a non-contrast imaging method) suggested that this blood flow was venous. Based on these findings, uterine artery embolization was scheduled for a later date.

Technical comments: To confirm the courses of the vessels, examination was performed using the Time-SLIP method to visualize the uterine arteries. Scanning was conducted in Move-In mode with the BBTI value adjusted so as to clearly depict the uterine arteries while suppressing signals from the bladder. Dynamic scanning and late-phase scanning were also performed, confirming the right-dominant blood flow suggested by the contrast study. Based on comparison of the contrast-enhanced images and the Time-SLIP images, it was concluded that information of comparable diagnostic value could be obtained using the non-contrast imaging method.

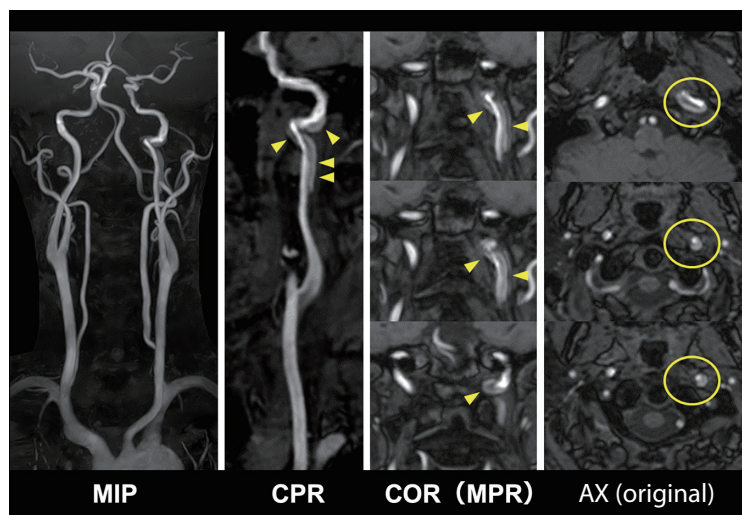
Comments on images: (a) Comparison of Time-SLIP image and contrast-enhanced T1WI FatSAT image. The BBTI and TR were adjusted to reduce background signals (such as those from the bladder) so the uterine arteries could be clearly visualized. Displaying the Time-SLIP image in color

and superimposing it on the T2WI image allowed the right-dominant blood flow to be more easily observed. (b) Comparison of a DSA image and a Time-SLIP image obtained with MIP during uterine artery embolization (UAE). The courses of the uterine arteries flowing into the retained placenta can be confirmed. (c) Comparison of T2WI, T1WI, and contrast-enhanced T1WI FatSAT images. The mass within the body of the uterus shows nonuniform hyperintensity in T2WI and isointensity in T1WI and the peripheral areas show hypointensity in T2WI and isointensity in T1WI as compared to the muscular layer. These findings suggest that the mass is associated with the previously identified retained placenta.

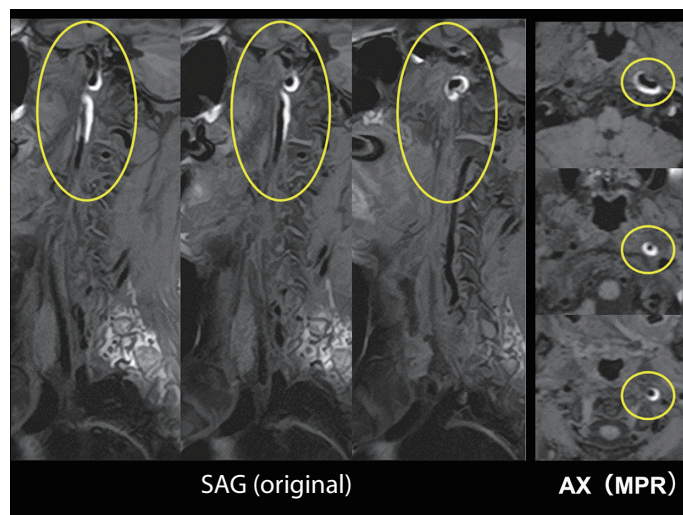
Comments of judges: The uterine arteries could be visualized using the Time-SLIP method. The BBTI value was carefully adjusted to suppress signals from the bladder (which could interfere with visualization), allowing the uterine arteries to be clearly depicted. In addition, comparison of the contrast-enhanced images and the MRA images acquired with Time-SLIP suggests that this non-contrast imaging method can provide equally useful diagnostic information.

Sex	Age	Weight	Software version	Fasting	Contrast medium
Female	20-30 years	50-60 kg	V8.0	Required	Magnescape IV injection 38% Syringe 11 mL
Dose	Injection rate	Administration method		Workstation	
11 mL	2 mL/s	An injector was used to inject Magnescape at 2 mL/s followed by a 20-mL saline flush.			

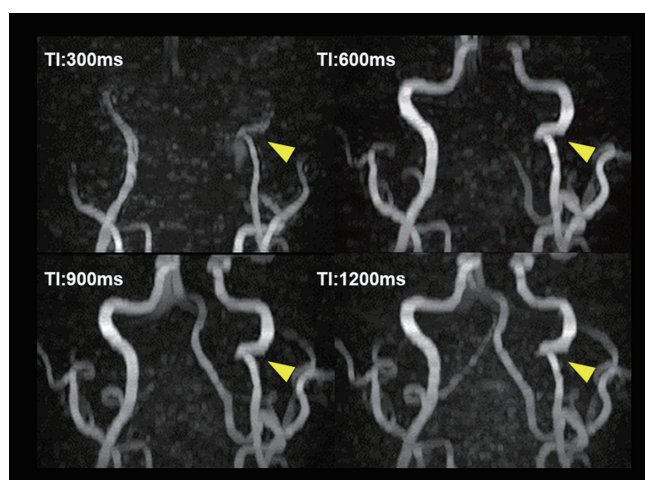
Acquisition conditions for (a) and (b)	SSF3D-F3 (50), TR: 4.0, TE: 2.00, FA: 120, TI: 250, BBTI: 2000, gating: peripheral pulse gating, SPEEDER Factor PE: 2.0, FOV / No Wrap: 35×30 / 1.3, PE matrix × RO matrix: 256×240, slice thickness / number of slices: 1.5 mm / 160, number of segments: 1, number of acquisitions: 1, scan time: 4:26
Acquisition conditions for (c)	FSE2D+9:MPV_HL, TR: 4200, TE: 99.0, FA/Flop: 120/140, Exsper PE: 2, FOV / No Wrap: 25×25 / 2.0, PE matrix × RO matrix: 288×400, slice thickness / number of slices: 3.0 mm / 37, number of segments: none, number of acquisitions: 1.5, AICE: used/d04e1.1, scan time: 3:14
Coils used	Atlas SPEEDER Body and Atlas SPEEDER Spine



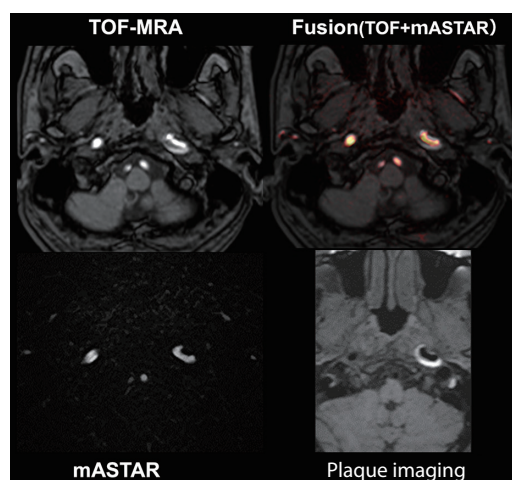
(a) TOF-MRA



(b) Plaque imaging



(c) mASTAR



(d) Comparison of TOF-MRA, mASTAR, fusion, and plaque imaging

Neck

Left internal carotid artery dissection

Jichi Medical University Saitama Medical Center, Saitama, Japan
Yoshimasa Ikeda

System used: Vantage Orian

Reason for examination: This patient developed pain on the left side of his neck and face which gradually worsened over a period of 2 weeks. Vascular MRI of the neck was requested for detailed examination.

Clinical comments: When evaluating patients with carotid artery dissection, it is important to determine the range of dissection, to detect the presence of thrombosis in the false lumen, and to evaluate blood flow in both the false and true lumens. On the other hand, the additional scanning needed to obtain this diagnostic information increases the total examination time, which places a greater burden on the patient and has a negative impact on

examination workflow. The method described in this update has been found to be very useful because it allows the status of the false lumen to be evaluated in a shorter examination time.

Technical comments: The scan conditions described in the 26th Garon The Best Image in 2018 were employed, and Fast 3D mode and AiCE were used in combination to shorten the scan times. The conventional mASTAR scan time of 5 minutes and 48 seconds could be reduced to 2 minutes and 14 seconds, and the conventional plaque imaging scan time of 4 minutes and 40 seconds could be reduced to 1 minute and 45 seconds. These shorter scan times made it possible to perform one-stop diagnostic imaging with a total scan time of only 10 minutes while maintaining high image quality. In addition, special procedures were employed to generate fusion images from the acquired images, providing a clearer understanding of the status of thrombus and blood flow in the false lumen and the relationships with blood flow in the true lumen.

Comments on images: (a) TOF-MRA images of suspected dissection of the left internal carotid artery (yellow arrowheads and yellow circles). (b) In order to examine the blood vessels of the neck over their entire length, plaque imaging was performed with sagittal acquisition. The lumen of the dissection was depicted with high intensity in plaque imaging (yellow circles), suggesting the formation of thrombus. (c) mASTAR was also performed to precisely evaluate the blood flow in the false lumen. The images showed no changes in signal intensity suggestive of blood flow in the false lumen, and the lesion was therefore diagnosed as a dissection with occlusion of the false lumen. (d) The combination of mASTAR, plaque imaging, and fusion images allowed accurate diagnosis of the blood flow and the status of both the false and true lumens.

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Comments of judges: Improvements have been made to a method described in a previous Garon, further expanding the range of applications of this method in clinical practice. The status of the blood flow in both the false and true lumens could be accurately evaluated by combining TOF-MRA, mASTAR, plaque imaging, and fusion images. This improved method is also highly evaluated because the scan time could be reduced to approximately 10 minutes by using Fast 3D mode and AiCE in combination.

Reference Garon article: Suspected vertebral artery dissection, 26th Garon The Best Image, 2018 (in Japanese)

Sex	Age	Weight	Software version	Fasting	Contrast medium
Male	50-60 years	70-80 kg	V9.0		
Dose	Injection rate	Administration method	Workstation		
			Ziostation™2		

Acquisition conditions for (a)	MRA3D:fc:F3(70), TR: 21, TE: 6.8, FA: 18, fat suppression: none, gating: none, SPEEDER Factor PE: 2.0, FOV / No Wrap: 13×24 / 2, PE matrix × RO matrix: 96×256, slice thickness / number of slices: 1.5 (0.75) mm / 178 (356), number of segments: 32, number of acquisitions: 1, AiCE: used/d03:1.0, scan time: 6:30
Acquisition conditions for (b)	FASE3D+4.5:MPV:F3W:T1, TR: 500, TE: 13.5, FA/Flop: 90/50, fat suppression: SPAIR, gating: none, SPEEDER Factor PE: 1.5, FOV / No Wrap: 28×25 / 1, PE matrix × RO matrix: 256×240, slice thickness / number of slices: 1.5 (0.75) mm / 65 (130), number of shots: 5, number of acquisitions: 1, AiCE: used/d04:1.7, scan time: 1:45
Acquisition conditions for (c)	FFE3D:F3(70):ASTR, TR: 5.6, TE: 1.9, FA: 8, TI: 300, 600, 900, 1200, TI step: 300 ms, fat suppression: none, gating: none, SPEEDER Factor PE: 2.0, FOV / No Wrap: 18×18 / 1, PE matrix × RO matrix: 160×160, slice thickness / number of slices: 3 (1.5) mm / 30 (60), number of segments: 2, number of acquisitions: 2, AiCE: used/d03:1.2, scan time: 2:14
Coils used	Atlas SPEEDER Head/Neck

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