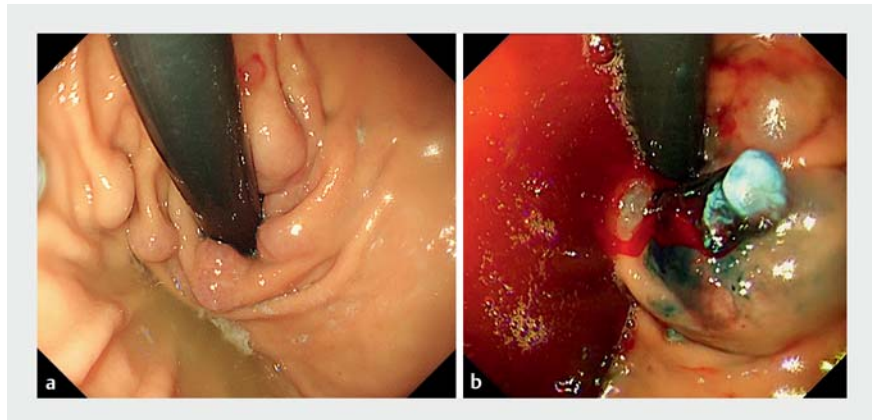


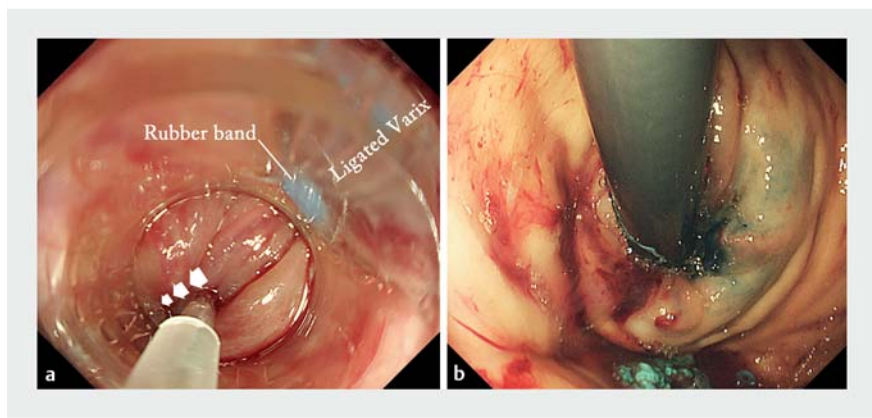
## Ligation-occluded endoscopic injection sclerotherapy: a novel retrograde strategy for gastroesophageal varices obliteration

We propose a novel retrograde obliteration strategy, ligation-occluded endoscopic injection sclerotherapy (LOEIS), for management of gastroesophageal varices. We report on a patient with GOV1+2 varices who benefitted from this strategy (► **Fig. 1 a**). She underwent endoscopy for recurrent variceal bleeding. Conventional variceal obturation with sclerosant [1] (1% lauromacrogol with methylene blue as tracer agent) to the first two cardiac varices was successful [2]. We tried to obturate a third cardiac varix with a caliber of 1.8–2.5 mm on endosonography, but failed to achieve accurate injection; unfortunately, this attempt also resulted in active bleeding (► **Fig. 1 b**). We decided to perform LOEIS.

The downstream esophageal extension of the bleeding cardiac varix was carefully identified. Esophageal variceal ligation (Super 7; Boston Scientific, Marlborough, Massachusetts, USA) was performed. Injection therapy was then carried out on this varix at 1–2 cm distal to the rubber band and 2 cm proximal to the dentate line. As the pre-secured rubber band blocked the hepatofugal drainage, the sclerosant was forced to flow toward the cardia (► **Fig. 2 a**). In this way, the role of the rubber band was similar to that of a dilated balloon in balloon-occluded retrograde transvenous obliteration and endoclip in clip-assisted gastric variceal obturation [3]. A combination of 7 mL foam sclerosant (1% lauromacrogol: room air=1:3), 1 mL tissue adhesive (N-butyl-2-cyanoacrylate), and 2.5 mL of normal saline was injected using a needle with a transparent catheter (23G; Boston Scientific) (► **Video 1**). Hemostasis was successfully achieved (► **Fig. 2 b**). Enhanced computed tomography confirmed effective obliteration of varices. The patient was discharged in good condition.



► **Fig. 1** GOV1+2 varices in a patient with hepatitis B virus liver cirrhosis. **a** Cardiac varices before endoscopic treatment. **b** Active bleeding during endoscopic variceal obturation.



► **Fig. 2** Ligation-occluded endoscopic injection sclerotherapy. **a** Injection therapy was performed in the downstream esophageal varix corresponding to the bleeding cardiac varix, at the distal side of a pre-secured rubber band. Arrows indicate sclerosant flow. **b** Hemostasis was successfully achieved.

LOEIS is particularly suitable for GOV1/2 with large esophageal and small gastric varices. When applied properly, LOEIS is both safe and efficient. It is highly complementary to conventional endoscopic obliteration methods and should be integrated into the technical arsenal for management of gastroesophageal varices.

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### Competing interests

The authors declare that they have no conflict of interest.



**Video 1** Ligation-occluded endoscopic injection sclerotherapy as a novel retrograde strategy for gastroesophageal varices obliteration.

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## The authors

**Wei Wu<sup>1</sup>, Qukai Liu<sup>1</sup>, Weiguang Li<sup>1</sup>, Jiali Kan<sup>2</sup>, Qi Wang<sup>1</sup>, Lifu Wang<sup>1</sup>**

- 1 Department of Gastroenterology, Ruijin Hospital affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai, China
- 2 Endoscopy Center, Wuxi Branch of Ruijin Hospital affiliated to Shanghai Jiao Tong University School of Medicine, Wuxi, China

## Corresponding author

**Wei Wu, MD, PhD**

Department of Gastroenterology, Ruijin Hospital affiliated to Shanghai Jiao Tong University School of Medicine, 197 Ruijin Er Road, Shanghai 200025, China  
Fax: +86-21-64150773  
ww11560@rjh.com.cn

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