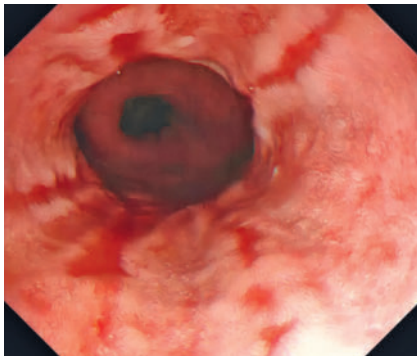
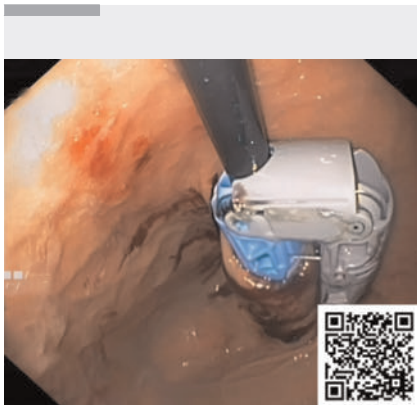


## Combining transoral fundoplication and robotic cruroplasty: a novel robotic-assisted endoscopy



► **Fig. 1** Endoscopy showing hiatal hernia with grade D esophagitis.



► **Video 1** Combining transoral fundoplication and robotic cruroplasty: a novel robotic-assisted endoscopy.

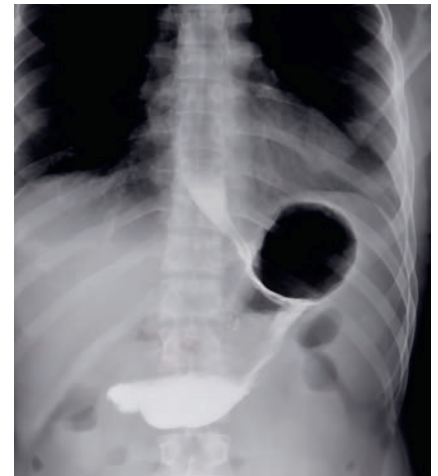
A 34-year-old man with severe gastroesophageal reflux disease (GERD) and grade D esophagitis combined with a large hiatal hernia did not fully respond to medication and lifestyle changes. As a result, it was decided to pursue a combined endoscopic and surgical approach. This report evaluates the feasibility and effectiveness of robotic-assisted hiatal hernia repair combined with endoscopic transoral incisionless fundoplication (Robo cTIF) [1–3], which combines endoscopy and robotics to treat chronic GERD associated with large hiatal hernias (► **Fig. 1**).

In this procedure, the patient underwent robotic-assisted laparoscopic hernia repair followed by endoscopic transoral incisionless fundoplication during a single anesthetic session (► **Video 1**), complemented by a multifaceted intervention that included nutritional counseling and physical activity guidelines. Proton pump inhibitors (PPIs) were tapered off over 6 weeks. We conducted baseline and 3-month assessments to measure endoscopic changes, GERD Health-Related Quality of Life (GERD HRQL) [2], Reflux Symptom Index (RSI), and post-procedure gastrografin (Bracco Diagnostics Inc., Monroe Township, New Jersey, USA) imaging (► **Fig. 2**).

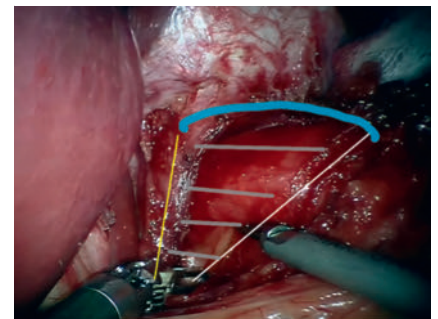
The procedure commenced with a robotic-assisted hiatal hernia repair cruroplasty capitalizing on the robot's precision, dexterity, and 3-dimensional visualization (► **Fig. 3**). This was followed by an endoscopic fundoplication using the TIF 2.0 device [4], to re-establish the gastroesophageal valve (► **Fig. 4**). The procedure was then supported by indocyanine green [5], ensuring tissue viability post-procedure (► **Fig. 5**).

Our procedure resulted in significant improvements in all evaluated outcomes from baseline to 3 months post-procedure. GERD HRQL scores greatly improved, dropping from 72 to 1 at 3 months post-procedure. Additionally, the RSI significantly declined from 24.0 to 2 at 3 months, indicating effective management of chronic GERD with hiatus hernia both objectively and subjectively. The patient experienced minimal postoperative pain, rapid recovery, and significant symptom improvement, which eliminated the need for PPIs.

In conclusion, the combined approach of robotic cruroplasty and TIF (Robo cTIF) successfully treated our 34-year-old patient. This method led to significant improvements in quality of life and reflux symptoms, with greatly reduced GERD-HRQL and RSI scores. The patient experi-



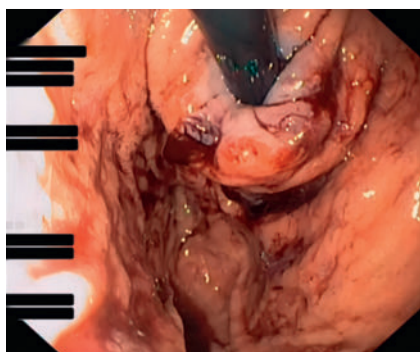
► **Fig. 2** Gastrografin study during swallow 3 months after the procedure.



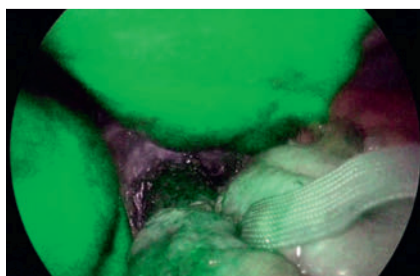
► **Fig. 3** Robotic surgery, hiatal dissection, and mobilizing the esophagus. The upper edge of the hiatal hernia (blue line), and right and left edges of the diaphragm (yellow and white lines) are shown, with the hiatal defect between (sectioned portion).

enced minimal postoperative pain, rapid recovery, and no longer requires PPIs. This highlights the potential of this technique for severe GERD cases with large hiatal hernias. However, the availability of this innovative approach may be limited to specific candidates who meet certain criteria and largely depends on receiving approval from local health systems.

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► **Fig. 4** The gastroesophageal valve after transoral incisionless fundoplication.




► **Fig. 5** The ribbon marks the gastroesophageal junction. Indocyanine green was used to detect flap-valve vascularity.

### Conflict of Interest

The authors declare that they have no conflict of interest.

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