

ADVANCES IN ENDOSCOPY

Current Developments in Diagnostic and Therapeutic Endoscopy

Section Editor: John Baillie, MB ChB, FRCP

Predicting Pancreatic Exocrine Insufficiency With EUS Elastography



J. Enrique Domínguez-Muñoz, MD, PhD
 Director, Department of Gastroenterology and Hepatology
 University Hospital of Santiago de Compostela
 Santiago de Compostela, Spain

G&H How does elastography work?

JED-M Elastography is a method used to evaluate the hardness of different tissues and is based on the principle that softer parts of tissues are easier to deform under compression than stiffer sections of tissues. Elastography translates the elastic properties of tissues into a map of different colors, which reads like a virtual biopsy; the stiffness of tissues is related to their histologic features. An elastographic blue predominant pattern, which is associated with a high strain ratio value, indicates the malignant nature of a pancreatic lesion or lymph node with a high accuracy. However, a green predominant pattern, which is associated with a low strain ratio value, indicates the benign nature of an explored lesion. The accuracy of endoscopic ultrasound (EUS) elastography for the diagnosis of malignancy is higher than 90%.

G&H What is the main use of EUS elastography at the present time?

JED-M EUS in general was initially developed to explore the pancreas and to assess pancreatic lesions and tumors. Indications for EUS have increased markedly, and it is now routinely used to stage gastrointestinal tumors and evaluate lymph nodes, among other indications. Elastography complements EUS for further evaluation and characterization of solid lesions. The main use of EUS elastography at the present time is for the characterization of solid tumors (mainly those of the pancreas) and lymph nodes.

G&H What advantages and disadvantages are associated with this procedure?

JED-M The advantages of EUS elastography are that it is simple to perform, with a minimal prolongation of the exploration time; it is inexpensive (and is already included in the majority of ultrasound equipment); and it adds no risk or complications to the EUS examination. However, EUS elastography is not a perfect virtual biopsy. A blue predominant pattern or an increased strain ratio can be observed in any malignant lesion independent of the specific histologic feature; thus, the main disadvantage of this procedure is that it cannot differentiate between various malignant tumors (eg, pancreatic cancer, pancreatic metastasis, lymphoma).

G&H Should EUS elastography be kept to specialized centers or used in all centers?

JED-M In my opinion, EUS elastography should be used in all centers in which endoscopic ultrasonography is available. A sonographer would not perform an abdominal ultrasound examination without Doppler ultrasonography simply because he or she is not working in a specialized center. The same logic applies to elastography. Because elastography can be attached to most ultrasound equipment, an endoscopist should use elastography as part of the EUS examination.

G&H Is there a learning curve associated with performing this procedure?

JED-M Once an endoscopist has gained experience in EUS, elastography is fairly easy to perform. Nevertheless, like any other procedure, there is a learning curve associated with it. It is important to note that although elastography is simple to perform, without proper learning it is

also very easy to perform incorrectly. Therefore, education and appropriate learning are always required. It is not only a matter of performing the elastographic evaluation in an appropriate manner, but of integrating the information provided by elastography into the global EUS evaluation.

G&H How common is pancreatic exocrine insufficiency in patients with chronic pancreatitis?

JED-M Pancreatic exocrine insufficiency (PEI) is one of the main complications of chronic pancreatitis, and it is defined as the inability of the pancreas to digest nutrients normally due to the decreased pancreatic secretion of digestive enzymes and bicarbonate. Over the course of chronic pancreatitis, functional pancreatic parenchyma is replaced by fibrosis. The more fibrotic the pancreas is, the less the amount of remaining functional parenchyma, which leads to a higher probability of PEI. Depending on the stage of chronic pancreatitis, the prevalence of PEI ranges from 20% (at the earliest stage of the disease) to 90% (at the advanced stages of the disease). Therefore, over the natural history of chronic pancreatitis, almost every patient will develop PEI.

G&H What role does elastography play in predicting PEI?

JED-M In our first study of elastography and chronic pancreatitis, my colleagues and I found that the more fibrotic the pancreas, the harder the tissue. Elastography is a helpful way to quantify the degree of pancreatic fibrosis in the context of chronic pancreatitis. As mentioned above, the more fibrotic the pancreas is, the higher the probability of PEI. Thus, EUS elastography allows endoscopists to foresee the probability of PEI in patients with chronic pancreatitis. This finding was also demonstrated in a more recent study from our group.

G&H What other methods are available for predicting PEI?

JED-M Although elastography can be used to predict or calculate the probability of PEI in chronic pancreatitis, it is a morphologic method. Functional methods are available to evaluate pancreatic function, such as the secretin endoscopic pancreatic function test, the ¹³C breath test, and the fecal elastase test. From a logical point of view, the diagnosis of PEI should be based on a function test; however, these tests are not widely available. Thus, information provided by EUS elastography may be of help.

G&H How could the findings of your studies impact clinical practice?

JED-M Elastography combined with EUS is becoming widely available and, as such, the diagnosis of chronic pancreatitis is increasing. It is now very easy to diagnose chronic pancreatitis and, during the same procedure, predict the probability of PEI with an elastographic examination. To that extent, this is a relevant finding because knowing whether a patient may have PEI will help clinicians to prescribe the appropriate therapy. It is highly interesting how morphologic information obtained by methods such as EUS and elastography may indirectly provide functional information of an organ (eg, pancreas).

G&H What further research is needed to improve the diagnosis and treatment of PEI?

JED-M There are currently many unmet needs in this field, even though the last 10 years have produced numerous studies and evidence about PEI that have markedly changed the way we understand this condition. However, there is still a long way to go. We need better methods to diagnose PEI that should not only be accurate but also easily used in any center worldwide. Additionally, research on how to better treat these patients using pancreatic enzyme replacement therapy would be beneficial. PEI has been shown to lead to malnutrition and its complications as well as to an increase in the risk of death in patients with chronic pancreatitis. We know that the management of PEI in these patients should avoid these complications. Thus, research is needed to help us to optimize enzyme replacement therapy to mimic pancreatic physiology as much as possible.

Dr Domínguez-Muñoz has served as an international advisor for Pentax Medical.

Suggested Reading

- Cui XW, Chang JM, Kan QC, Chiorean L, Ignee A, Dietrich CF. Endoscopic ultrasound elastography: current status and future perspectives. *World J Gastroenterol.* 2015;21(47):13212-13224.
- Domínguez-Muñoz JE, Iglesias-García J, Castiñeira Alvaríno M, Luaces Regueira M, Lariño-Noia J. EUS elastography to predict pancreatic exocrine insufficiency in patients with chronic pancreatitis. *Gastrointest Endosc.* 2015;81(1):136-142.
- Iglesias-García J, Domínguez-Muñoz JE, Castiñeira-Alvaríno M, Luaces-Regueira M, Lariño-Noia J. Quantitative elastography associated with endoscopic ultrasound for the diagnosis of chronic pancreatitis. *Endoscopy.* 2013;45(10):781-788.
- Iglesias-García J, Lariño-Noia J, Abdulkader I, Forteza J, Domínguez-Muñoz JE. Quantitative endoscopic ultrasound elastography: an accurate method for the differentiation of solid pancreatic masses. *Gastroenterology.* 2010;139(4):1172-1180.