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Commentary on "A Vein-viewing Application Enabled Detecting Abdominal Wall Varices Related to the Presence of Non-treated Gastroesophageal Varices: A Cross-sectional Study"

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ABSTRACT

As mobile devices evolve into medical tools, this study specifically investigates the potential of a vein-viewing application to identify gastroesophageal varices (GOV), a critical complication of cirrhosis. The results showcase the efficacy of the application in detecting Abdominal Wall Varices (AWV) associated with cirrhosis and GOV. Notably; AWV grading is significantly higher in vein-weighted images than un-manipulated images, emphasizing the application's capability to enhance visualization. Using mobile devices for AWV detection presents promising prospects for non-invasive screening methods for liver disease.

Keywords: Abdominal wall varices; Cirrhosis; Gastroesophageal varices; Mobile devices

DESCRIPTION

Cirrhosis poses a significant health risk, potentially leading to liver cancer and hepatic decompensation, marked by complications such as ascites, hepatic encephalopathy, and variceal bleeding. In 2019, cirrhosis was associated with 2.4% of global deaths [1]. Gastroesophageal varices (GOV) manifest in 30% to 40% of individuals with compensated cirrhosis and 60% to 85% of those with decompensated cirrhosis at the time of cirrhosis diagnosis [2]. According to the Baveno VII guideline, screening endoscopy is recommended when liver stiffness measurement exceeds 20 kPa or platelet count falls below 150 × 10^9/L [3]. The necessity of endoscopy burdens patients, prompting the exploration of targeted approaches for specific populations. We sought a novel approach to identify at-risk populations and concentrated on Abdominal Wall Varices (AWV) directly connected to esophageal varices through the portal vein. Enlargements of AWV, conventionally known as "Caput Medusae," arise in instances of severe portal hypertension but are infrequently observed in modern clinical practice [4]. Employing VeinSeek Pro (VeinSeek LLC, Los Angeles, CA) (https://www.veinseek.com/), a vein-viewing device requiring no external equipment currently available only for iPhone and other iOS devices (**Figure 1A**), marked a pivotal shift in our investigative approach. It enhances the contrast of vein images by boosting oxyhemoglobin/deoxyhemoglobin absorption contrast. By applying VeinSeek Pro to the abdominal wall, we identified its efficacy in detecting abdominal wall varices (**Figure 1B**). This promising outcome led us to embark on a prospective study utilizing the vein-viewing application as our primary investigative tool.

We investigated the efficacy of the vein-viewing application on the iPhone for detecting AWV in patients with chronic liver disease and explored the relationship between AWV and GOV [5]. A total of 100 adult patients with chronic liver disease, including cirrhosis, were prospectively enrolled. All patients underwent endoscopy within three months of inclusion. The study also obtained unmanipulated (UI) and vein-weighted images (VWI) for each patient. We established a new classification for this system with AWV graded as 0 (non-detectable), 1 (slightly detectable), and 2 (distinct) (**Figure 2**).

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The results showed that the vein-viewing application effectively detected AWV related to cirrhosis and GOV. The grading of AWV was significantly higher in VWI compared to UI, indicating the application's ability to enhance the visualization of AWV. The study further explored the relationship between AWV and GOV, finding that VWI-AWV grade 2 was associated with factors such as cirrhosis, high Child-Pugh score, ascites, the presence of GOV, and low platelet count. Multivariate analysis revealed that VWI-AWV grade 2 was an independent factor related to non-treated GOV. Using a mobile device for detecting AWV and its association with liver diseases opens new possibilities for non-invasive screening methods.

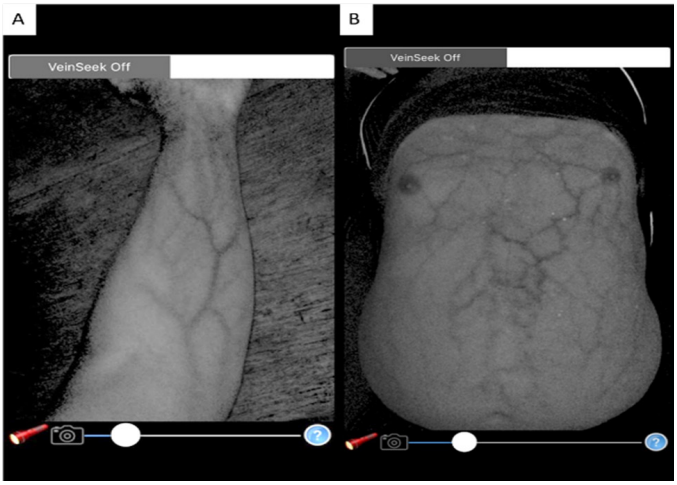

Figure 1: Images from the vein-viewing application. A) Cutaneous veins of the forearm. B) Abdominal wall veins in patients with cirrhosis.

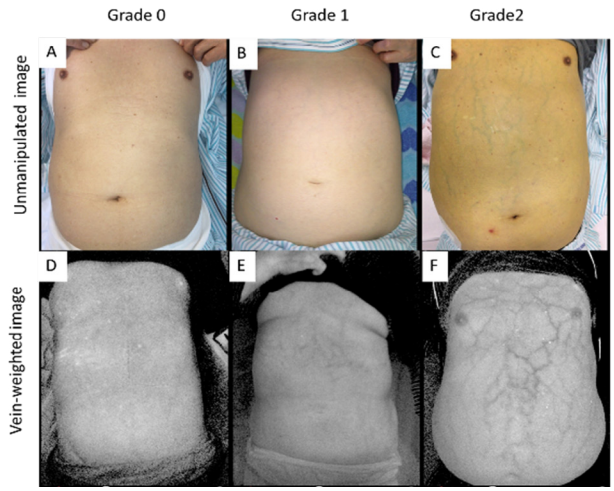

Figure 2: Classification of abdominal wall varices. A) grade0; UI-non-detectable, B) grade1; UI-slightly detectable, C) grade2; UI-distinct, D) grade0; VWI-non-detectable, E) grade1; VWI-slightly detectable, F) grade2; VWI-distinct, UI Unmanipulated image, VWI Vein-weighted image

Numerous medical applications developed for wearable and mobile devices have emerged recently. Wearables can now detect atrial fibrillation, check blood oxygen levels, and even assist with nightmares [6-8]. Some applications support smoking cessation, diabetes management, and can even extend the survival time of cancer patients [9-11]. The cameras equipped with mobile devices make it possible to detect conditions such as anemia or cataracts [12,13]. In this context, we further reported on an algorithm that can detect jaundice from images taken with an iPhone without needing special equipment [14]. The “democratization of healthcare” is anticipated to advance when physical findings that previously required a doctor's examination can be detected using mobile devices.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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