EDITORIAL COMMENT

Toward a new ultrasound-based imaging method for the diagnosis of acute pancreatitis: A preliminary study suggesting that it may be feasible

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See "Kaya M, Değirmenci S, Göya C, Tuncel ET, Uçmak F. The importance of acoustic radiation force impulse (ARFI) elastography in the diagnosis and clinical course of acute pancreatitis" on page 342-7.

Acute pancreatitis (AP) is an inflammatory disorder of the pancreas presenting as abdominal pain and increased levels of pancreatic enzymes in the blood (1). The spectrum of AP ranges from mild interstitial pancreatic edema to pancreatic necrosis, multiple organ failure, and death. The incidence of AP is rising in many countries because of increased alcohol consumption and widely available diagnostic methods, and it is a potentially fatal disorder (2).

The reported annual incidence (4.5-79.8/100,000 population/year) varies in different countries because of different diagnostic criteria, geographical factors, and changes over time (3). In the United States, AP is the leading gastrointestinal cause of hospitalization (4). From 1960 to 1980, a 10-fold increase in AP incidence was reported, and the mortality rate was 1%-9% (5).

In a prospective multicenter study including more than 1000 patients with AP, the mortality rate was reported as 1.5% and 17% in mild and severe AP, respectively, whereas the overall mortality was 5% (6). In hospitalized patients with AP, the reported mortality rate is approximately 10% (ranging from 2% to 22%); however, in severe AP, the mortality rate can be as high as 30% (7,8). In necrotizing AP, the mortality rate can increase from 12% with sterile necrosis to 30% with infected necrosis and to 47% with multiorgan failure (9).

It was shown that early diagnosis of severe AP is crucial in order to reduce morbidity and mortality, and adequate intensive therapy can decrease mortality (10).

The diagnosis of AP can be made by the presence of 2 out of the 3 following criteria: (1) typical abdominal pain characteristic of AP, (2) elevation of serum amylase and/or lipase ≤3× times the upper limit of normal, and/or (3) abdominal radiographic imaging studies [transabdominal ultrasound, endoscopic ultrasound (EUS), computed tomography (CT) scan, and magnetic resonance imaging (MRI)] demonstrating the characteristic changes of AP (11).

Abdominal radiographic imaging studies are not used for the diagnosis of AP in every patient, but they may establish probable etiologies and exclude other diagnoses.

CT scan or MRI should be reserved for patients with AP when the diagnosis is not apparent or when the clinical picture of patients does not improve within the first 48-72 h after the initial admission or to evaluate complications in order to exclude or establish peripancreatic collections, necrosis, and abscess (11).

All abdominal imaging methods used for the diagnosis of AP, except transabdominal ultrasound, are invasive, and each one has its own limitations. CT scan is the best initial modality for staging AP and detecting complications. However, it involves radiation exposure and fixed images. In addition, with intravenous contrast, it is discouraged in patients with renal insufficiency and patients at risk of chronic renal failure. MRI is time consuming, expensive and could not be available in every medical center. Endoscopic retrograde cholangiopancreatography and EUS are invasive and generally cause considerable postoperative complications and also limited by the availability of experienced medical staff.

Compared with these imaging techniques, ultrasound has distinct advantages in terms of low cost, lack of radiation, and ease of use.

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Ultrasound is preferred in the initial study, especially when biliary etiology is suggested to diagnose AP. It is inexpensive, easy to perform at the bedside, and allows the examination of the gallbladder and bile duct system. Its sensitivity in detecting AP ranges from 62% to 95% (11). However, it also has some limitations, such as obesity and abdominal gas in the patient and the skill of the operator.

It is obvious that if the sensitivity and specificity of ultrasound could be enhanced, it would be useful in many patients with AP.

In this latest issue of Turkish Journal of Gastroenterology, the authors investigated the value of acoustic radiation force impulse (ARFI) elastography in the diagnosis and clinical course of AP. ARFI is a new ultrasound-based imaging method that is used for the evaluation of tissue stiffness. It consists of qualitative virtual touch tissue imaging, displaying a color-coded elastogram of comparative tissue stiffness and quantitative virtual touch tissue quantification (VTQ). ARFI elastography has been used to diagnose many pancreatic diseases including chronic pancreatitis, pancreatic space-occupying lesions, pancreatic inflammatory disease, and AP (12).

The authors studied the role of ARFI elastography in the diagnosis and clinical course of AP. They used VTQ to implement ARFI elastography. Tissue elasticity was measured as proportional to the square of the wave velocity (SWV).

In order to determine the role of this new USG-based imaging method, they included 108 patients with AP (100 edematous and 8 necrotizing AP) and 79 healthy controls. ARFI elastography was performed in the first 24 h of admission to the hospital by an experienced radiologist in B-mode sonograms and in the ARFI technique. The mean age and gender distribution was similar for patients and controls.

They found that the patients have significantly higher mean SWV than healthy controls. When a cut-off value of 1.63 m/s for SWV was recorded, the sensitivity and specificity for the diagnosis of AP were 100% and 98%, respectively. Although they found that ARFI elastography has very high sensitivity and specificity for the diagnosis of AP, it could not determine patients with and without complications and also patients with edematous and necrotizing AP. Additionally, they did not find any correlation between ARFI elastography and age, mean length of hospital stay, and mean amylase level. The authors con-

cluded that ARFI elastography may be a feasible imaging method for the diagnosis of AP, but it could not predict the clinical course of AP.

ARFI was first evaluated by Xie et al. (13) to assess the utility of elastography using VTQ imaging in healthy volunteers and patients with AP. In this preliminary study, the authors found that the mean SWV values of the pancreas are not significantly different between healthy controls and patients with AP. They concluded that although VTQ is a promising new method for the quantification of pancreatic elasticity, further studies are warranted. Then, another researcher group compared the diagnostic success of ARFI elastography with B-mode ultrasound and CT scan in patients with AP (14). They found that when using a cut-off value of 1.63 m/s, the sensitivity and specificity of VTQ for the diagnosis of AP were 100% and 98%, respectively.

To the best of our knowledge, there is no study investigating the role of ARFI elastography for the evaluation of the complications of AP (12). Although the number of patients with complications is very small (16 out of 108 patients), the authors did not find any significant difference between patients with and without complications and patients with and without necrotizing AP. However, large and comprehensive studies are necessary in order to reach a conclusion regarding the role of ARFI elastography in patients with complicated AP.

However, despite these few preliminary studies, there is no recommendation for the use of ARFI elastography in diagnosing AP. Although there are promising preliminary studies, further comprehensive and confirmative studies from different centers and populations are needed in order to recommend this relatively new non-invasive imaging method for the diagnosis of AP.

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