

Ultrasound for the Abdominal Aorta


 CME
Credits

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We report the case of a 66-year-old male whose medical history was hypertension without regular follow-up and medical control, and smoking for about 30 years (1 pack of cigarettes per day). The chief complaint at the emergency department was abdominal pain onset before 1 h and extended to the back. His vital sign on the arrival was as follows: blood pressure of 160/90 mmHg, respiratory rate of 22/min, and pulse rate of 103 beats/min. While waiting for blood drawing and results of hematology tests in the waiting area, he suddenly fainted and then complained of more aggressive abdominal pain after awaking. The vital sign in the second measure was as follows: blood pressure of 80/60 mmHg, respiratory rate of 25/min, and pulse of 110 beats/min. The patient was transferred to the critical area immediately because of shock.

As for patients with abdominal pain combining with shock, ultrasound is an important tool for diagnosis besides understanding the full medical history and complete physical examination. We can use ultrasound for the abdominal aorta as an adjunct to the primary survey.

SCANNING TARGETS OF ULTRASOUND FOR THE ABDOMINAL AORTA

- Whether the patient has abdominal aortic aneurysm? How is the diameter?
- Whether the patient has aortic dissection?
- Whether it has the risk of rupture?

SELECTION OF PROBE

- Abdominal probe (with 2.5–5.0 MHz convex transducer).

MANIPULATION

Place the probe at the patient's upper abdomen and scan in the transverse [Figure 1] and longitudinal directions [Figure 2].

ANATOMICAL STRUCTURE OF NORMAL ABDOMINAL AORTA AND ULTRASOUND IMAGES

The main branches of abdominal aorta from cranial to caudal direction are celiac trunk, superior mesenteric artery, renal artery, and inferior mesenteric artery. The abdominal aorta below the inferior mesenteric artery is bifurcated into the left and right common iliac arteries, supplying the blood flow to the pelvic cavity.

1. Transverse view: The abdominal aorta is located in the posterior abdominal cavity and anterior to the spinal cord. Spinal cord is a very important landmark in ultrasound scanning. The inferior vena cava can be seen at the right side of the patient [Figure 3]. Move the probe along the celiac trunk and the superior mesenteric artery, cranially toward caudally to the bifurcation. Renal artery and inferior mesenteric artery sometimes cannot be observed because of the patient's body type and intestinal gas.
2. Longitudinal view: After localization of the celiac trunk and the superior mesenteric artery, rotate the probe clockwise to longitudinal direction then start scanning [Figure 4].

COMMON DISEASES AND THE ULTRASOUND IMAGES

The main causes of lethal abdominal pain resulted from the aorta are abdominal aortic aneurysm and aorta dissection. They must be excluded carefully.

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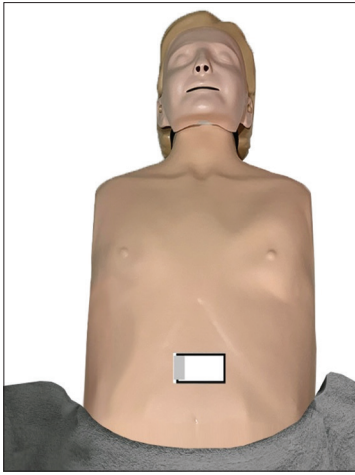


Figure 1: Transverse scanning of aorta

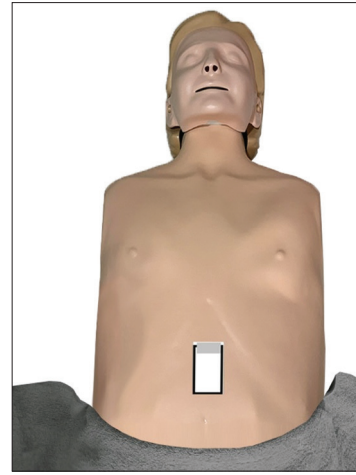


Figure 2: Longitudinal scanning of aorta

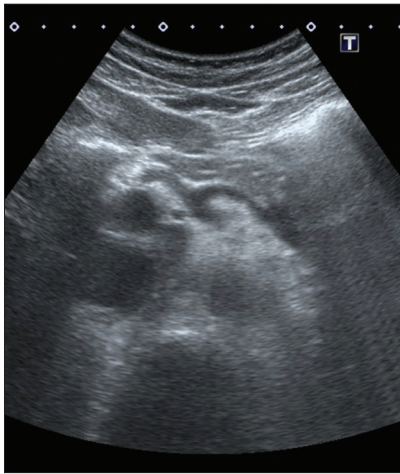


Figure 3: Transverse view of aorta (at the celiac trunk). The anatomical structure illustrated in the figure will be observed when the probe is placed horizontally at the bottom of the diaphragm

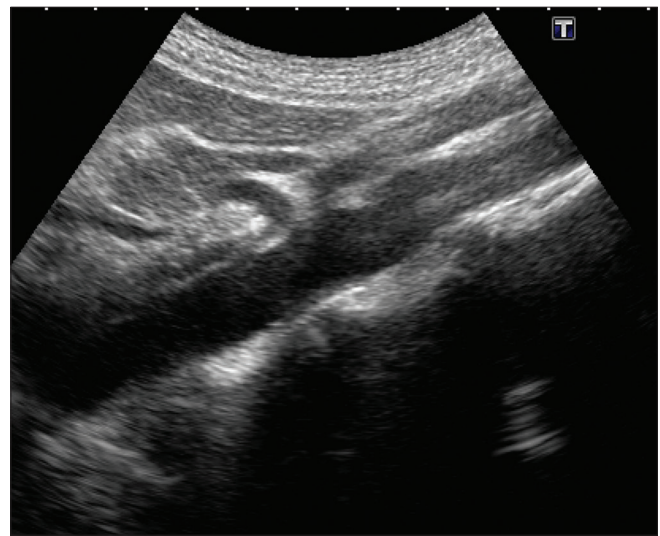


Figure 4: Longitudinal view of aorta. The anatomical structure illustrated in the figure can be observed in order

The clinical manifestations of abdominal aortic aneurysm vary. Patients may have a sudden abdominal pain, back pain, faint, shock, or beating abdominal mass. The common risk factors include males aged more than 60 years, hypertension, smoker, and atherosclerosis.

Most abdominal aortic aneurysm is located below the renal artery. Abdominal ultrasound examines the transverse view of the abdominal aorta, and generally, the outer diameter of the abdominal aorta in transverse plane is measured. If it is larger than 3 cm, then it is abdominal aortic aneurysm. If it is larger than 5 cm, then it has a higher risk of rupture.^[1]

According to the involvement of the ascending aorta, aortic dissection is categorized as Stanford type A (the dissection range involved in the ascending aorta) and type B (the dissection range not involved in the ascending aorta). Most patients with aorta dissection have tearing pain in the chest or abdomen,^[2] and some of them may have local neurological signs.^[3-5] Possible findings with ultrasound images included an intimal flap and ascites (caused by the ruptured aorta dissection).

The ultrasound image of this case is the abdominal aortic aneurysm. However, the measured outer diameter was 3.9 cm, without peripheral effusion or ascites. The cause of the abdominal pain and shock remains to be investigated.

Patients with abdominal aorta problems, regardless of abdominal aortic aneurysm or aorta dissection, are severe and critical diseases in the abdomen that first-line physicians must pay more attention. Learning the skill of abdominal ultrasound scanning will accelerate the medical process and preserve patients' safety.

Declaration of patient consent

The authors certify that they have obtained appropriate patient consent form. In the form, the patient has given his consent for the images and other clinical information to be reported in the journal. The patient understands that his name and initial will not be published and due efforts will be made to conceal the identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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