



## State of the Art: New Technologies in Endoscopy

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### Outline

- The era of lumen-apposing metallic stents (LAMS)
- EUS- guided drainage of PFCs and GB
- EUS- guided Gastrojejunostomy
- EUS- guided GG (EDGE)
- Full-thickness resection device (FTRD)
- G (Gastric) POEM or Pyloromyotomy
- MUSE

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## AXIOS Lumen Apposing Stent

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### “Hot” AXIOS

- HOT AXIOS incorporates electrocautery into the tip
- Enables easy passage into the target body organ
- Can be introduced directly into the target organ under EUS-guidance (“freestyle”), or can be introduced over a guidewire (no cystotome required)



Stent Sizes (diameter x length, mm)	
US	EU
10x10	6x8
15x10	8x8
(not yet available)	10x10
	15x10

#### Benefits

- Safety - reduces instrument exchanges and leak risk
  - Dramatically reduces time of procedure
- Penetrates easily enabling access to non-adherent structures

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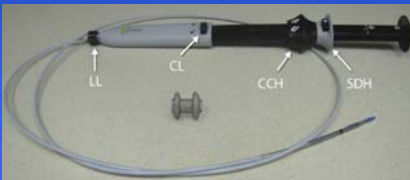
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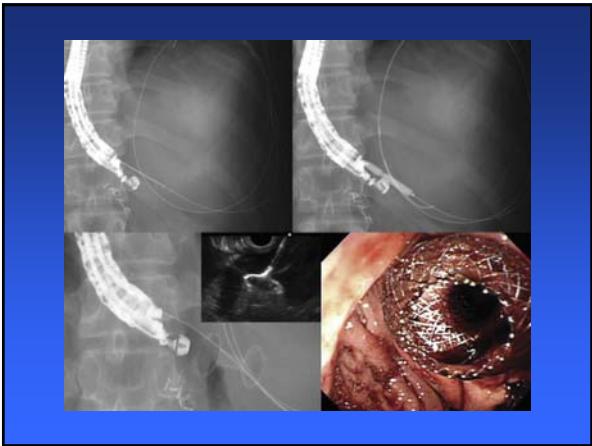
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**EUS-guided drainage  
Of PFCs**

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**Traditional EUS-guided pseudocyst drainage**

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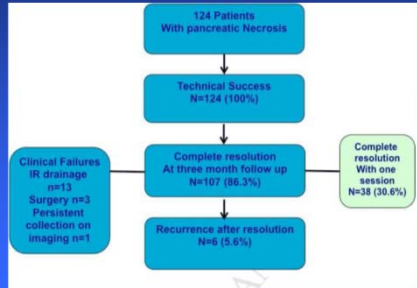
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## Endoscopic Therapy With Lumen-apposing Metal Stents is Safe and Effective for Patients With Pancreatic Walled-off Necrosis

Sharaiha, Tyberg, Khashab, et al. CGH 2016, in press



DEN 78  
PD stent 19  
H2O2 38  
NCT 22

Median # of interventions was 2 (1-9)

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## EUS-guided GBD




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### EUS-guided gallbladder drainage with a lumen-apposing metal stent (with video)

Shayan Irani, MD,<sup>1</sup> Todd H. Baron, MD,<sup>2</sup> Ian S. Grimm, MD,<sup>2</sup> Mounir A. Khashab, MD<sup>3</sup>

GIE 2015

Results of 15 patients undergoing EUS-GBD by using a LAMS	
Technical success, no. (%)	14 (93)
Clinical success, no. (%)	15 (100)
Median time to clinical response, days	1 (0-3)
Median (range) stent dwell time, days	140 (9-230)
Stent removed, no. (%)	0
Adverse events, no.	
Fever	1
Recurrent cholecystitis, no.	0
Unrelated deaths, no.	2

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## EUS-Guided Gastrojejunostomy

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## Techniques of EUS-GJ

- Direct EUS-GJ
- Balloon-assisted EUS-GJ
- Balloon-occluded gastrojejunostomy bypass

Khashab, Baron, Binmoeller, Itoi. GIE 2015;81:1234-6  
Itoi et al. Gut 2016;65:193-5

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## Direct EUS-GJ



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## Balloon-assisted EUS-GJ



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## Balloon-occluded gastrojejunostomy bypass



Itoi et al. Gut 2016;65:193-5

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## Procedural Outcomes

NEW METHODS: Clinical Endoscopy

EUS-guided gastroenterostomy: the first U.S. clinical experience  
(with video) 

Mouen A. Khushf, MD,<sup>1</sup> Vivek Kumbhari, MD,<sup>2</sup> Ian S. Grimm, MD,<sup>2</sup> Saowanee Ngamruengphong, MD,<sup>1</sup>  
Gerard Aguilu, RN,<sup>3</sup> Mohamed El Zein, MD,<sup>4</sup> Anthony N. Kalloo, MD,<sup>5</sup> Todd H. Baron, MD<sup>6</sup>

GIE 2015;82:932-8

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NEW METHODS: Clinical Endoscopy

**EUS-guided gastroenterostomy: the first U.S. clinical experience (with video)**

Momen A, Khashab, MD,<sup>1</sup> Virek Kumbhari, MD,<sup>1</sup> Ian S. Grimes, MD,<sup>2</sup> Narawadee Ngamruengphong, MD,<sup>1</sup> Gerard Aquino, RN,<sup>3</sup> Mohammad H Zein, MD,<sup>4</sup> Anthony N. Kalloo, MD,<sup>5</sup> Todd W. Baron, MD

	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6	Patient 7	Patient 8	Patient 9	Patient 10
Age (years)	57/Male	51/Male	55/Male	61/Male	52/Male	55/Female	48/Female	42/Male	48/Female	52/Male
Etiology of gastric outlet obstruction	Pancreas cancer	Superior mesenteric artery syndrome	Chronic pancreatitis	Gallbladder cancer	Peptic stricture	NSAD stricture	Chronic pancreatitis	Duodenal/pancreatic	Breast cancer	Chronic pancreatitis
Location of obstruction	Third part of the duodenum	Third part of the duodenum	First/second part of the duodenum	First/second part of the duodenum	Second duodenum	Pylorus	First/second duodenum	First/second duodenum	Second duodenum	First duodenum
Preter duodenal stricture	No	No	No	No	No	Yes	No	No	No	No
EUS-guided gastroenterostomy technique	Direct	Balloon-assisted	Balloon-assisted	Balloon-assisted	Balloon-assisted	Balloon-assisted	Balloon-assisted	Balloon-assisted	Balloon-assisted	Balloon-assisted
Electrocautery used for GE tract dilation	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	No
Technical success	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Site of small bowel anastomosis to stomach	Proximal jejunum	Proximal jejunum	Proximal jejunum	Proximal jejunum	Proximal jejunum	Fourth duodenum	Fourth duodenum	Fourth duodenum	N/A	Proximal jejunum
Clinical success	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes
Stent: Ocular Occlusion Spring System (guide)	4	3	3	3	3	4	1	2	N/A	4

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**Prospective evaluation of endoscopic ultrasonography-guided double-balloon-occluded gastrojejunostomy bypass (EPASS) for malignant gastric outlet obstruction**

Takaao Itoi,<sup>1</sup> Kentaro Ishii,<sup>1</sup> Nobuhito Ikeuchi,<sup>1</sup> Atsushi Sofuni,<sup>1</sup> Takuji Gotoda,<sup>1</sup> Fuminori Moriyasu,<sup>1</sup> Vinay Dhir,<sup>2</sup> Anthony Yuen Bin Teoh,<sup>3</sup> Kenneth F Binmoeller<sup>4</sup>

GUT 2016;65:193-5

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<b>Number of patients</b>	<b>20</b>
Double balloon insertion time	10.5 minutes
Technical success	90%(18/20)
Clinical success	18/18
Adverse events	2 stent misdeployments
Duration of follow-up	100 days
Recurrent GOO	None

Itoi et al. GUT 2016;65:193-5

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## EDGE Procedure

Endoscopic ultrasound-directed transgastric ERCP (EDGE) for Roux-en-Y anatomy: a novel technique

Kedia et al. Endoscopy 2015

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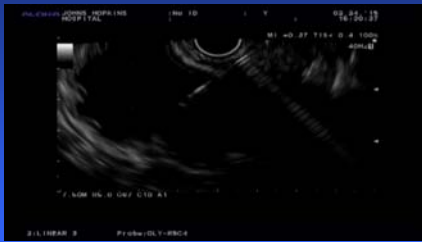
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## EDGE procedure



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### Full Thickness Resection Device (FTRD)

- Many attempts have been made in the past
- Ovesco developed a device based on the OTSC
- Maximum lesion size 3cm



Courtesy of Paul Fockens

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### Full Thickness Resection Device (FTRD)



Courtesy of Paul Fockens

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### Full Thickness Resection Device (FTRD)



Courtesy of Paul Fockens

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## Full Thickness Resection Device (FTRD)



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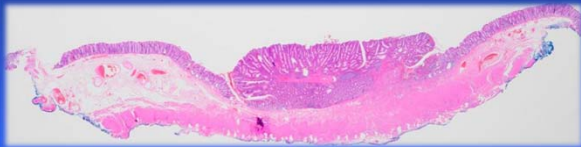
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## Full Thickness Resection Device (FTRD)

- Non-lifting remnant adenoma after 2 EMR's



Courtesy of Paul Fockens

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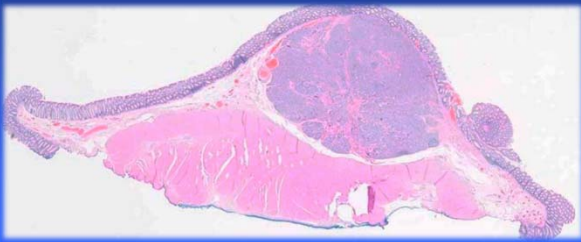
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## Full Thickness Resection Device (FTRD)

- NET in sigmoid, patient was referred for sigmoid resection but turned down by surgeon



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### THINKING OUTSIDE THE BOX

Gastric peroral endoscopic myotomy for refractory gastroparesis:  
first human endoscopic pyloromyotomy (with video) 📺

Khashab et al. 2013 Nov;78(5):764-8



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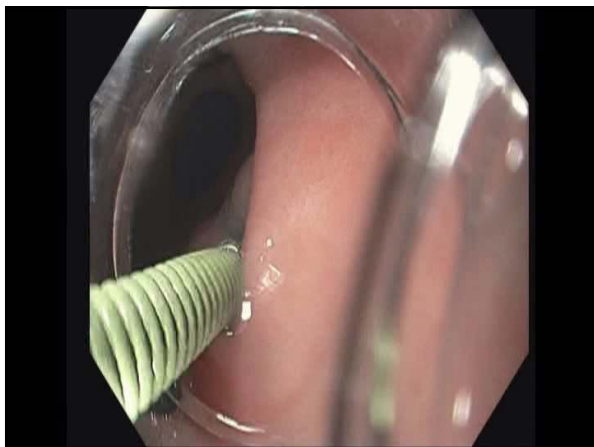
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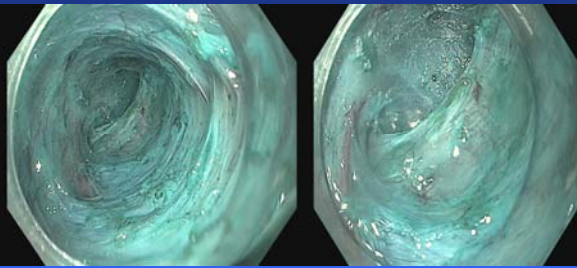
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## Procedural technical aspects



Tunnel/Myotomy length

Direction/approach and  
Identification of pylorus

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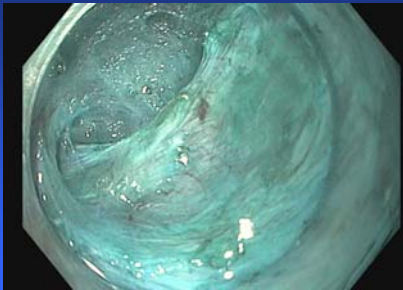
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## Procedural technical aspects



**Fear the Duodenum !!**

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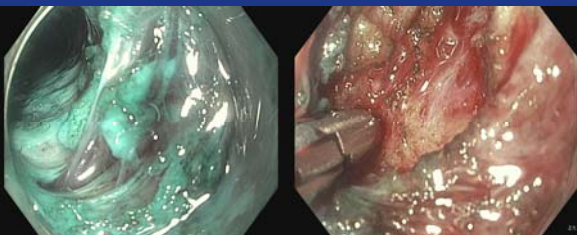
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## Procedural technical aspects



Bleeding risk

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## Procedural technical aspects



More difficult closure than E-POEM

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- **MUSE**

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## The MUSE™ System

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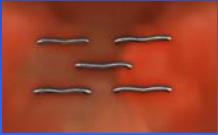

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### What MUSE Does

- The fundus is stapled to the esophagus
  - 3cm above GE Junction
  - 150–180° anterior wrap
- Each application fires 5 staples (quintuplet)
  - Standard 4.8mm titanium surgical staples
  - Reliably used for gastroesophageal anastomosis for >40 years



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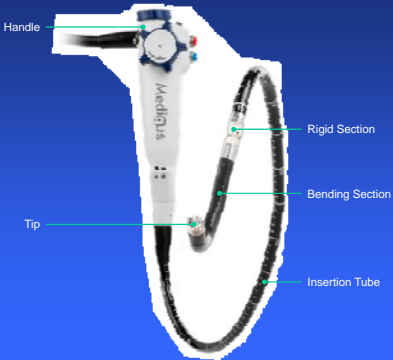
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### The MUSE™ System



## Structure and Function

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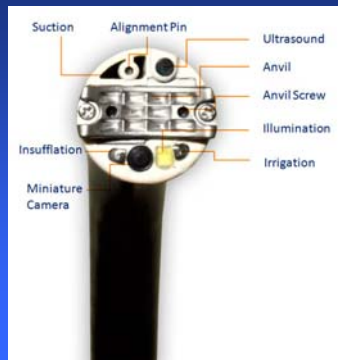
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### The MUSE™ System



## The Tip

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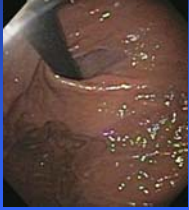
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## Anterior Fundoplication with MUSE



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Transoral Incisionless endoscopic fundoplication guided by impedance planimetry to treat severe GERD symptoms post POEM



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Thank you



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