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EDITORIAL

Computed tomography for the prediction of oesophageal variceal bleeding: A surrogate or complementary to the gold standard?

Yasser Fouad, Mohamed Alboraie

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Abstract

In this editorial we comment on the in-press article in the *World Journal of Gastrointestinal endoscopy* about the role of computed tomography (CT) for the prediction of esophageal variceal bleeding. The mortality and morbidity are much increased in patients with chronic liver diseases when complicated with variceal bleeding. Predicting the patient at a risk of bleeding is extremely important and receives a great deal of attention, paving the way for primary prophylaxis either using medical treatment including carvedilol or propranolol, or endoscopic band ligation. Endoscopic examination and the hepatic venous pressure gradient are the gold standards in the diagnosis and prediction of variceal bleeding. Several non-invasive laboratory and radiological examinations are used for the prediction of variceal bleeding. The contrast-enhanced multislice CT is a widely used non-invasive, radiological examination that has many advantages. In this editorial we briefly comment on the current research regarding the use of CT as a non-invasive tool in predicting the variceal bleeding.

Key Words: Computed tomography; Esophageal varices; Bleeding; Non-invasive predictor; Endoscopy

Core Tip: Predicting the patient at a risk of variceal bleeding is extremely important and receives a great deal of attention, paving the way for primary prophylaxis either using medical treatment including carvedilol or propranolol, or endoscopic band ligation. Endoscopic examination and the hepatic venous pressure gradient are the gold standards in the diagnosis and prediction of variceal bleeding. The computed tomography (CT) is a widely used non-invasive, radiological examination that can be used as a predictor of variceal bleeding and has many advantages. Conflicting results have been shown regarding the effectiveness of CT in predicting variceal bleeding and more studies are needed.

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INTRODUCTION

A well-known complication of chronic liver disease, with a high mortality rate, is bleeding esophageal varices. Mortality and morbidity rates are significantly increased in patients with chronic liver disease when complicated with variceal bleeding[1,2]. For logical reasons, many researchers have been keen to study the use of non-invasive techniques in the field of liver diseases. Patient comfort, avoiding high costs, and saving time were the main factors that stimulated research in this aspect. Predicting a patient's risk of bleeding is extremely important and receives a great deal of attention, as it paves the way for primary prophylaxis with either medical therapy including carvedilol or propranolol, or endoscopic band ligation[3,4].

Predictors of variceal bleeding

Although esophagogastroduodenoscopy (EGD) is the gold standard for the diagnosis, management, and prognosis of bleeding esophageal varices, it is invasive, costly, and sometimes lacks inter-observer agreement regarding the size of the varices compared to computed tomography (CT) in some previous studies[5].

Another gold standard is the hepatic venous pressure gradient (HVPG). Although the HVPG can predict the occurrence of variceal bleeding and assess the response to medical treatment, it is an invasive and expensive procedure, requires high expertise and is not widely available in clinical practice[3,6,7].

Several non-invasive laboratory and radiological examinations are used for the prediction of variceal bleeding. A recent systemic review highlighted the predictive factors of variceal bleeding. These factors included Child-Pugh score, ultrasound parameters, ascites, specific endoscopic findings, Fibrosis Index, portal vein diameter, CT scan findings, presence and size of collaterals, platelet counts, Von Willebrand Factor, coagulation parameters, and the use of β-blocking agents. Although this systemic review identified multiple potential predictive factors for esophageal variceal bleeding, several limitations and biases could influence the conclusions with further validations needed[8].

The role of ultrasound in the prediction of variceal bleeding was studied. The relation between left gastric vein diameter and variceal bleeding revealed significant results. Moreover, a comprehensive Model for End-Stage Liver Disease-Ultrasound Doppler index emerged as another predictive factor with better performance as a predictor of varices and its complications[9,10].

Assessment of liver and splenic stiffness in patients with chronic liver diseases has been shown in a few studies. High splenic and liver stiffness predicted esophageal variceal bleeding[11-13].

The role of CT in prediction of variceal bleeding

In a recent meta-analysis, CT imaging, as a non-invasive method, was superior to liver stiffness measures (LSM) and magnetic resonance imaging for predicting esophageal varices and variceal bleeding in patients with cirrhosis[14].

CT is a widely used non-invasive, contrast-enhanced multislice radiological examination. It is a well-tolerated, cost-effective procedure, requiring no sedation with the advantage of simultaneous detection of hepatic benign and malignant lesions. The three-dimensional post-processing of imaging data allows precise examination of the portal vein and its branches with subsequent guidance of decision-making and surgical or radiological interventions using transjugular intrahepatic portosystemic shunt. The CT can differentiate between peri esophageal and submucosal gastroesophageal varices in a matter closely related to the endoscopic examination results. The CT contrast can be seen in the portal vein and parallel vascular pathways and may reach the esophagus in patients with active variceal bleeding[14,15].

The CT findings in cirrhotic patients with esophageal varices include the presence and size of various collaterals (including paraesophageal and paraesophageal draining collaterals, coronary and short gastric veins). These findings are accurate predictors of either oesophageal varices or recurrence of oesophageal variceal bleeding[16]. Furthermore, in patients with uncontrolled variceal bleeding, intraluminal protrusion of gastric varices, gastric varix size, and larger spleen and liver volumes, were predictive of refractory variceal bleeding and portal venous intervention[17].

Investigators included CT in a nomogram for better prediction of the risk of variceal bleeding. A nomogram including CT, hemoglobin, platelet count, albumin to globulin ratio, fasting blood glucose, and serum chloride, has been found to be significantly associated with the risk of variceal bleeding[18].

Recently, a machine learning model based on contrast-enhanced CT was developed to predict the risk of complications or death in patients with acute variceal bleeding. The Liver-Spleen model based on contrast-enhanced CT was effective in predicting the prognosis of patients with variceal bleeding with a positive impact on decision-making and personalized therapy in the clinical settings[19].

In the current issue of *World Journal of Gastrointestinal Endoscopy*, Martino *et al*[20] in their systemic review explored the role of CT in the prediction of oesophageal variceal bleeding. They included 9 articles in their analysis. The studies were geographically covering most parts of the world and significant findings were recorded. Conflicting results are shown with some recommendations from the authors. The most important recommendation is the need for large multicentre prospective studies[20].

Although a lot of research studies highlighted the importance of CT in the prediction of esophageal variceal bleeding, there are no guidelines or societal recommendations regarding the use of CT in cirrhotic patients to predict variceal bleeding risk. Recently, the Chinese Societies of Gastroenterology endorsed a recommendation for the use of LSM combined with platelet count and multislice contrast-enhanced CT as non-invasive examinations for the diagnosis of portal hypertension in cirrhosis[21].

CONCLUSION

We believe that CT, when used in combination with other tools, can help predict patients at very high risk, but currently it cannot replace EGD or HPVG in predicting the risk of variceal bleeding. We may recommend reminding clinicians and radiologists to invest in the regular use of CT scan in monitoring patients with liver disease to highlight indicators of portal hypertension and risk of variceal bleeding (*e.g.* coronary veins and short gastric veins). Routine screening of these indicators will be crucial for better follow-up of liver patients and help in making decisions for endoscopic or medical prophylaxis. Further research integrating CT with other non-invasive measures and artificial intelligence will have tremendous value in clinical applications and personalized medicine.

FOOTNOTES

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