Non-Contrast Portal Vein Imaging Using *syngo* NATIVE MR Angiography

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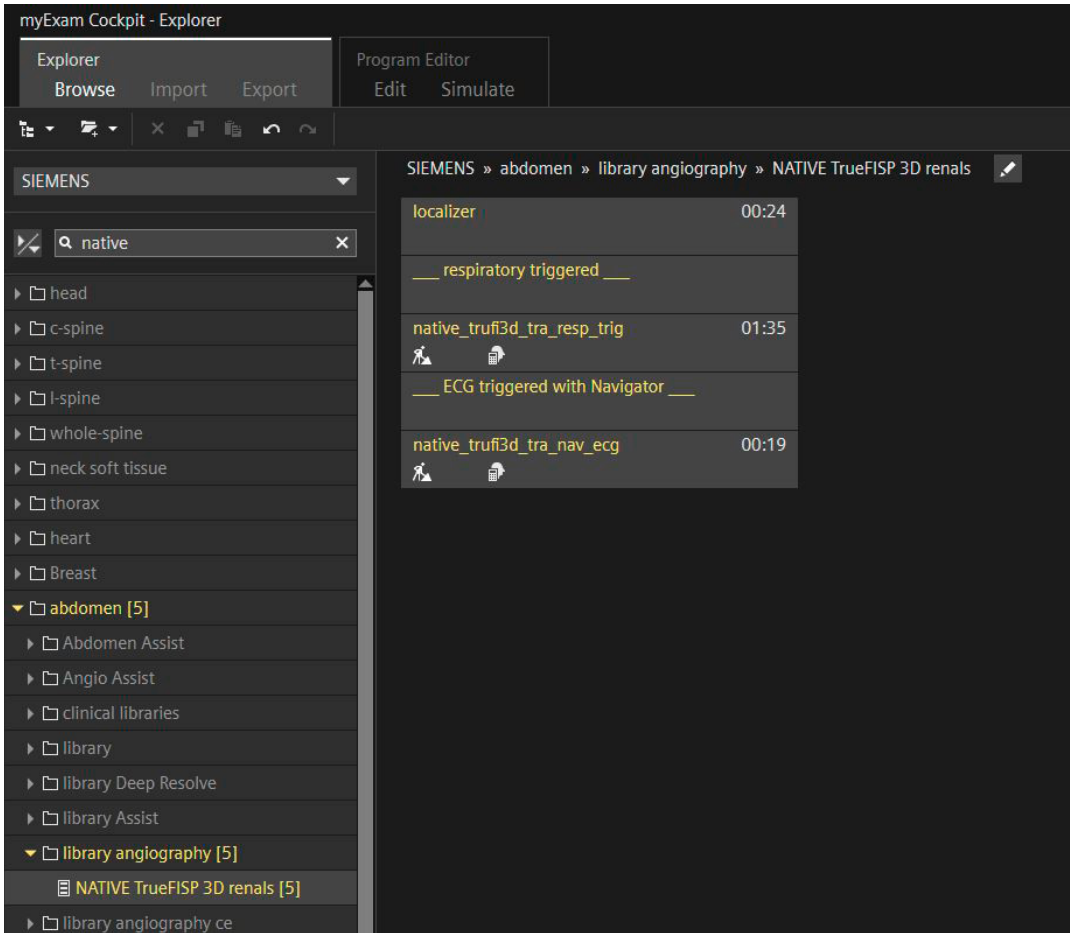
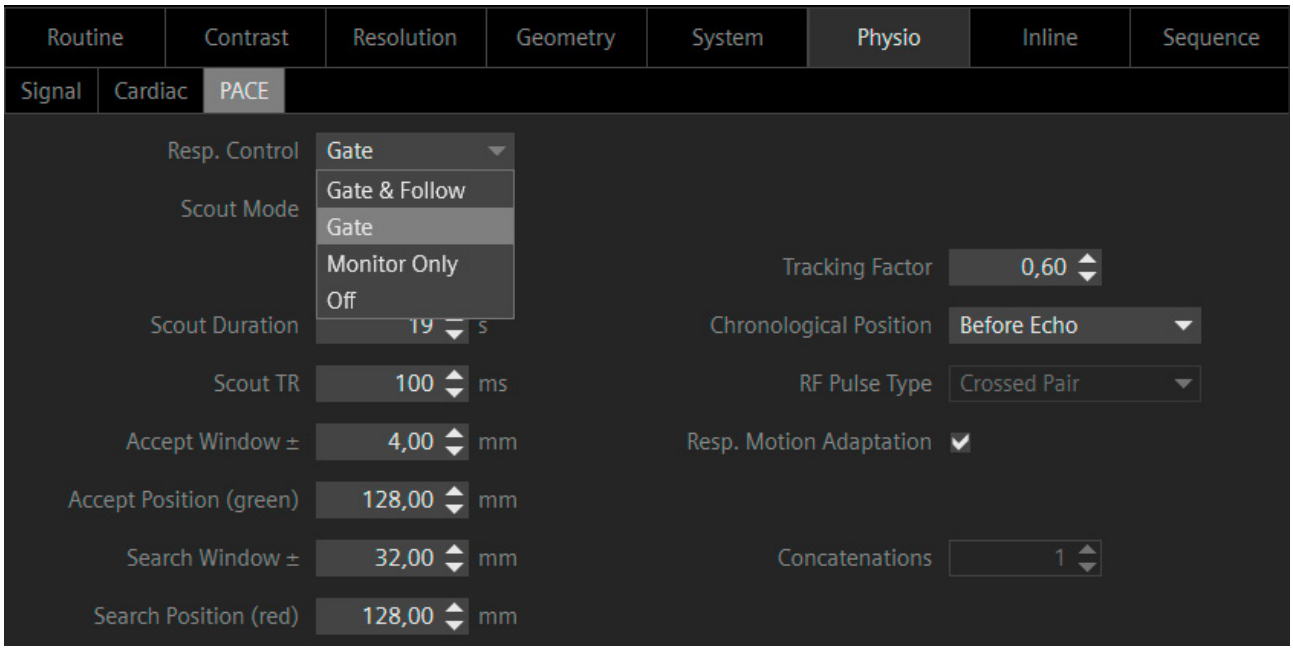
Evaluation of the portal venous system is an important part of abdominal magnetic resonance imaging (MRI) studies, particularly in patients with chronic liver disease, suspected portal vein thrombosis, or portal hypertension, or before interventional and surgical procedures. Contrast-enhanced MR angiography is commonly used for this purpose; however, in daily practice a non-contrast technique is desirable in many situations. These include impaired renal function, repeated follow-up examinations, limited intravenous access, or even allergies. Ultrasound is often the first-line imaging method, but MRI offers a larger field of view and a better anatomical overview [1, 2].

The aim of our protocol is to provide a reproducible, patient-friendly, and clinically useful examination of the portal venous system without the need for gadolinium. The protocol can be done using a 1.5T or 3T system. The examples below are from two 1.5T systems (MAGNETOM Sola and MAGNETOM Flow) and one 3T system (MAGNETOM Lumina), respectively. We can use either the Contour or Body Matrix coils together with the Spine coil integrated into the table.

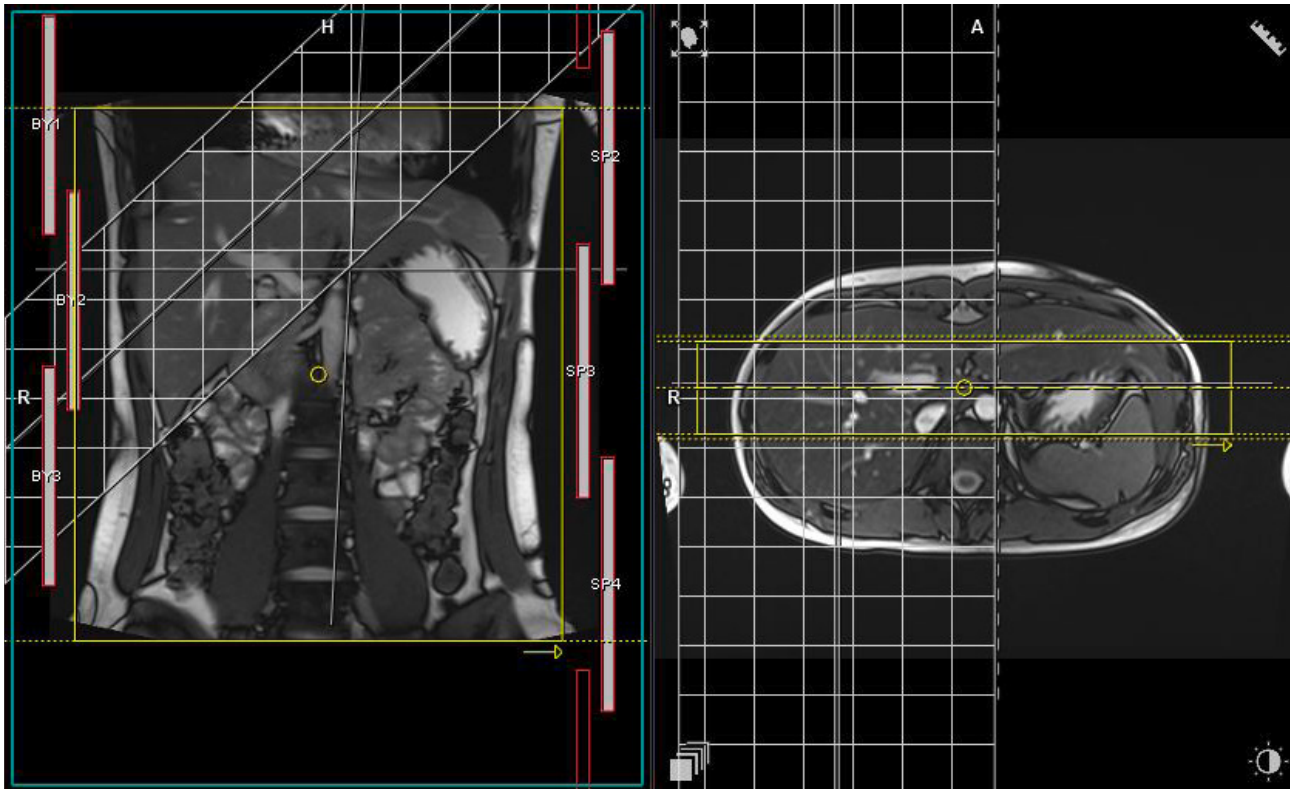
We can benefit from BioMatrix Technology integrated into the Spine coil and use the respiratory signal to gate and trigger the data acquisition. You can take the native_trufi3d_tra_resp_trig protocol directly from the Siemens Healthineers protocol tree (Fig. 1). You still have the possibility to use the Resp. control on the Physio card and PACE (Fig. 2).



1 Where to find the native_trufi3d_tra_resp_trig protocol.

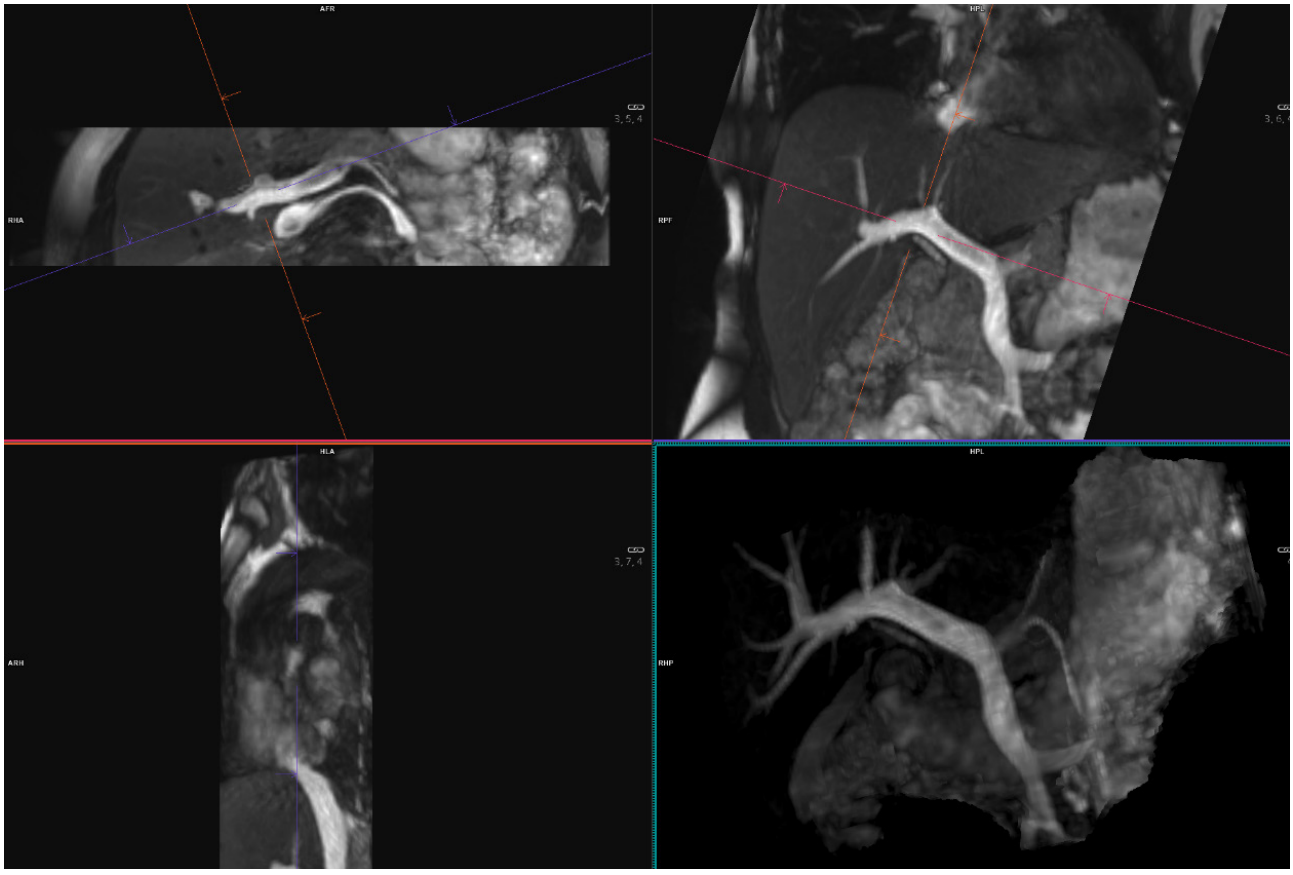


2 Respiratory gating options.

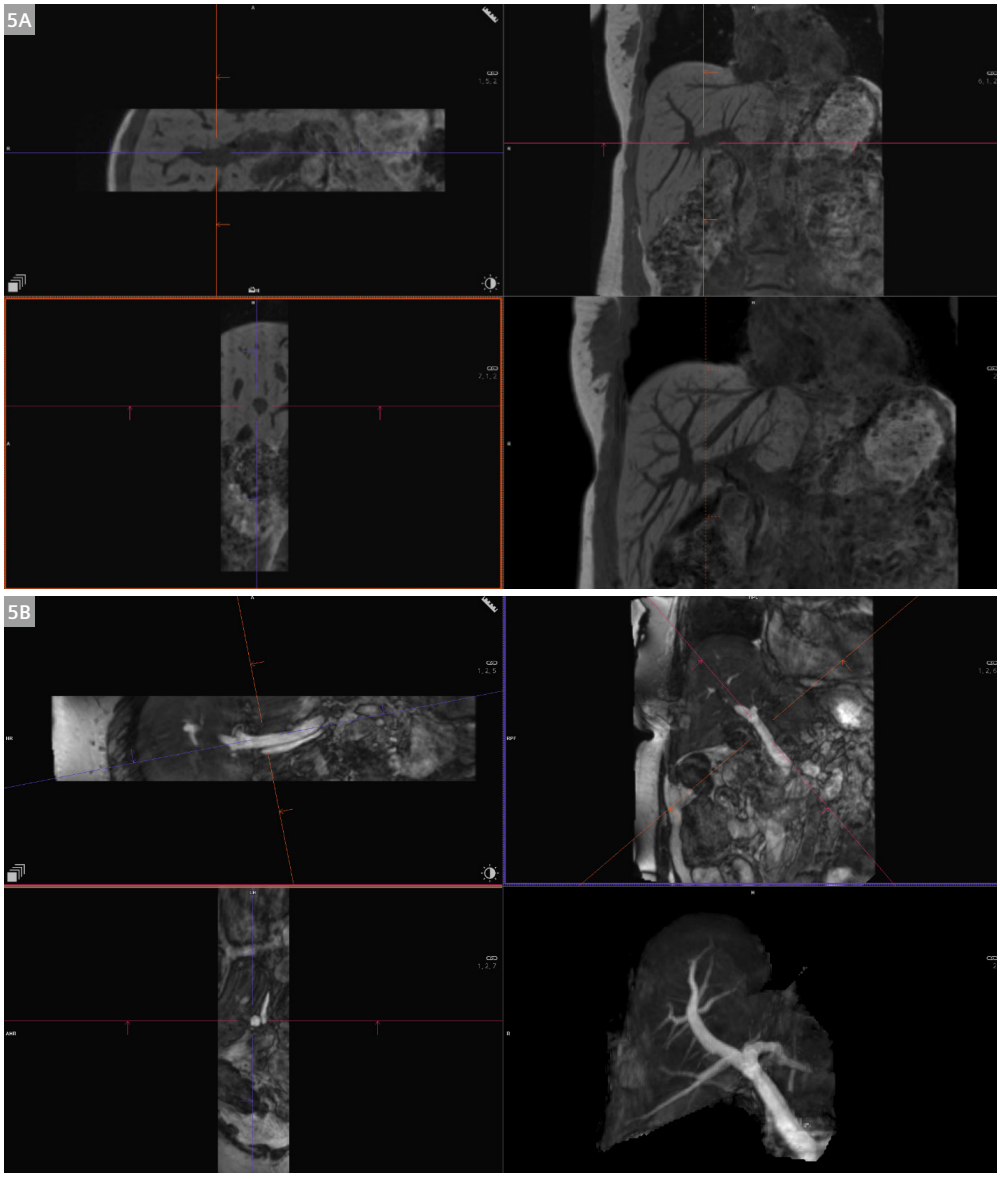


3 How to position the slices and the inversion graphics.

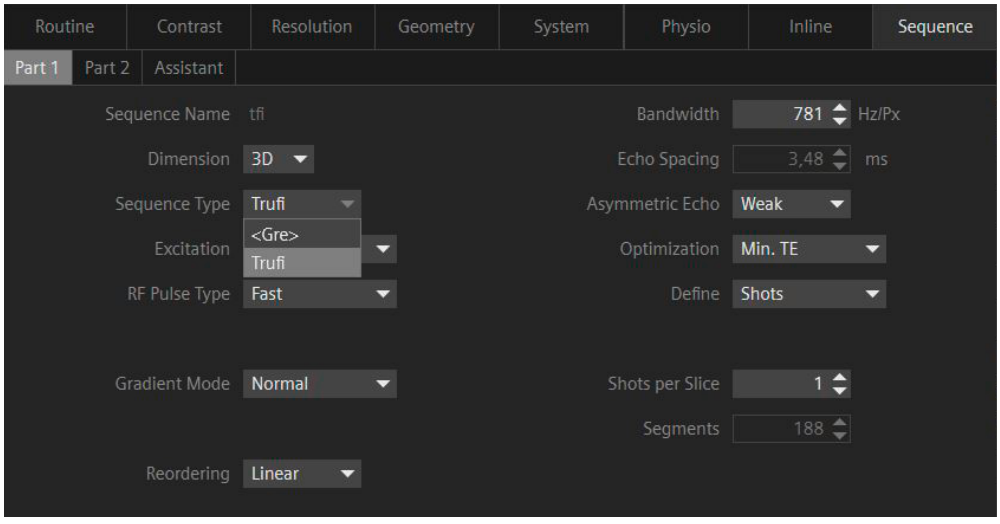
Some sequence adjustments are needed. Change the acquisition orientation to coronal. Increasing the slice thickness to 1.5 mm helps to get more signal. The inversion graphics and the inversion time (TI) values are important. We used two inversion graphics positioned diagonally to the liver and perpendicular to the portal vein (Fig. 3). At 1.5T, we set the TI value at 1500 ms. Depending on the size of the patient, you can increase the slice oversampling. The sequence can be modified to be bright blood with Trufi 3D (Fig. 4), or dark blood with GRE_3d (Fig. 5). Changing the sequence type is easy to do on the sequence tab (Fig. 6).



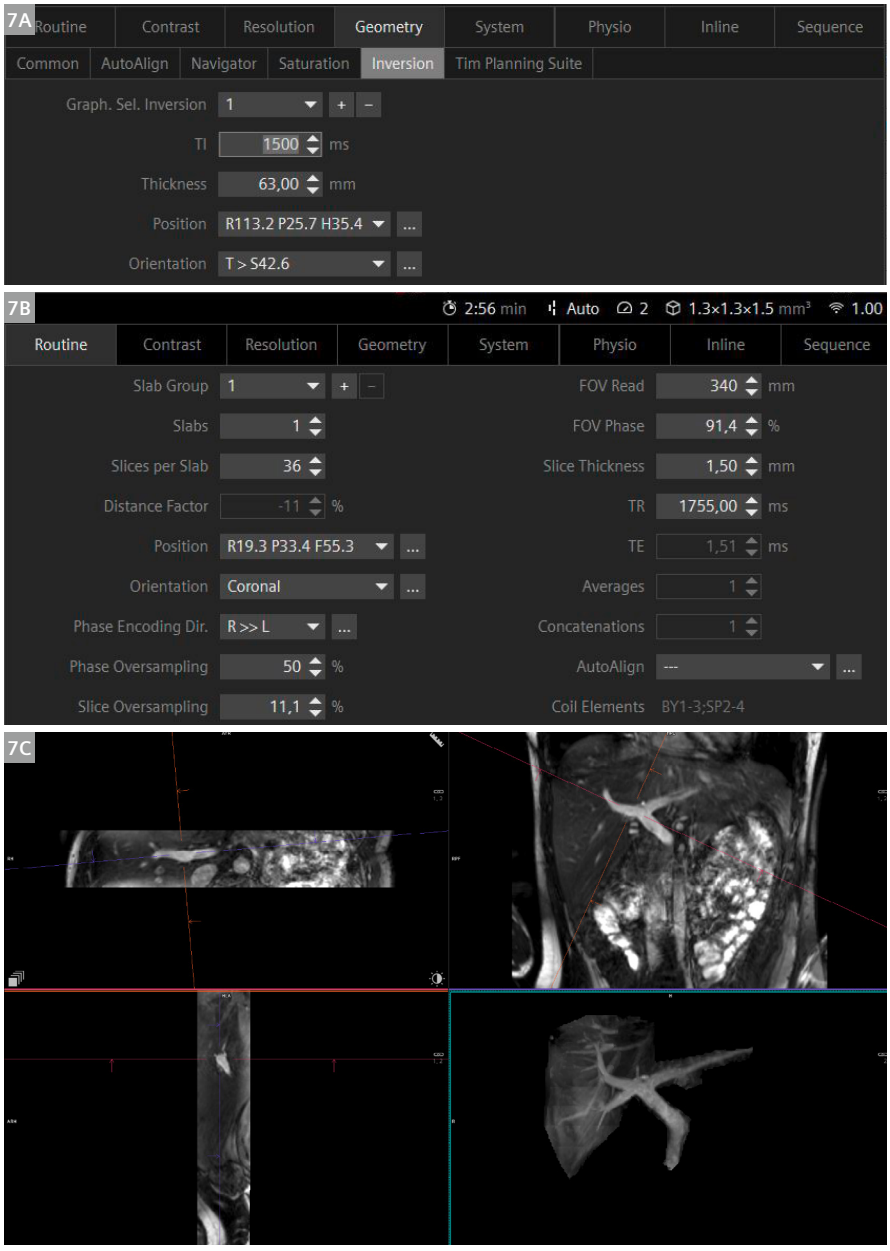
4 The sequence can be modified to be bright blood with Trufi 3D. Images acquired on a 1.5T MAGNETOM Sola.



5 The sequence can be modified to be dark blood with GRE_3d MR. Images acquired on a 1.5T MAGNETOM Sola **(5A)** and MAGNETOM Flow **(5B)**.



6 Changing the sequence between Trufi and GRE.



7 The MAGNETOM Lumina 3T protocol.

Study ID: 2aaaa4901

Conclusion

Native non-contrast MRI of the portal vein is a useful addition to abdominal MRI at 1.5T. With careful planning, patient coaching, and source-image review, the technique can provide clinically relevant information about portal venous patency and anatomy.

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References

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2 Lee CH. Portal vein thrombosis on unenhanced MRI: a case series. BJR Case Rep [Internet]. 2022;9(1):20220059. Available from: http://dx.doi.org/10.1259/bjrcr.20220059