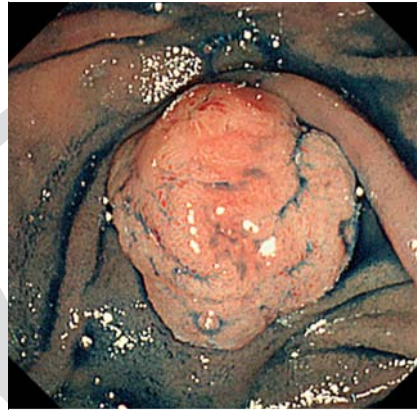


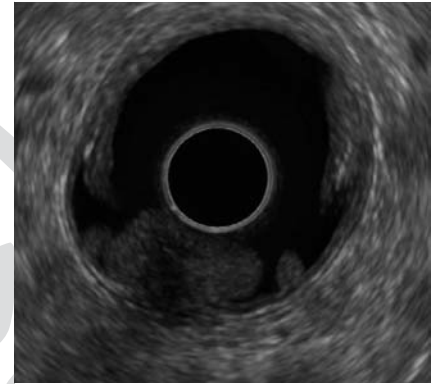
Gel immersion technique for the examination and treatment of an ampullary tumor

Endoscopic papillectomy using the underwater technique [1] for ampullary tumors allows for involutions of the mucosal folds and permits resection without capturing the muscularis propria and without the need for submucosal fluid injection [2,3]. However, there are some disadvantages to underwater endoscopic papillectomy. For example, it can be difficult to maintain a sufficient amount of water, there is a risk of flushing away the resected specimens, and mixing of any blood with the water can cause loss of visibility. To overcome these disadvantages, we successfully applied the gel immersion technique, a novel method for securing the endoscopic visual field using gel with an appropriate viscosity (Viscoclear; Otsuka Pharmaceutical Factory, Inc., Tokushima, Japan) during gastrointestinal tract bleeding [4,5].

A 67-year-old man presented with an ampullary tumor (► **Fig. 1**) and endoscopic ultrasonography (EUS) was performed. Gel immersion EUS (GI-EUS) provided better acoustic coupling without flattening of the tumor, for a longer time than with water filling, and revealed an ampullary tumor without invasion of the duodenal muscularis propria or intraductal involvement (► **Fig. 2**; ► **Video 1**). GI-EUS



► **Fig. 1** Image during side-viewing duodenoscopy showing a tumor of the major duodenal papilla.

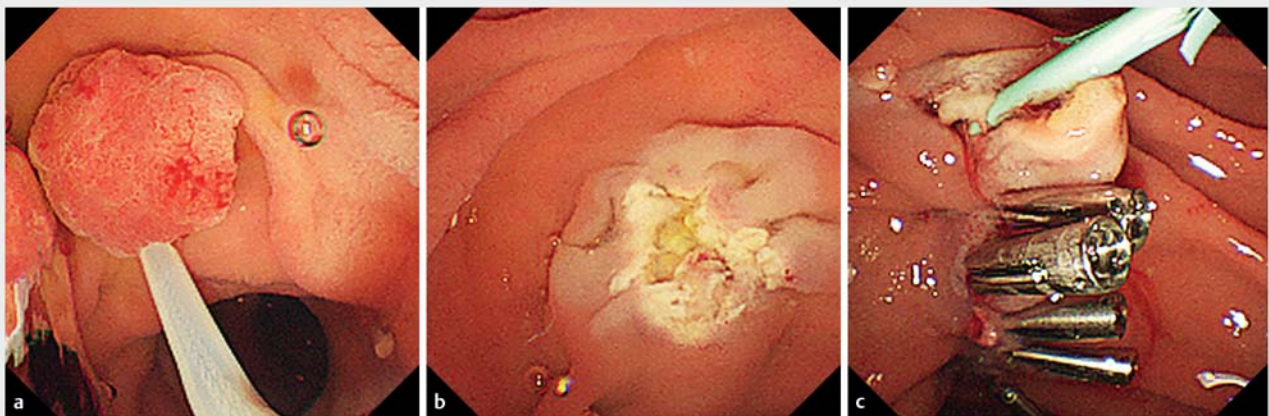


► **Fig. 2** Endoscopic ultrasonography (EUS) image showing how the use of gel provided better acoustic coupling with the ampullary tumor without flattening, allowing gel immersion EUS to show an ampullary tumor without invasion of the duodenal muscularis propria or intraductal involvement, along with the involutions of mucosal folds while the muscle layer remained circular.

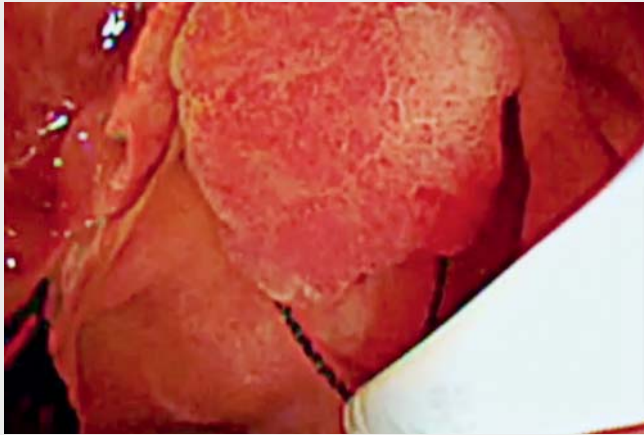
also showed the involutions of the mucosal folds while the muscle layer remained circular, as with the underwater technique [1].

Gel immersion endoscopic papillectomy (GI-EP) was chosen as the treatment with the patient's agreement and sufficient informed consent. An auxiliary injection cap (BioShield irrigator; US Endoscopy, Ohio, USA) was used to allow the operative channel to remain free, and Viscoclear was injected before and during GI-EP. En bloc papillectomy was

performed with a standard snare using a high frequency blended electric cutting current (► **Fig. 3 a, b**). After the resection, the specimen remained within the gel, the mild bleeding did not spread, and the visual field remained secure. A pancreatic stent was inserted, and the mucosal defect was closed using endo-



► **Fig. 3** Endoscopic images showing: **a** the ensnared papilla during gel immersion papillectomy; **b** the appearance following papillectomy; **c** a pancreatic stent that was subsequently placed and closure of the mucosal defect with endoclips.



▶ **Video 1** The gel immersion technique is used successfully to examine an ampullary tumor using endoscopic ultrasonography and for treatment with endoscopic papillectomy.

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clips (▶ **Fig. 3c**; ▶ **Video 1**). No adverse events occurred and histopathological findings revealed a tubular adenoma with negative margins.


GI-EUS and GI-EP may be useful for the examination and treatment of ampullary tumors.

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Competing interests

Dr. Katanuma has received speaker's fees from Olympus Co., Tokyo, Japan. The remaining authors declare that they have no conflict of interest.

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