Is computerised tomography better than fibreoptic gastroscopy for early detection of gastric varices?

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Abstract

Introduction: Video endoscopic diagnosis of gastric varices is particularly limited, owing to the deep submucosal or subserosal location of the varices and the normal appearance of the overlying mucosa.

Aim: We present and emphasise the value of computerised tomography (CT) examination in the early detection of gastric varices (GVs).

Material and methods: In this retrospective study, a total of 216 consecutive patients with cirrhosis were evaluated at the Turkiye Yuksek Ihtisas Training and Research Hospital between September 2008 and March 2011.

Results: One hundred and thirty patients with cirrhosis were enrolled in the study. The mean age of the male (88 cases) patients was 59.45 ±2.42 years, and the mean age of the female (42 cases) patients was 56.29 ±1.14 years. Computerised tomography identified oesophageal varices (EVs) in 103/130 patients, and endoscopy identified EVs in 103/130 patients. Computerised tomography identified GVs in 86/130 patients, and endoscopy identified GVs in 26/130 patients. After endoscopic elastic band ligation (EBL), CT identified GVs in 22/26 patients, and endoscopy identified GVs in 7/26 patients.

Conclusions: Gastric varices lie in the submucosa, deeper than EVs, and distinguishing GVs from gastric rugae may be difficult with video endoscopy. This study demonstrated that CT is a sensitive method for early detection of GVs and has been used previously in the evaluation of GVs.

Introduction

Liver cirrhosis is frequently complicated by the development of portal hypertension. Depending on the severity of liver disease, between 50% and 80% of patients with cirrhosis will finally develop oesophageal or gastric varices [1]. Because of the significant morbidity and mortality associated with bleeding from varices, patients with cirrhosis undergo screening for oesophageal varices (EVs) and gastric varices (GVs) using upper gastrointestinal endoscopy [2, 3]. Gastric varices are less common than EVs, occurring in approximately 20% of patients with portal hypertension (PHT) [4]. Although GVs bleed less frequently than EVs, bleeding tends to be more severe, to require more transfusions, and to have a higher mortality rate than EV bleeding [5].

Video endoscopic diagnosis of gastric varices is particularly limited owing to the deep submucosal or subserosal locations of the varices and the appearance of the overlying mucosa [6]. In patients with cirrhosis, spontaneous portosystemic shunts, oesophageal and gastric varices, and periluminal varices are increasingly recognised, with advancement in multi-detector computerised tomography (CT) imaging because CT imaging is non-invasive, does not require sedation, is better tolerated than endoscopy, and allows review and accurate measurement of variceal size. Furthermore, if the accuracy of CT in detecting gastric varices is significant, a strategy that uses initial CT for surveillance for small varices could be cost-effective [7].

Aim

We carried out a retrospective comparison of CT imaging against upper gastrointestinal endoscopy for the detection of gastric varices. Thus, the goal of this study was to investigate the value of CT examination in the early detection of GVs.

Material and methods

In this retrospective study, a total of 216 consecutive patients with cirrhosis were evaluated at Turkiye Yuksek Ihtisas Training and Research Hospital between September 2008 and March 2011. Diagnosis of liver cirrhosis was based on a previous liver biopsy or compatible clinical, laboratory, and imaging findings. Exclusion criteria included an inability to provide consent, a recent history (7 days) of upper gastrointestinal bleeding, previous portosystemic shunt procedure, or previous liver transplantation. In addition, patients with thyroid hormone abnormalities or renal insufficiency, defined as a serum creatinine of 1.7 mg/dl in non-diabetics or 1.5 mg/dl in diabetics, were excluded given concerns regarding the requirement of intravenous contrast during CT. One hundred and thirty patients met the inclusion criteria for screening for oesophageal varices. All patients were scheduled to undergo upper gastrointestinal endoscopy.

All patients underwent CT with a Somatom Plus S scanner (Siemens Medical Systems, Erlangen, Germany) in the Radiology Department. A gastrointestinal radiologist, with more than 5 years of experience and blinded to the results of the endoscopy, read the CT studies. Axial images were evaluated to determine the presence and size of the gastric varices (Figure 1). The clinical characteristics and laboratory data of all patients were collected for comparison.

Statistical analysis

The Statistical Package for Social Sciences (SPSS) 18.0 for Windows was used to analyse the data. Data were expressed as mean ± SD for normally distributed variables, as median and range for non-normally distributed variables, and count and percentage for categorical variables. Categorical variables were compared with the χ^2 test or Fisher's exact test, and continuous variables were compared with Student's *t*-test or the Mann-Whitney test as appropriate. A p-value < 0.05 indicated statistical significance.

Results

One hundred and thirty patients with cirrhosis were enrolled in the study. The mean age of the male (88 cases) patients was 59.45 ±2.42 years, and the mean age of the female (42 cases) patients was 56.29 ±1.14 years. Patient characteristics are detailed in Table I. The aetiologies of liver cirrhosis were cryptogenic (37 cases), hepatitis B (63 cases), alcohol (2 cases), hepatitis C (15 cases), hepatoportal sclerosis (4 cases), portal vein thrombosis (5 cases), primary biliary cirrhosis (2 cases), Wilson's disease (1 case), and Budd-Chiari syndrome (1 case). Table I shows the performance of CT in detecting GVs identified on endoscopy. Computerised tomography identified EVs in 103/130 patients, and endoscopy identified EVs in 103/130 patients. Computerised tomography identified GVs in 86/130 patients, and endoscopy identified GVs in 26/130 patients. After endoscopic elastic band ligation (EBL), CT identified GVs in 22/26 patients, and endoscopy identified GVs in 7/26 patients. Although there were no significant differences in the model for end-stage liver disease (MELD) score between cirrhotic patients with and without GVs on screening endoscopy, a significant difference was observed between these groups in respect to MELD scores.

Discussion

Gastric varices are a common and serious complication of portal hypertension [5]. Gastric varices are discovered most commonly during screening of patients with PHT for varices or at the time of the first variceal bleed, at which time the bleeding is usually caused by associated EVs [8]. Standard video endoscopy underestimates the true prevalence of gastric varices in patients with PHT. Gastric varices lie in the submucosa, deeper than EVs, and distinguishing GVs from gastric rugae may be difficult with video endoscopy. However, not all gastric varices have a serpiginous form or a ve-

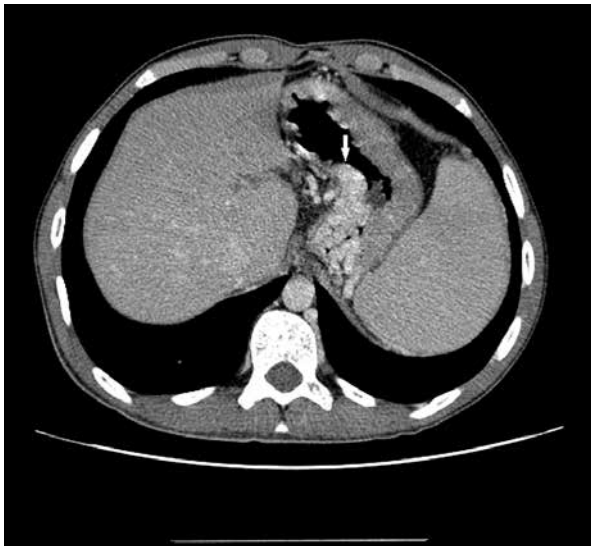

Figure 1. Computerised tomography showing the presence of submucosal fundal varices

Table I. Patients' characteristics

Parameter	CT identified the GV	*N*	Mean ± standard deviation	*P*-value
Mean age [years]	No	44	61.34 ±12.07	0.008
	Yes	86	55.25 ±12.42	
Gender:				
Female	No		15	0.09
	Yes		27	
Male	No		29	
	Yes		59	
Haemoglobin [g/dl]	No	44	12.74 ±2.15	0.004
	Yes	86	11.55 ±2.18	
Platelets [× 10^3 µl]	No	44	143.83 ±113.05	0.11
	Yes	85	113.60 ±95.25	
AST [U/l]	No	44	57.18 ±47.93	0.17
	Yes	86	72.62 ±79.58	
ALT [U/l]	No	44	41.02 ±38.16	0.68
	Yes	86	43.87 ±37.27	
Total bilirubin [mg/dl]	No	44	2.43 ±2.41	0.40
	Yes	86	2.79 ±2.23	
Albumin [g/dl]	No	44	3.67 ±0.71	0.03
	Yes	86	3.34 ±0.90	
INR	No	44	1.33 ±0.54	0.005
	Yes	85	1.44 ±0.51	
MELD	No	44	10.75 ±4.74	0.008
	Yes	84	13.38 ±6.07	
Endoscopy identified the GV:				
No	No		16	0.001
	Yes		10	
Yes	No		28	
	Yes		76	

CT – computerised tomography, GV – gastric varices, AST – aspartate aminotransferase, ALT – alanine aminotransferase, INR (PT) – international normalised ratio of a patient's prothrombin time to a normal control sample, MELD – model for end-stage liver disease.

nous colour, which can make it challenging to distinguish among gastric varices, submucosal tumours, and thickened mucosal folds with endoscopic imaging alone [9]. Radiographic imaging modalities such as splenoportography, magnetic resonance venography or CT angiography, and endoscopic ultrasonography have shown that a significant number of GVs are not evident at endoscopy [10, 11]. The goal of this retrospective study was to investigate the value of CT examination in the early detection of gastric varices.

The most important limitation of this study is the use of endoscopy as the reference standard. Different endoscopists performed video endoscopy in this study. This may have resulted in an incorrect grading system of variceal size by endoscopy.

In one series, CT showed specific signs of oesophageal collateral vessels in 65% of cases with confirmed varices [12]. In this study, CT identified EVs in 103/130 patients, and endoscopy identified EVs in 103/130 patients. This is mainly because several advances in CT technology may have improved the detection and grading of varices by radiologists.

Since one of the major problems in the diagnosis of gastric varices is patient compliance with, and tolerance of, endoscopy, the use of a fast, non-invasive CT scan may increase compliance with recommendations for the diagnosis [7]. Computerised tomography allows the assessment of the gastric fundus for the presence and differentiation of submucosal and perigastric varices. Moreover, contrast-enhanced conventional and single-detector helical CT are useful for expeditiously evaluating the overall status of portosystemic vessels in patients who have portal hypertension [13]. Thus, submucosal, intramural, and perigastric serpentine vascular structures are well demonstrated on CT and are best examined in the portal venous phase.

The role of the evaluation of the size of gastric varices with endoscopy is not well defined. There are no clear recommendations regarding prophylactic therapy. Computerised tomography demonstrated high sensitivity for the assessment of gastric varices and, in addition, detected gastric varices in many patients in whom gastric varices were not reported at endoscopy. This suggests that CT may either be more sensitive than endoscopy for the detection of gastric varices or less specific [14]. In this study, CT identified GVs in 86/130 patients, and endoscopy identified GVs in 26/130 patients.

This study demonstrated the novel role of CT as a tool for the diagnosis of gastric varices. This study demonstrated that CT is a sensitive method for early detection of GVs, and CT has been used previously in the evaluation of GVs.

Conflict of interest

The authors declare no conflict of interest.

References

1. D'Amico G, Pagliaro L, Bosch J. Pharmacological treatment of portal hypertension: an evidence-based approach. Semin Liver Dis 1999; 19: 475-505.

2. Franchis R. Evolving consensus in portal hypertension. Report of the Baveno IV consensus workshop on methodology of diagnosis and therapy in portal hypertension. J Hepatol 2005; 43: 167-76.
3. Kapoor A, Dharel N, Sanyal AJ. Endoscopic diagnosis and therapy in gastroesophageal variceal bleeding. Gastrointest Endosc Clin N Am 2015; 25: 491-507.
4. Sarin SK, Lahoti D, Saxena SP, et al. Prevalence, classification and natural history of gastric varices: a long-term follow-up study in 568 portal hypertension patients. Hepatology 1992; 16: 1343-9.
5. Weilert F, Binmoeller KF. Endoscopic management of gastric variceal bleeding. Gastroenterol Clin North Am 2014; 43: 807-18.
6. Thakeb F, Salem SA, Abdallah M, et al. Endoscopic diagnosis of gastric varices. Endoscopy 1994; 26: 287-91.
7. Kim YJ, Raman SS, Yu NC, et al. Esophageal varices in cirrhotic patients: evaluation with liver CT. AJR Am J Roentgenol 2007; 188: 139-44.
8. Triantafyllou M, Stanley AJ. Update on gastric varices. World J Gastrointest Endosc 2014; 6: 168-7.
9. Wong RC, Farooq FT, Chak A. Endoscopic Doppler US probe for the diagnosis of gastric varices. Gastrointest Endosc 2007; 65: 491-6.
10. Yu NC, Margolis D, Hsu M, et al. Detection and grading of esophageal varices on liver CT: comparison of standard and thin-section multiplanar reconstructions in diagnostic accuracy. AJR Am J Roentgenol 2011; 197: 643-9.
11. Krige JE, Shaw JM, Bornman PC. The evolving role of endoscopic treatment for bleeding esophageal varices. World J Surg 2005; 29: 966-73.
12. Balthazar EJ, Naidich DP, Megibow AJ, et al. CT evaluation of esophageal varices. AJR Am J Roentgenol 1987; 148: 131-5.
13. Willmann JK, Weishaupt D, Böhm T, et al. Detection of submucosal gastric fundal varices with multi-detector row CT angiography. Gut 2003; 52: 886-92.
14. Perri RE, Chiorean MV, Fidler JL, et al. A prospective evaluation of computerized tomographic (CT) scanning as a screening modality for esophageal varices. Hepatology 2008; 47: 1587-94.

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