Digestive and Liver Disease 48 (2016) 695–702

Contents lists available at ScienceDirect

Digestive and Liver Disease

journal homepage: www.elsevier.com/locate/dld

Review Article

Computed tomography in evaluating gastroesophageal varices in patients with portal hypertension: A meta-analysis

Tseng Yu-Jen [a], Zeng Xiao-qing [a], Chen Jie [a], Li Na [a], Xu Peng-ju [b], Chen Shi-yao [c,*]

[a] Department of Gastroenterology, Zhongshan Hospital, Fudan University, Shanghai, China
[b] Department of Radiology, Zhongshan Hospital, Fudan University, Shanghai, China
[c] Department of Gastroenterology, Endoscopy Center, Evidence-based Medicine Center, Zhongshan Hospital, Fudan University, Shanghai, China

ARTICLE INFO

Article history:
Received 8 January 2016
Accepted 18 February 2016
Available online 2 March 2016

Keywords:
Computed tomography
Diagnosis
Gastroesophageal varices
Meta-analysis

ABSTRACT

Aims: Gastroesophageal varices (GOV) is a common complication in patients with portal hypertension. We conducted a meta-analysis in attempt to evaluate the diagnostic accuracy of computed tomography (CT) as a noninvasive imaging tool for identifying GOV in reference to esophagogastroduodenoscopy (EGD).

Methods: A systemic literature search of multiple databases were conducted to identify articles that investigated the diagnostic performance of CT for GOV, while employing EGD as reference standard. A 2×2 table was conducted according to the available published data for both esophageal varices (EV) and gastric varices (GV) as individual subgroups. The following indices were calculated: pooled sensitivity and specificity, positive and negative likelihood ratio, diagnostic odds ratio, and area under receiver operating characteristics. All statistical analyses were conducted via STATA13.0 and RevMan5.3.

Results: A total of 11 studies were included in this meta-analysis, 10 articles evaluated the diagnostic accuracy of CT for EV (807 subjects) and 7 articles for GV (583 subjects). The pooled sensitivity and specificity for identifying EV were 0.896 (95% CI, 0.841–0.934) and 0.723 (95% CI, 0.644–0.791), respectively, with an AUROC of 0.86. The pooled sensitivity and specificity for identifying GV were 0.955 (95% CI, 0.903–0.980) and 0.658 (95% CI, 0.433–0.829), respectively, with an AUROC of 0.95. A subgroup analysis suggested varying CT technology could serve as a potential source of heterogeneity between included studies. A Deek's funnel plot indicated a low probability for publication bias.

Conclusion: Computed tomography could potentially replace EGD as a primary screening tool for diagnosing GOV, however results should be interpreted with caution given its suboptimal specificity.

1. Introduction

Portal hypertension is a progressive complication secondary to intra-hepatic, pre-hepatic, or post-hepatic aetiology [1]. Liver cirrhosis being the more common intra-hepatic cause, affects roughly 1% of the population worldwide, with Asian and African countries heavily weighing on disease prevalence [2]. Portal hypertension is often associated with a series of complications including ascites, hepatic encephalopathy, and gastroesophageal varices. Among which, gastroesophageal varix haemorrhage is the most common gastroenterological emergency [3]. Approximately 50% of patients with cirrhosis develop gastroesophageal varices and their presence is often correlated with disease severity [4].

Gastric and esophageal varices can occur concurrently or in solitary, with esophageal varices more prevalent in patients with portal hypertension. The prevalence of gastroesophageal haemorrhage is approximately 10–30% per year [5]. Esophageal varices occur in 30 to 40% of cirrhotic patients, while gastric varices occur in approximately 20%. However, GV rupture is associated with a higher mortality rate of up to 45% [1,6]. Risk factors for gastroesophageal variceal haemorrhage include size of varix (large >10 mm, medium 5–10 mm, and small <5 mm), Child Pugh's score, and presence of red-spots [7].

The high morbidity and mortality rates associated with gastroesophageal variceal haemorrhage demands an early detection and prophylactic treatment for patients at risk for disease development. The American Association for the Study of Liver Diseases (AASLD) recommends patients to undergo screening esophagogastroduodenoscopy (EGD) for detecting esophageal and gastric varices

* Corresponding author at: Department of Gastroenterology, Endoscopy Center, Evidence-based Medicine Center, Zhongshan Hospital, Fudan University, 180 Fenglin Road, Shanghai 0086200032, China. Tel.: +86 13601767310/15000223468; fax: +86 2164038472.
E-mail address: chen.shiyao@zs-hospital.sh.cn (S.-y. Chen).

http://dx.doi.org/10.1016/j.dld.2016.02.007
1590-8658/

when the diagnosis of cirrhosis is made. All varices are graded as small or large (>5 mm) and the presence or absence of red spots is duly noted. Patients with gastroesophageal varices should be assessed for risk of variceal haemorrhage and treated accordingly with prophylactic medication (β-blockers) or minimally invasive preventive therapy such as (EVL or sclerotherapy) [4]. However, the point prevalence of esophageal varices requiring prophylaxis ranges from 15 to 25%, and even lower for gastric varices. The majority of patients who undergo EGD screening at the time of cirrhosis diagnosis either have no varices, or have small varices that do not require treatment [8]. Moreover, EGD is an invasive and expensive procedure that requires sedation and is poorly tolerated by patients due to associated discomfort during and after the procedure [9].

Computed tomography imaging could potentially replace EGD as a non-invasive, more tolerable, and inexpensive test in the accurate diagnosis and risk assessment of gastroesophageal varices. With advancements in radiological imaging techniques, CT application now allows for multiple rendering models, such as but not limited to, multidetector computed tomography (MDCT), volume rendering (VR), minimum intensity projection (CT-MIP) and shade surface display (SSD), which could provide a more infallible identification and assessment of gastric varices [9–11]

2. Methods

2.1. Search strategy

This meta-analysis was conducted according to the PRISMA statement [12]. A systematic search of MEDLINE, Embase, Web of Science, and Scopus was performed through August 2015 to identify relevant articles on diagnostic accuracy of computed tomography for gastroesophageal varices in reference to esophagogastroduodenoscopy (EGD). A combination of the following search terms were used: (esophageal varices OR gastric varices OR gastroesophageal varices) AND (CT OR computed tomography OR angiography). Refer to Appendix 1 for detailed search strategy. 2 reviewers (YT and XZ) independently reviewed the title and abstract of studies in attempt to eliminate irrelevant articles, based on a priori established inclusion and exclusion criteria.

2.2. Inclusion and exclusion criteria

Inclusion criteria are as follows: (1) diagnostic accuracy of CT imaging was assessed in reference to EGD, (2) data provided was sufficient to conduct a 2×2 table for analysis, (3) absence or presence of either gastric or esophageal varices were assessed. Exclusion criteria includes: (1) study population was limited to patients with gastroesophageal varices initially confirmed with EGD, (2) studies that only provided diagnostic rate, without calculable sensitivity and specificity. No language or article type restrictions were imposed. Additional reference articles were acquired through a manual search of computerized databases.

2.3. Quality assessment

All included studies were subjected to the Quality Assessment for Studies Diagnostic Accuracy-2 (QUADAS-2) guideline and rated according to the 4 domains (Patient Selection, Index Test, Reference Standard, Flow and Timing) for risk of bias and sources of variation (applicability) assessment. Risk of bias was judged as “low”, “high”, or “unclear”, under the guidance of a series of 10 signalling

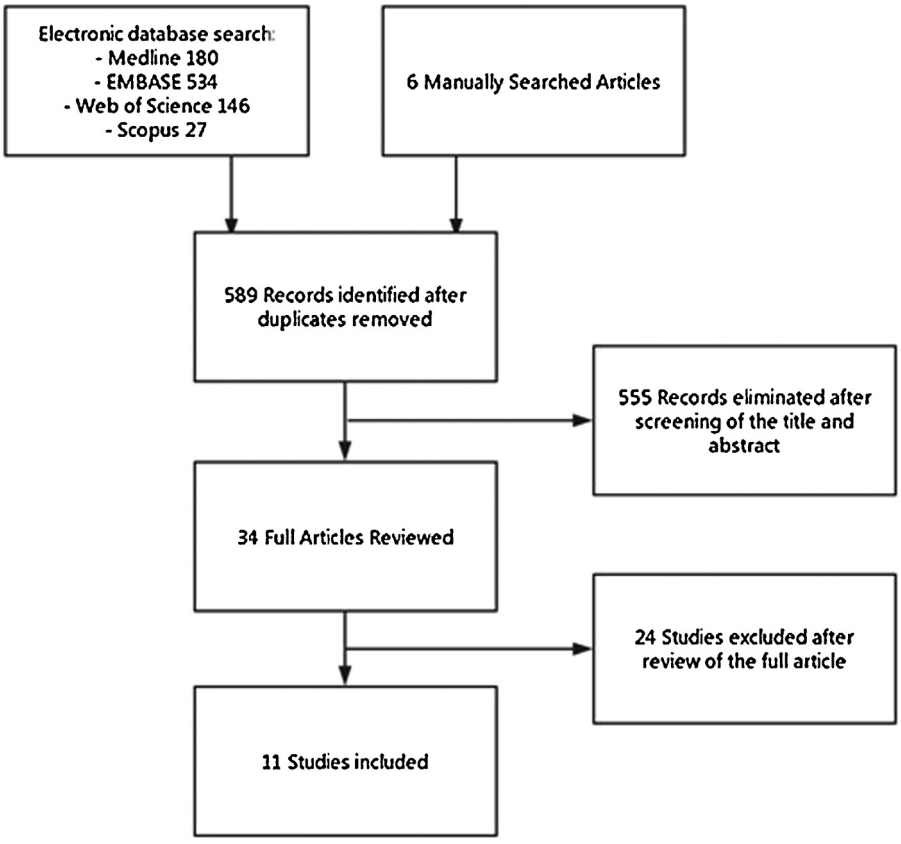

Fig. 1. Study Identification flowchart.