



2ª edición  
Curso 2017/2018

Especialización en  
**Ultrasonografía  
Endoscópica Avanzada**

Título propio  
Universidad  
de Alcalá

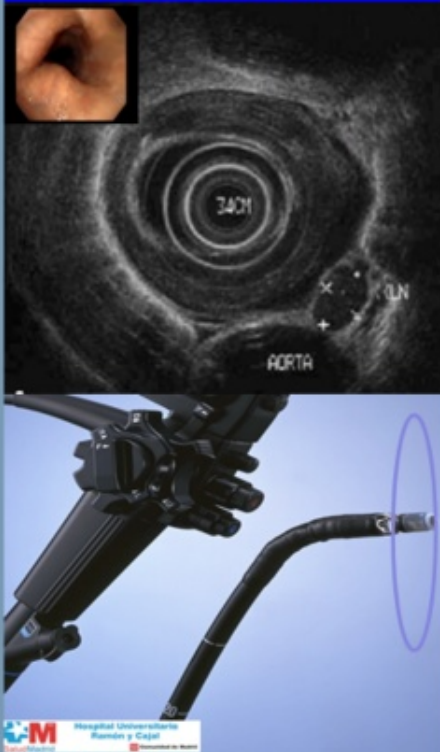
## INDICACIONES CLINICAS DE ULTRASONOGRAFIA ENDOSCOPICA

Enrique Vázquez Sequeiros  
Servicio de Gastroenterología y Hepatología  
Hospital Universitario Ramón y Cajal. IRYCIS. Madrid.

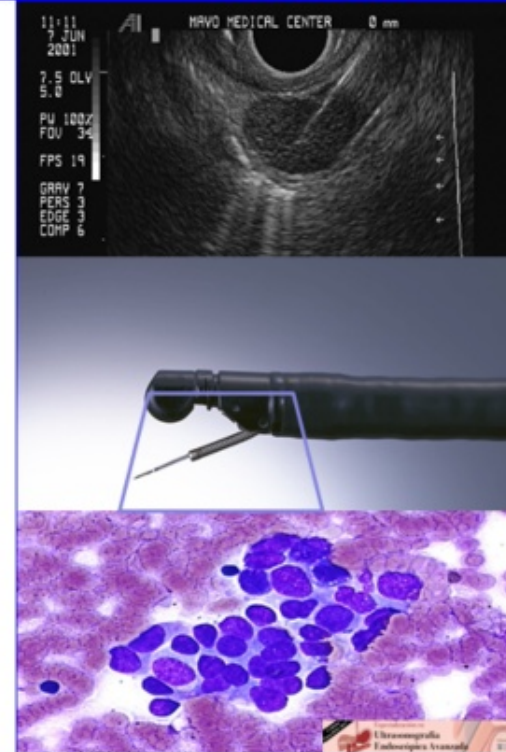
Hospital Universitario  
Ramón y Cajal  
Universidad de Madrid

# ECOENDOSCOPIOS

## Radial



## Lineal

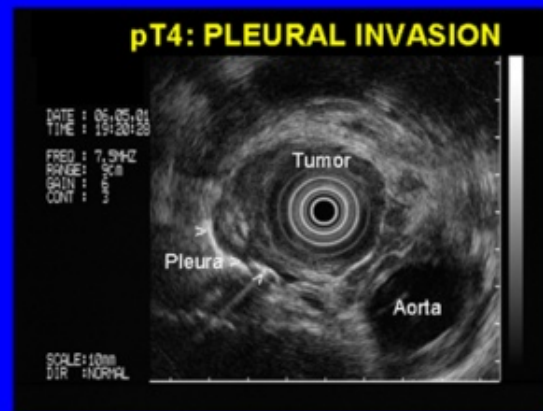
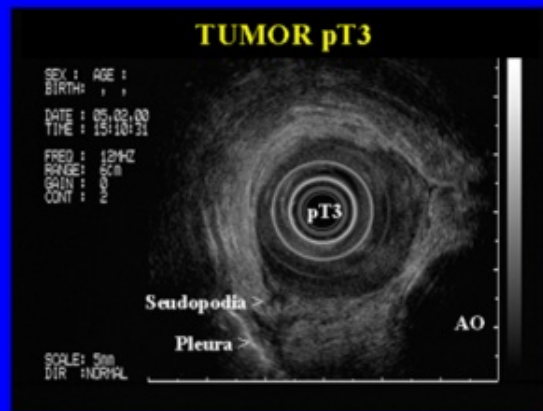
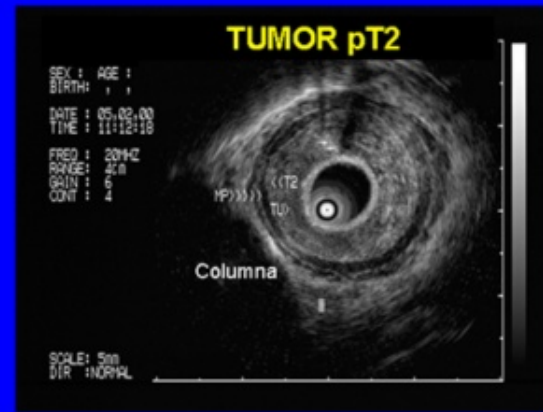
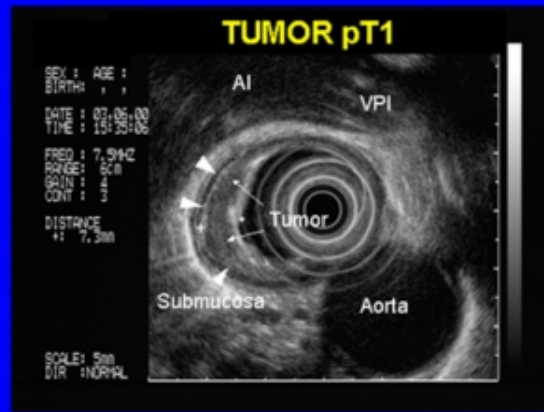


## CAPAS PARED ESOFAGO (7.5 MHz)

FREQ : 7.5MHz  
RANGE : 9cm  
GAIN : 2  
CONT : 3



SCALE: 10mm  
DIR : NORMAL



# ADENOPATIA: USE-PAAF

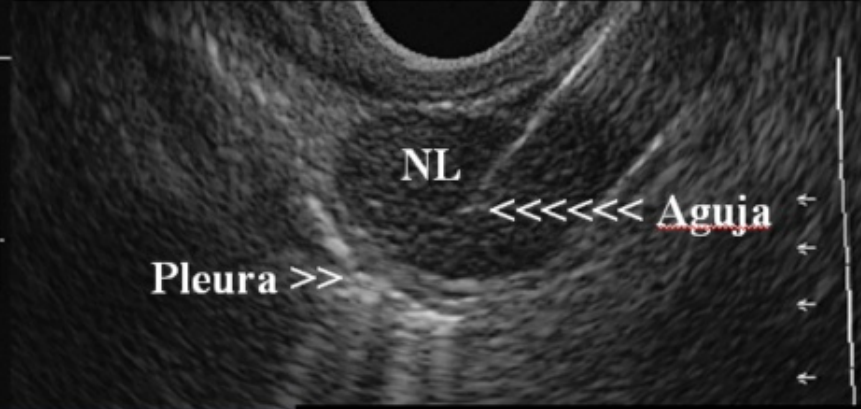
11:11  
7 JUN  
2001

7.5 OLY  
5.0

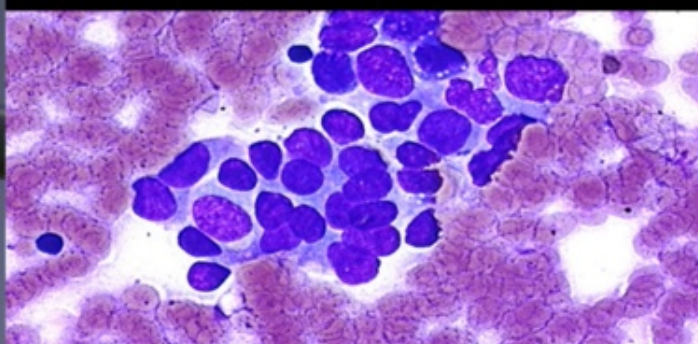
PW 100%  
FOV 34

FPS 19

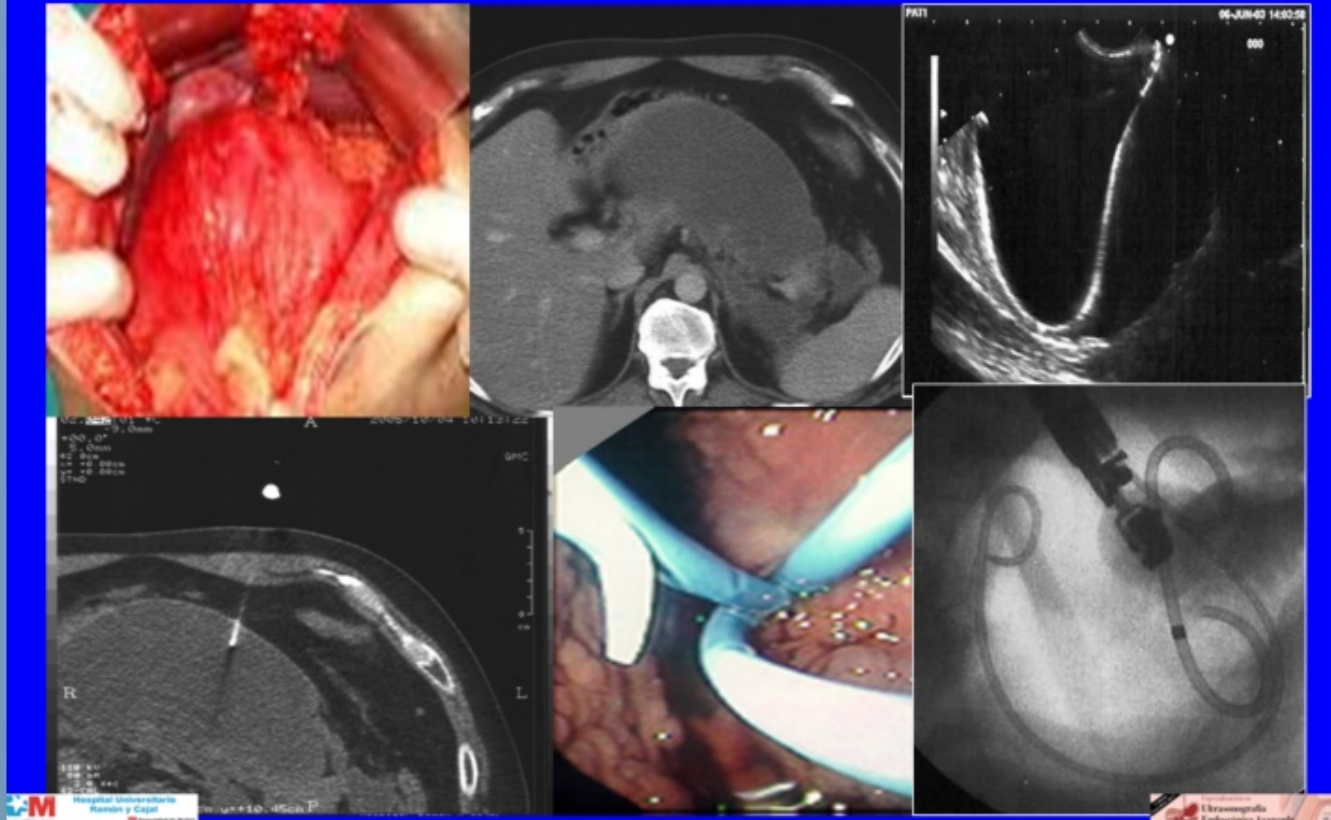
GRAY 7  
PERS 3  
EDGE 3  
COMP 6



## CITOLOGIA: ADENOCARCINOMA

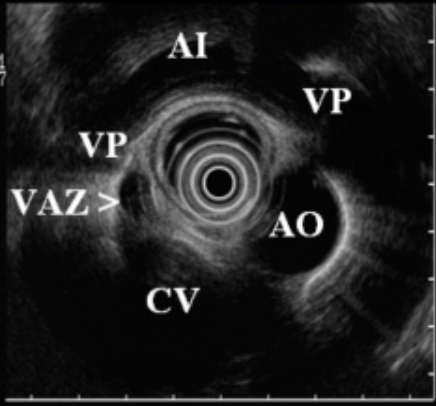


# DRAINAGE OF PANCREATIC FLUID COLLECTIONS (PFC)

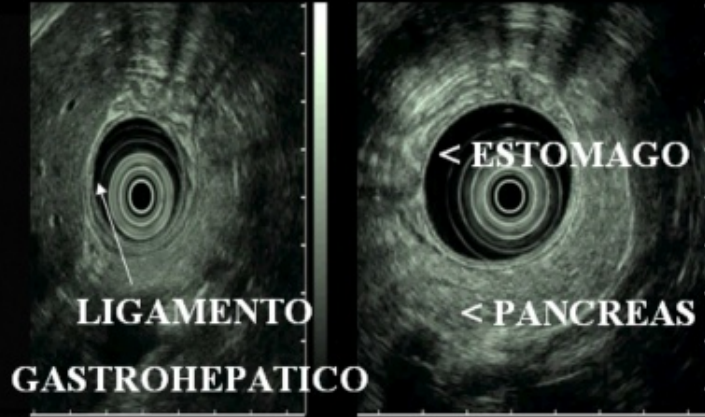


### MEDIASTINO POSTERIOR

SEX : AGE :  
BIRTH: , ,  
DATE : 03.15.01  
TIME : 20:32:17  
FREQ : 7.5MHz  
RANGE : 10cm  
GAIN : 3  
CONT : 3

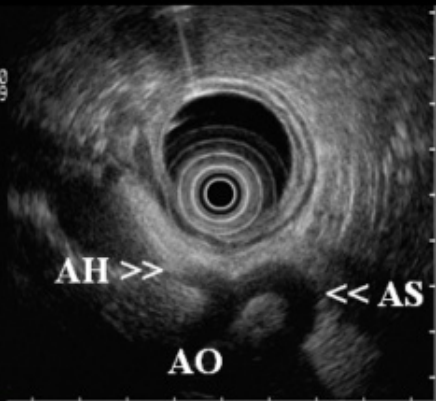


### ESPACIO PERIGASTRICO



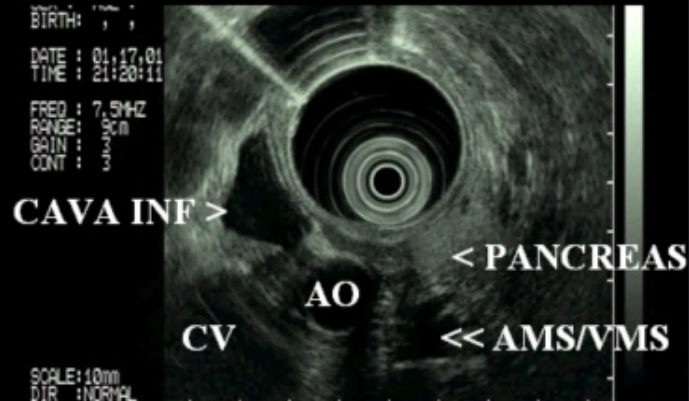
### TRONCO CELIACO

ALLAN  
SEX : AGE :  
BIRTH: , ,  
DATE : 03.06.00  
TIME : 13:13:53  
FREQ : 7.5MHz  
RANGE : 10cm  
GAIN : 3  
CONT : 3

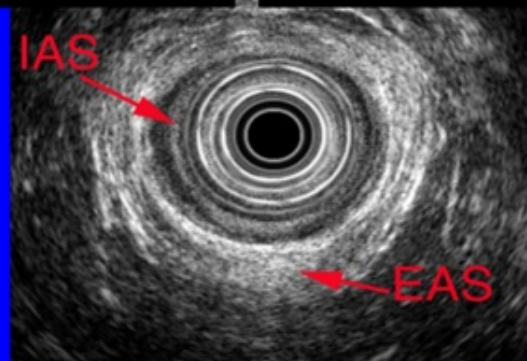
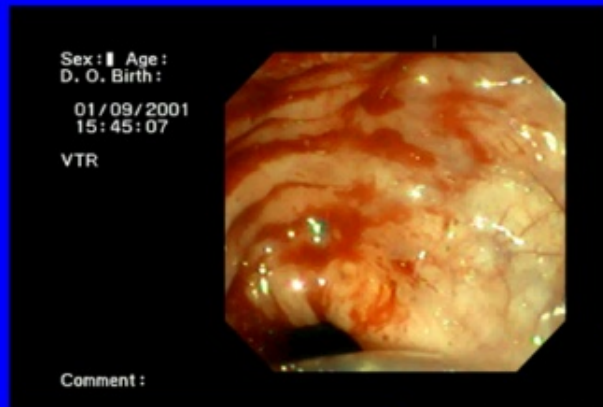


### ESPACIO PERIDUODENAL

BIRTH: , ,  
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TIME : 21:20:11  
FREQ : 7.5MHz  
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GAIN : 3  
CONT : 3



# RECTO/CANAL ANAL

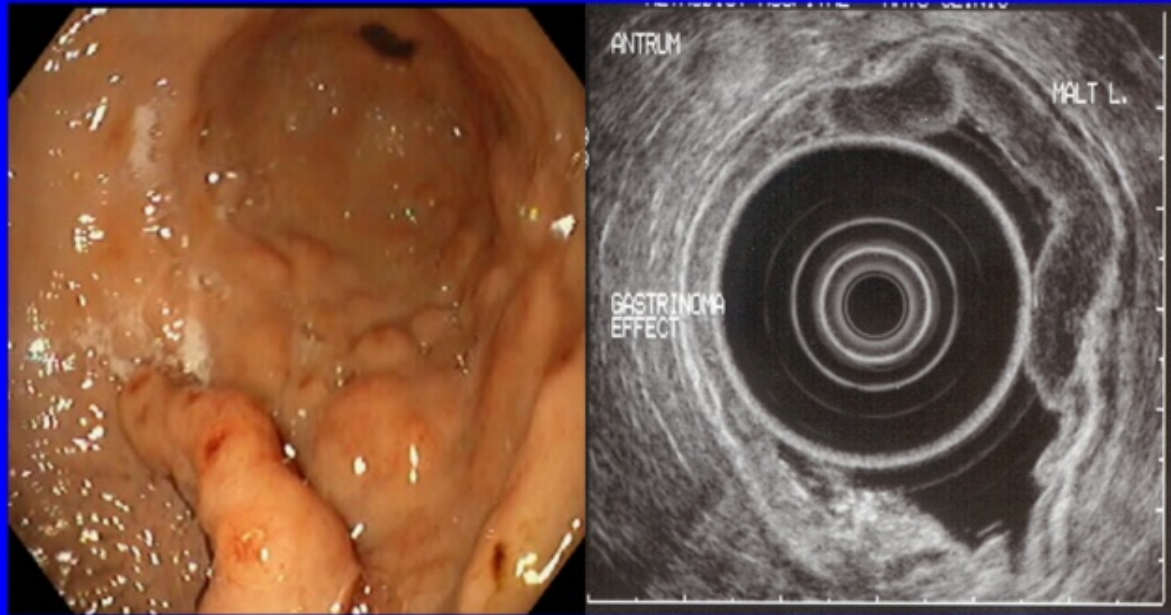




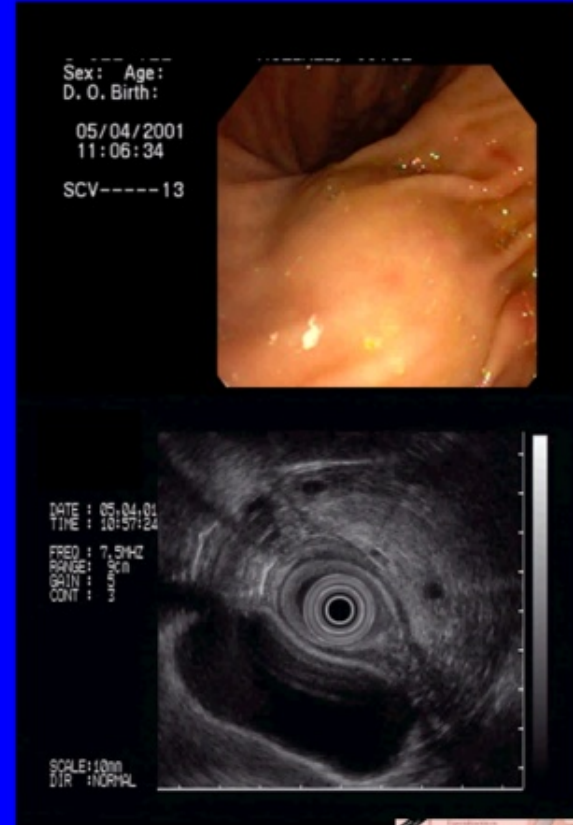
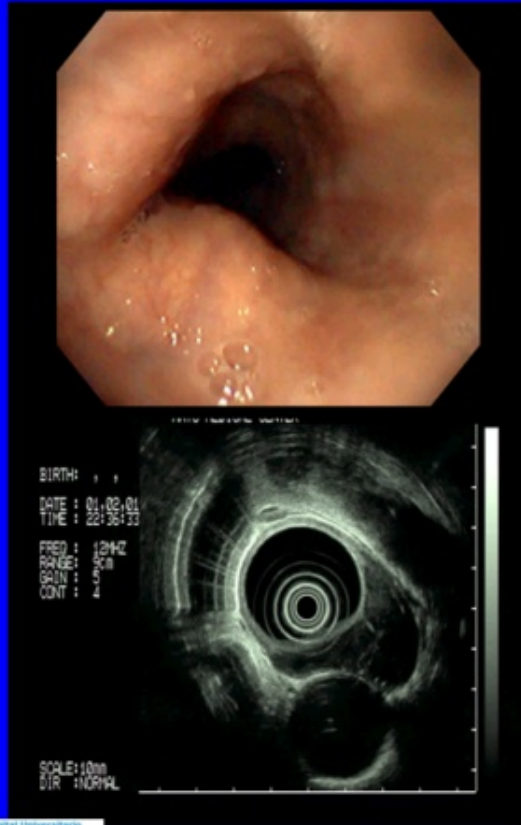
# INDICACIONES

- **Pliegues engrosados**
- **Tumor subepitelial vs compresión**
- **Pancreatitis**  
(recidivante y crónica)
- **Enf. litiásica**  
(Colédoco y microlitiasis)
- **Hipertensión portal**
- **Enf. fistulizante rectal**
- **Incontinencia fecal**
- **Carcinoma:** (Esófago, estómago, páncreas, vía biliar, papila, recto, linfoma/MALT, pulmón)
  - *Estadificación preCIR*
  - *Respuesta tto neoadyuvante*
  - *Seguimiento postCIR*
- **Punción:**
  - Tumor (páncreas, parietales)
  - Adenopatías (mediastino, gastroduodenales y recto)
- **Terapéutica:**
  - Inyección (neurolysis, inmunoterapia, terapia génica,...)
  - Ablación (quistes, TNE,...)
  - Drenaje (coleciones, vía biliar/pancreática,...)

# PLIEGUES ENGROSADOS



# TUMOR SUBEPITELIAL COMPRESSION

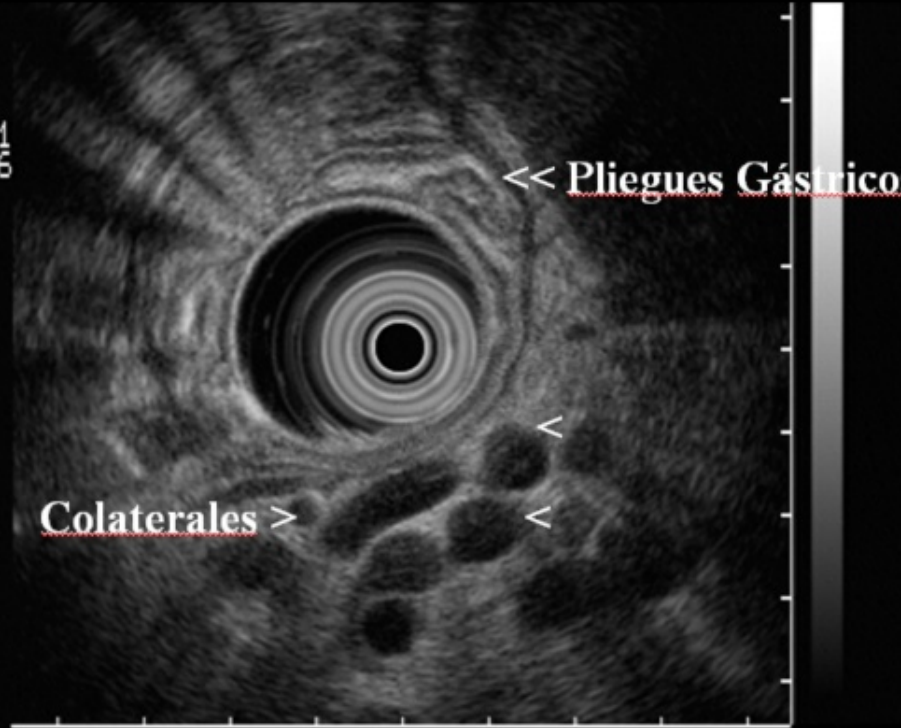


# HIPERTENSION PORTAL

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BIRTH: , ,

DATE : 03, 05, 01  
TIME : 22: 42: 46

FREQ : 7.5MHz  
RANGE: 9cm  
GAIN : 2  
CONT : 2

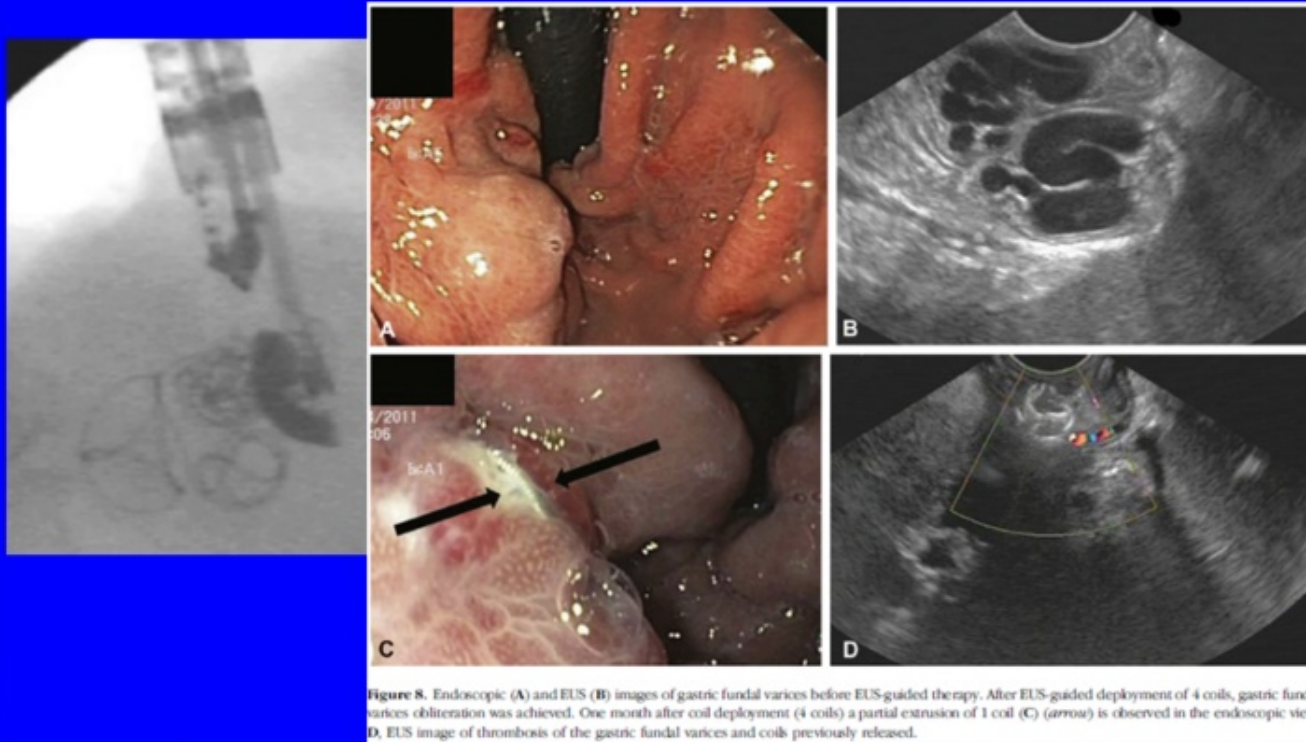


<< Pliegues Gástricos

Colaterales >

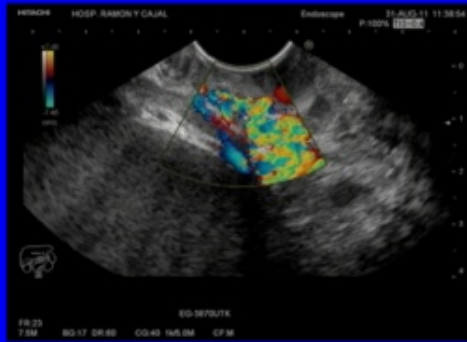
SCALE: 10mm  
DIR : NORMAL

# HIPERTENSION PORTAL



**Figure 8.** Endoscopic (A) and EUS (B) images of gastric fundal varices before EUS-guided therapy. After EUS-guided deployment of 4 coils, gastric fundal varices obliteration was achieved. One month after coil deployment (4 coils) a partial extrusion of 1 coil (C) (arrows) is observed in the endoscopic view. D, EUS image of thrombosis of the gastric fundal varices and coils previously released.

## Ecoendoscopia y Doppler para el control de la obliteración de las varices fúndicas



Variz fúndica con flujo antes de la inyección



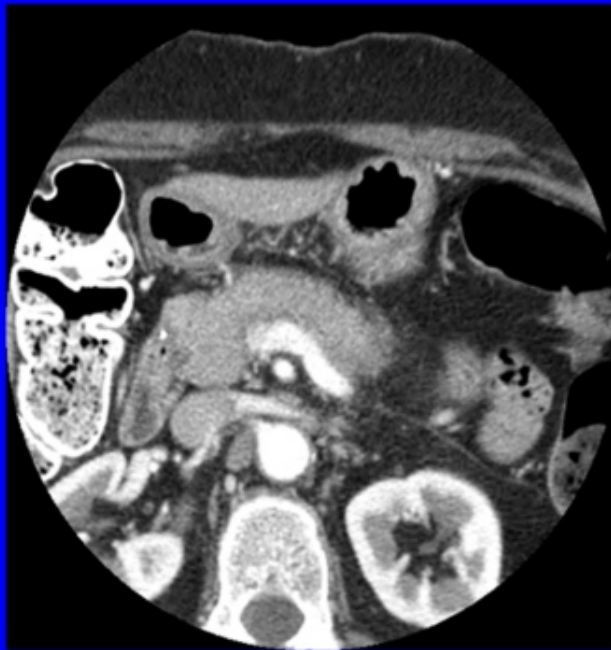
Variz fúndica tras la inyección de cianoacrilato



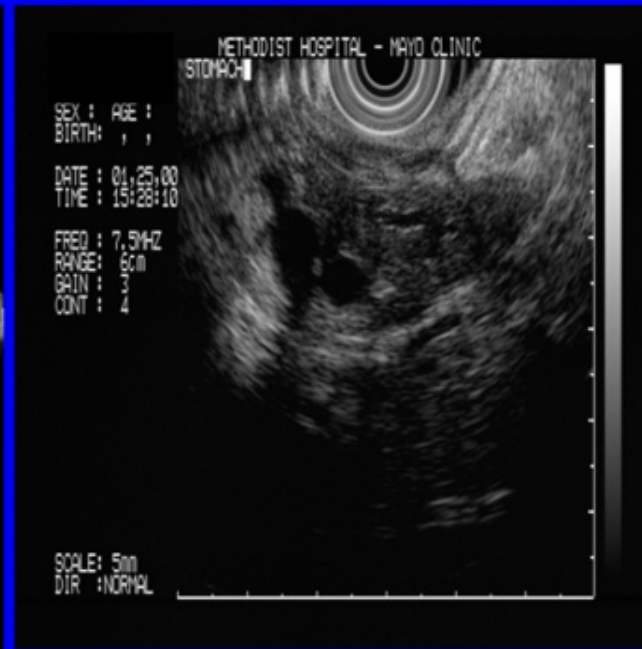
Comprobación con USE de la obliteración de las varices fúndicas

# PANCREATITIS CRONICA

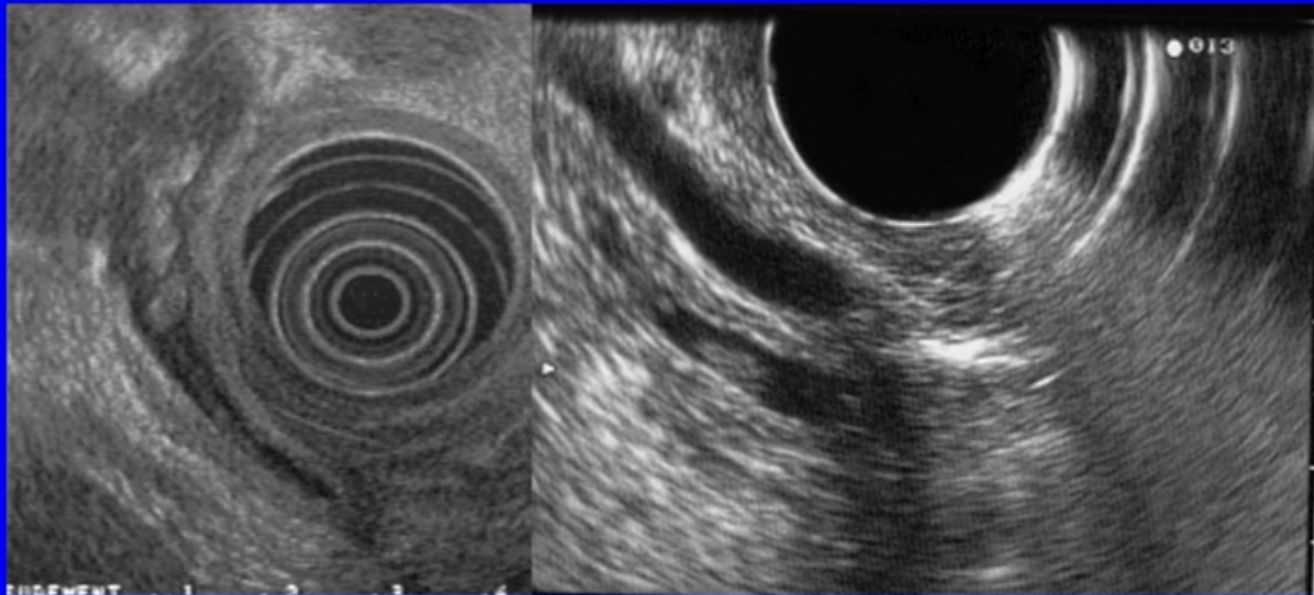
TAC



USE

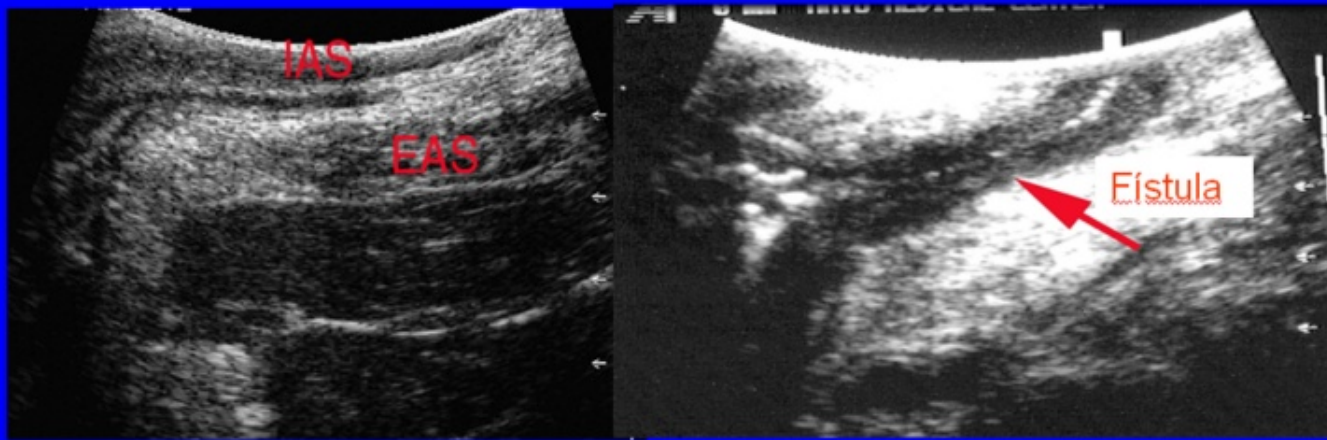


# ENFERMEDAD LITIASICA BILIAR

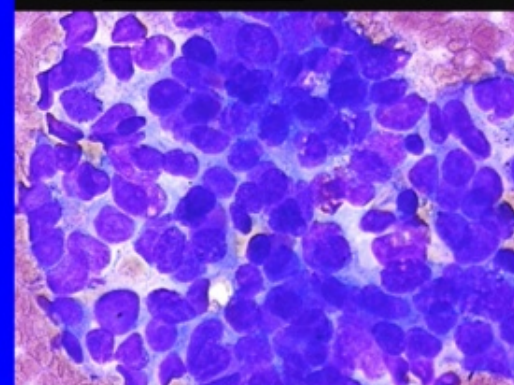
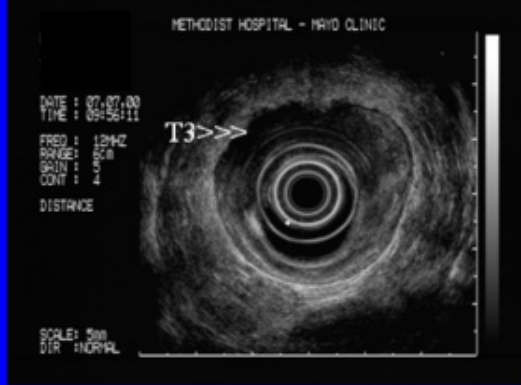
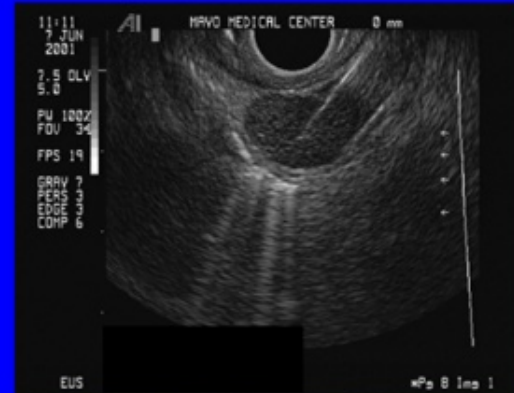




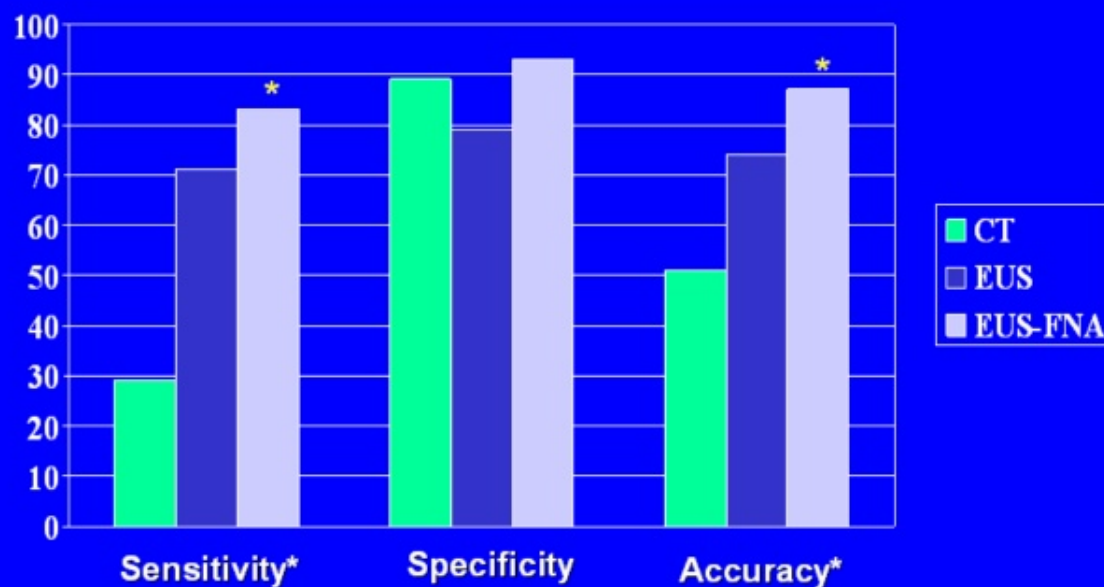
# ENFERMEDAD FISTULIZANTE



# CARCINOMA ESOFAGO



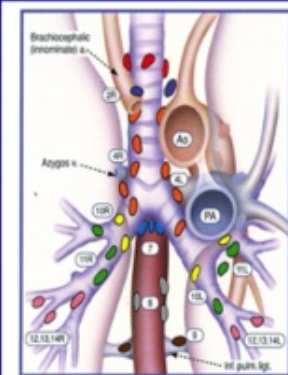
## Results: LN staging (Gold Standard 1)



\*EUS-FNA more sensitive and accurate than CT or EUS ( $p < 0.01$ )

*Vázquez Sequeiros E, et al. Gastroenterology 2003*

# USE-PAAF: ADENOPATIAS MEDIASTINO



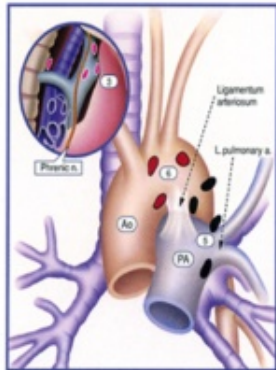
**Superior Mediastinal Nodes**

- 1 Highest Mediastinal
- 2 Upper Paratracheal
- 3 Pre-vascular and Retrotracheal
- 4 Lower Paratracheal (including Azygos Nodes)

N<sub>1</sub> = single digit, ipsilateral  
 N<sub>2</sub> = single digit, contralateral or supraclavicular

**Aortic Nodes**

- 5 Subaortic (A-P window)
- 6 Para-aortic (ascending aorta or phrenic)

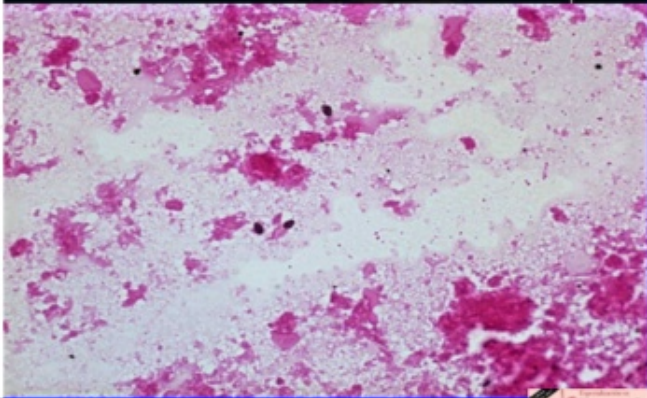


**Inferior Mediastinal Nodes**

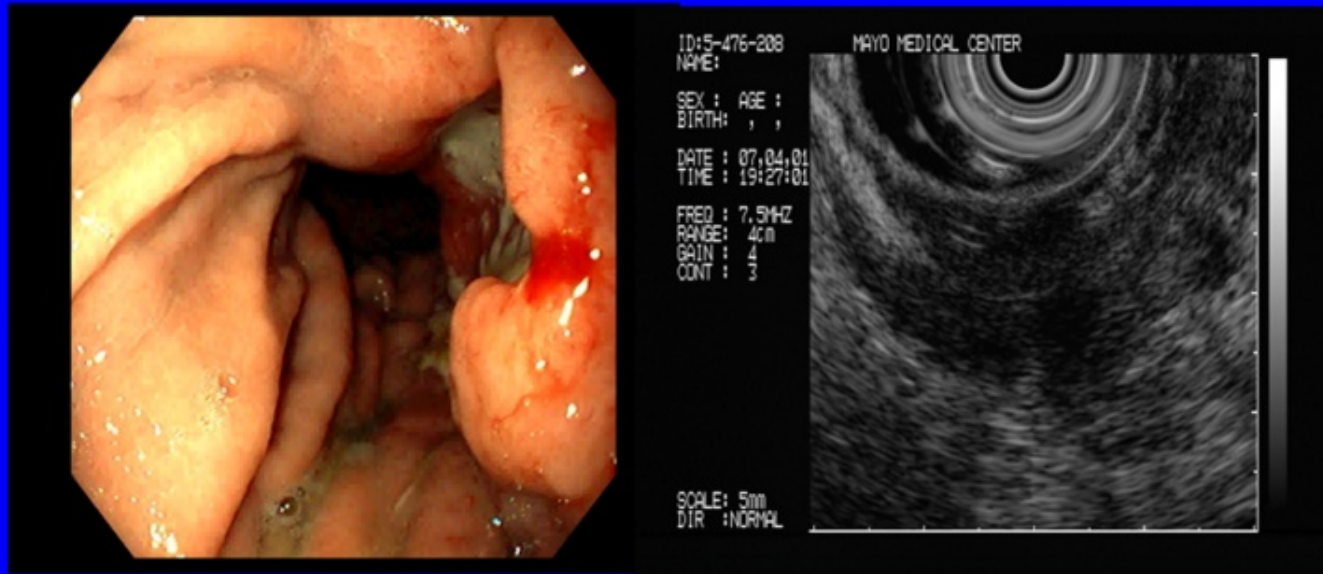
- 7 Subcarinal
- 8 Paraesophageal (below carina)
- 9 Pulmonary Ligament

**N<sub>1</sub> Nodes**

- 10 Hilar
- 11 Interlobar
- 12 Lobar
- 13 Segmental
- 14 Subsegmental



# CARCINOMA GASTRICO



# CARCINOMA RECTAL

## EUS and Magnetic Resonance Imaging in the staging of rectal cancer: a prospective and comparative study

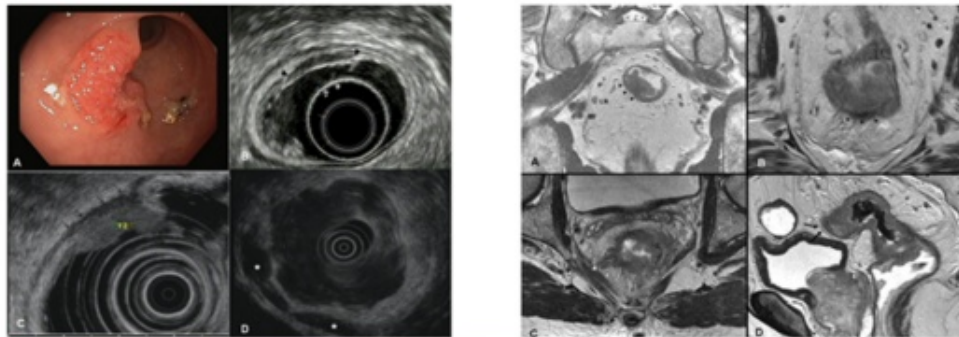
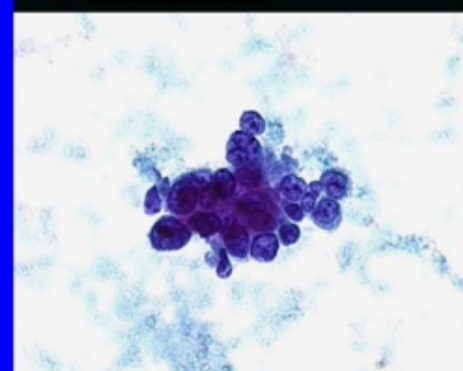


TABLE 2. Sensitivity, specificity, and accuracy obtained by EUS and MRI in estimating T stage of rectal tumors according to pathological stage

	pT1			pT2			pT3			pT4		
	Se. % (95% CI)	Sp. % (95% CI)	Acc. % (95% CI)	Se. % (95% CI)	Sp. % (95% CI)	Acc. % (95% CI)	Se. % (95% CI)	Sp. % (95% CI)	Acc. % (95% CI)	Se. % (95% CI)	Sp. % (95% CI)	Acc. % (95% CI)
EUS	89 (52-100)	96 (89-99)	95 (77-92)	50 (28-72)	83 (73-92)	76 (65-84)	84 (71-93)	63 (45-78)	76 (65-84)	0 (0-60)	100 (96-100)	95 (88-99)
MRI	0 (0-34)	100 (95-100)	90 (81-95)	75 (51-91)	78 (66-87)	77 (67-85)	82 (69-91)	85 (84-95)	83 (73-90)	100 (40-100)	95 (88-99)	95 (89-99)
P	NP	NP	NP	NS	NS	NS	NS	NS	NS	NP	NP	NP

Se, Sensitivity; CI, confidence interval; Sp, specificity; Acc, accuracy; MRI, magnetic resonance imaging; NP, not possible because at least 1 variable in each 2-way table on which measures of association are computed is a constant; NS, not significant.

# CARCINOMA PANCREAS



# CARCINOMA PANCREAS: USE-PAAF

**Diagnostic Characteristics of EUS FNA for Pancreatic Mass Lesions<sup>†</sup>**

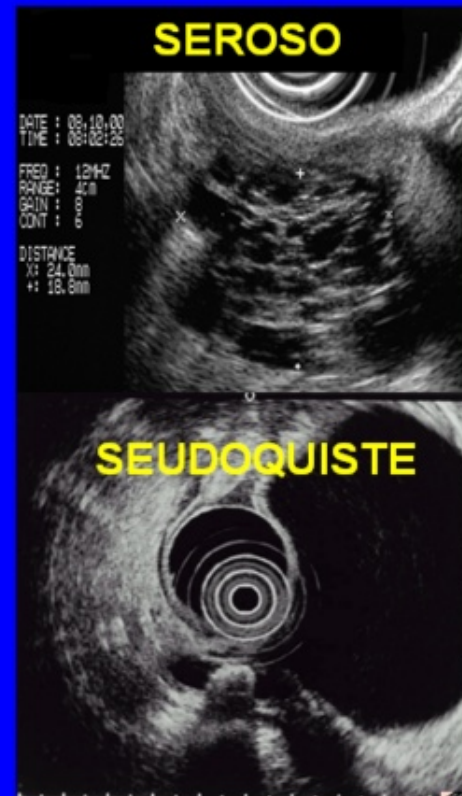
	n	Sensitivity, percent	Specificity, percent	Accuracy, percent
Chang, 1994	--	91	100	87
Giovannini, 1995	43	75	100	79
Cahn, 1996	50	88	100	87
Bhutani, 1997	47	64	100	72
Chang, 1997	44	92	100	95
Erickson, 1997	28	--	--	96
Faigel, 1997	45	72	100	75
Gress, 1997 (Linear)	95	--	--	86
Gress, 1997 (Radial)	26	--	--	81
Wiersema, 1997	124	87	100	88
Binmoeller, 1998	58	76	100	92
Binmoeller*, 1998	45	87	100	91
Williams, 1999	144	82	100	85
Fritscher-Ravens, 2001	112	88	100	92
Suits, 1999	98	96	100	96
Gress, 2001	102	93	100	96

\*Used the GF UM 30P scope

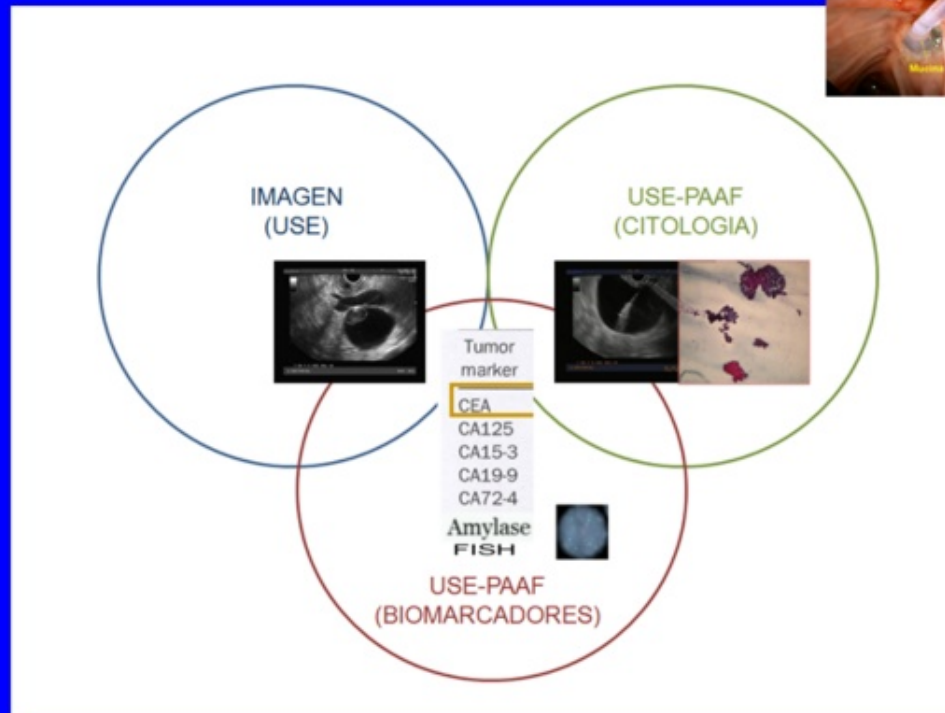
<sup>†</sup>Norton, ID, Wiersema, MJ. Endoscopic ultrasound-guided fine needle aspiration biopsy. In: Endoscopic Ultrasonography, Gress, F, Bhattacharya, I (Eds), Blackwell Science, Malden, MA 2001. p.136. Reprinted with permission of Blackwell Science, Inc.



# TUMOR QUISTICO PANCREAS



# TUMOR QUISTICO PANCREAS

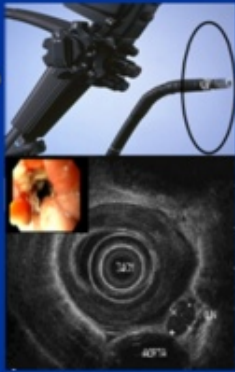


## THERAPEUTIC EUS: THE TIME LINE

← RADIAL EUS → ← LINEAR EUS → ← THERAPEUTIC EUS →

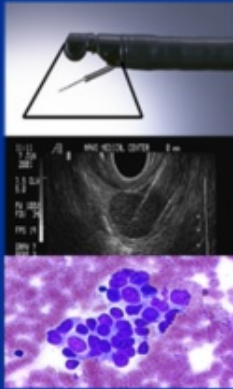
1980

Di Magno



1992

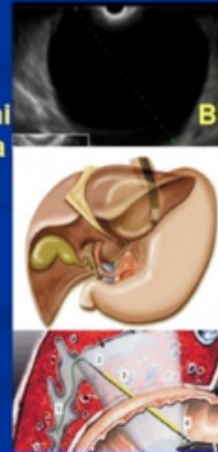
Vilman  
Wegener  
Grimm



Wiersema  
1996

2001

Giovannini  
Wiersema



2012

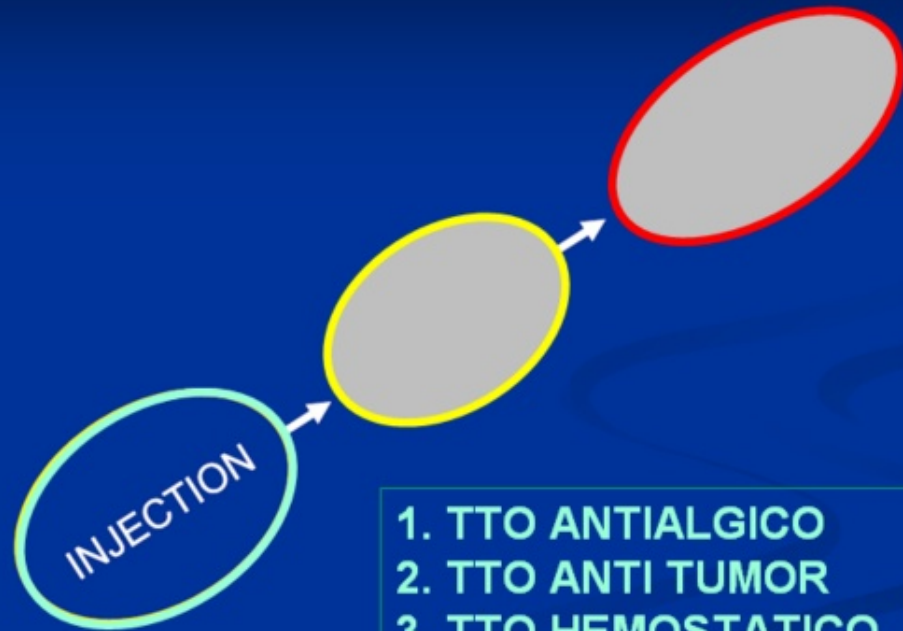
Binmoeller  
Itoi

## THERAPEUTIC EUS: THE COMPLEXITY SCALE



MP

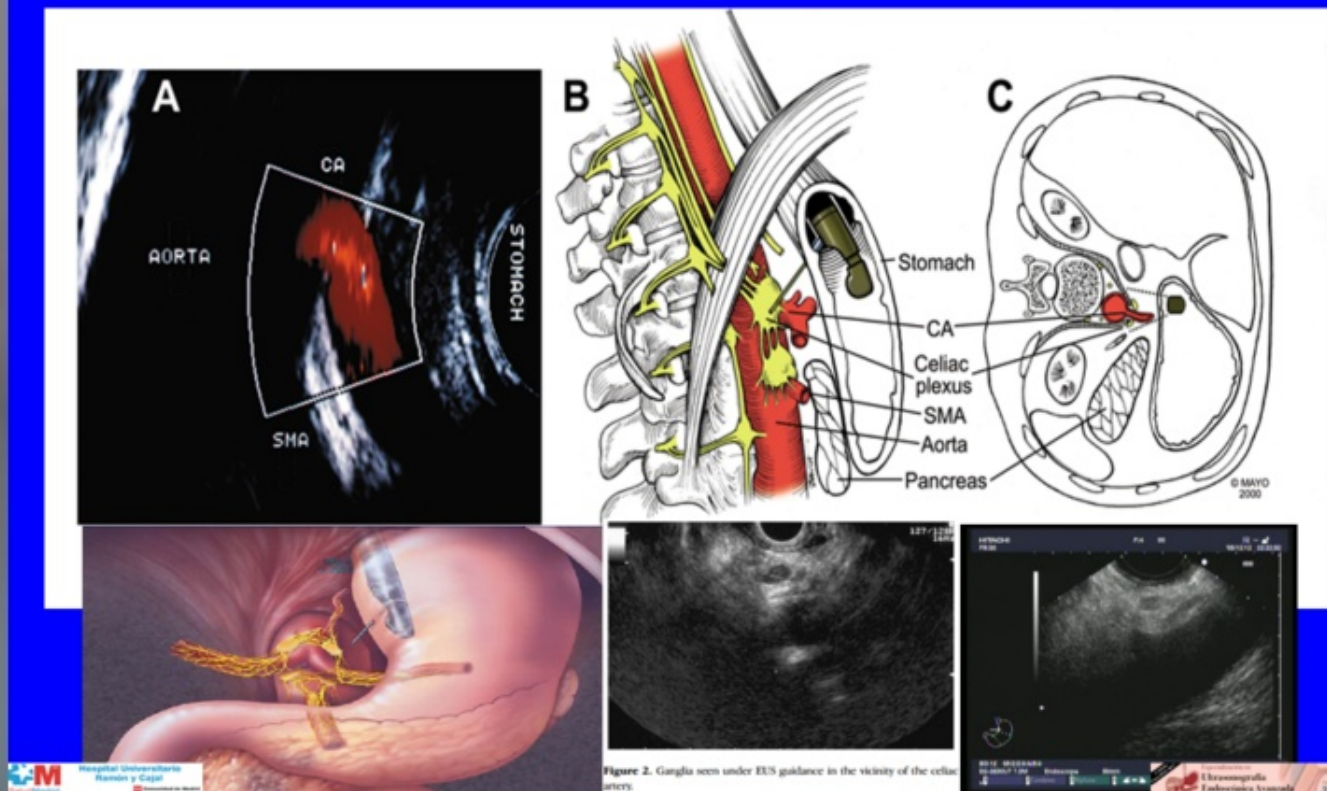
## THERAPEUTIC EUS: THE COMPLEXITY SCALE



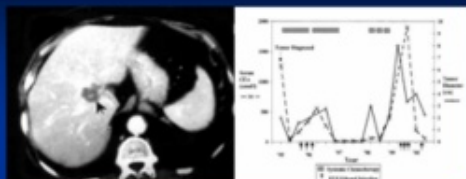
MP

# NEUROLISIS/BLOQUEO PLEXO CELIACO

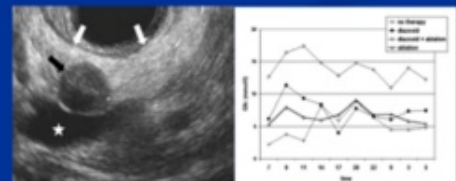
## Alcohol/Triamcinolona



### ALCOHOL ABLATION: SOLID TUMOR



Barclay, GI Endosc 2002



Jurgensen, GI Endosc 2006

### ALCOHOL ABLATION: INSULINOMA

Guidance Pt (EUS or IOUS)	Treatment session (n = 14)	Needle caliber (gauge)	No. of Injections	Alcohol %	Alcohol volume, mL	Complications Intra-procedural*	Complications (post-procedure)†
1	IOUS	1 of 1	25	Not stated	95	1.5	None
2	EUS	1 of 3	22	2	95	0.12	None
		2 of 3	22	2	95	0.38	None
		3 of 3	22	3	95	0.12	None
3	IOUS	1 of 1	25	Not stated	98	0.8	None
4	EUS	1 of 2	25	2	98	0.12	None
		2 of 2	25	3	98	0.25	None
5	EUS	1 of 2	25	5	98	0.95	None
		2 of 2	22	4	98	0.28	None
6	EUS	1 of 2	22	4	98	3.0	None
		2 of 2	22	3	98	1.5	None
7	EUS	1 of 2	22	3	99	0.7	None
		2 of 2	22	6	99	1.0	None
8	IOUS	1 of 1	27	Not stated	98	0.7	None

Levy, GI Endosc 2012

### ALCOHOL ABLATION: CYSTIC TUMOR

	Injectate	n	Resolution	Complications
Gan GIE 2005	Ethanol 80%	25	35%	0%
Oh GIE 2008	Ethanol 99% Paclitaxel	14	78%	7%
DeWitt GIE 2009	Ethanol vs Saline	25 vs 17	33% vs 0%	4.7% vs 0%
DiMaio Pancreas 2011	Ethanol 80%	13	0% vs 38%	0% (pain 1)
Oh Gastro 2011	Ethanol 99% Paclitaxel	52	62%	1 Pancreatitis & obliteration splenic v

**EUS Treatment of Pancreatic Cysts: Let's Keep the Alcohol (and the other therapy) Locked in the Cupboard**



### OTHER EUS-GUIDED ANTI-TUMOR THERAPIES

VOLUME 33 NUMBER 8 APRIL 10 2015

JOURNAL OF CLINICAL ONCOLOGY ORIGINAL REPORT

**Phase I Trial of Intratumoral Injection of an Adenovirus Encoding Interleukin-12 for Advanced Digestive Tumors**

Juan Sempere, Guillermo Martínez, Juan Peña, María Blázquez, Jorge Garriga, Ignacio Blázquez, Alberto Benito, Javier Lora, José María, José Carlos Salda, Cristina Olajón, José Solís, Rubén Salda, Carlos Latorre, Ignacio Mirón, Cheng Qian, and José Prieto

NEW METHODS: Clinical Endoscopy

**EUS-guided fiducial placement for CyberKnife radiotherapy of mediastinal and abdominal malignancies**

ARTICLE IN PRESS

ORIGINAL ARTICLE

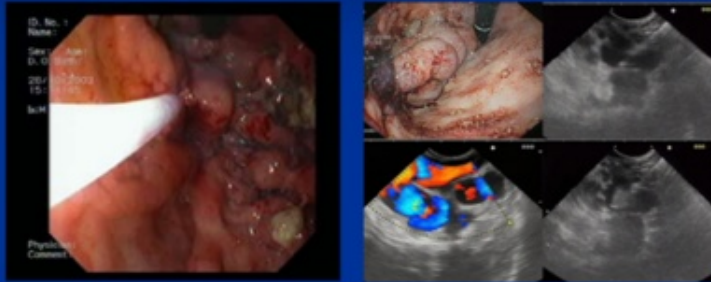
**Feasibility and safety of EUS-guided cryothermal ablation in patients with locally advanced pancreatic cancer**

Piero Giorgio Arcidiacono, MD,<sup>1,2</sup> Silvio Carraro, MD,<sup>1,2</sup> Michele Bardi, MD,<sup>3</sup> Maria Chiara Pizzoni, MD,<sup>4</sup> Stefano Cappio, MD,<sup>5</sup> Giancarlo Balzano, MD,<sup>6</sup> Claudia Bortone, MD,<sup>7</sup> Stefano Corradi, MD,<sup>8</sup> Roberto Nicolini, MD,<sup>9</sup> Marko Ivančević Čuček, MD,<sup>10</sup> Aleksandar Stojković, MD,<sup>11</sup> Daniel von Brunn, MD,<sup>12</sup> Axel Eckhoff, MD,<sup>13</sup> Pier Alberto Tassoni, MD<sup>14</sup>

Milan, Italy

<sup>1</sup> Gastroenterologia  
<sup>2</sup> Endoscopia  
<sup>3</sup> Endoscopia  
<sup>4</sup> Endoscopia  
<sup>5</sup> Endoscopia  
<sup>6</sup> Endoscopia  
<sup>7</sup> Endoscopia  
<sup>8</sup> Endoscopia  
<sup>9</sup> Endoscopia  
<sup>10</sup> Endoscopia  
<sup>11</sup> Endoscopia  
<sup>12</sup> Endoscopia  
<sup>13</sup> Endoscopia  
<sup>14</sup> Endoscopia

## EUS-GUIDED GLUE VARICEAL INJECTION



Romero-Castro, GI Endosc 2007



### EUS 2008 Working Group document: evaluation of EUS-guided vascular therapy

Michael J. Levy, MD, Amitabh Chak, MD  
Rochester, Minnesota, Cleveland, Ohio, USA

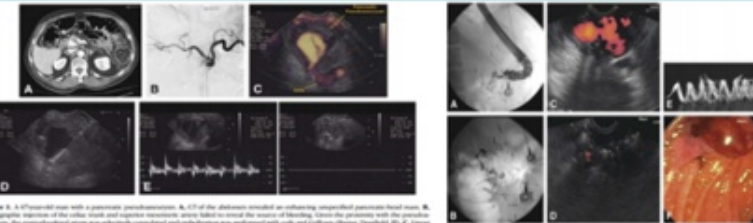


Figure 1. A 70-year-old man with a pancreatic pseudocyst. A, CT of the abdomen revealed an enhancing, unseptated pancreatic fluid mass. B, Sonographic depiction of the cystic fluid and superior mesenteric artery failed to reveal the source of bleeding. C, Close proximity with the pancreatic system. The gastroduodenal artery was selectively cannulated and embolization was performed with coils and Lethalium (Boston, Duxbury, MA). D, Linear EUS and power Doppler revealed the exact point of communication between the gastroduodenal and superior mesenteric arteries. E, A 1.5-cm-long piece of wire inserted into the pseudocyst and advanced to the site of the feeding vessel, where 7 mL of 95% alcohol was injected. F, A post-embolization Doppler image on the left demonstrates a clear flow area initially, the image on the right was taken 20 minutes later and shows that blood flow within the pseudoaneurysm completely ceased.

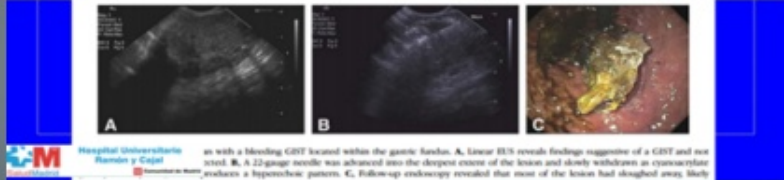


Figure 2. A 70-year-old man with a bleeding GIST located within the gastric fundus. A, Linear EUS reveals findings suggestive of a GIST and not a cyst. B, A 22-gauge needle was advanced into the deepest extent of the lesion and slowly withdrawn as cyanoacrylate was injected. C, Follow-up endoscopy revealed that most of the lesion had sloughed away, thus





## THERAPEUTIC EUS: THE COMPLEXITY SCALE



MP

# DRENAJE COLECCIONES PANCREAS



Seewald, *GI Endosc* 2005

Temporary cystogastrostomy with self-expanding metallic stents for pancreatic necrosis



Fig. 4 The partial covered SEMS in situ.



Fig. 5 The view through the SEMS in the walled-off necrosis.

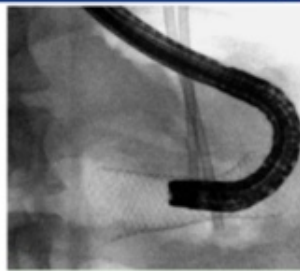
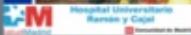
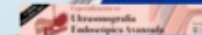


Fig. 6 The endoscope enters the walled-off necrosis through the stent.

Belle, *Endosc* 2010



Itoi, *GI Endosc* 2011  
Weilert, *Endosc* 2012



# DRENAJE COLECCIONES PANCREAS

## Results:

DRAINAGE OF PFC WITH FCSEMS II	
N	211 patients
<u>Technical success</u> (n,%, 95% CI)	205/211 = 97% (93-99%)
Short term success (n,%, 95% CI)	198/211 = 94% (89-97%)
Long term success (n,%,95% CI)*	178/211 = 85% (79-89%)
Complications (n,%)	44/211 = 21% (16-27%)
- Bleeding	15/211 = 7% (4-11%)
- Infection/ <u>disfunction</u> stent	23/211 = 11% (7-16%)
- Perforation/ <u>pneumoperitoneum</u>	6/211 = 3% (1-6%)

\*Treatment failure (15%) required 2nd treatment (Endoscopic 5%; percutaneous-X ray 3%; surgery 7%)

Vazquez Sequeiros GIE 2016



# DRENAJE COLECCIONES PELVICAS

Varadaraju & Iyer Evaluation of EUS-guided drainage of pelvic fluid collections

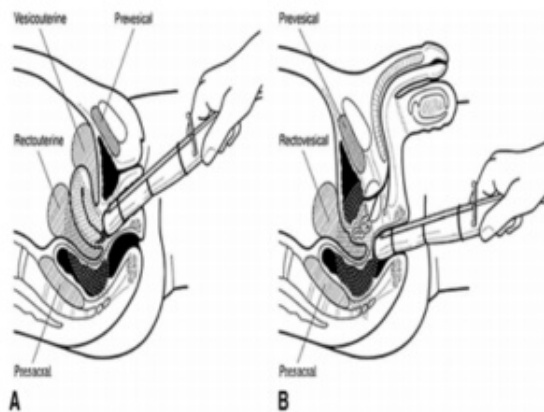


Figure 1. Schematic sagittal diagrams. A, The female pelvis during transrectal US examination. B, The male pelvis during transrectal US examination. (Source: Ref 5 [with permission].)



Figure 2. Passage of a 0.035-inch guidewire into the abscess under EUS guidance.



Figure 3. Dilation of the transrectal tract to 8 mm by using over the wire.

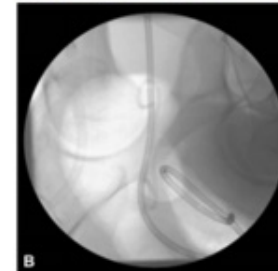


Figure 4. A, An endoscopic view of the transrectal stents. B, Fluoroscopic view of transrectal drainage catheter and a transrectal stent.

TABLE 1. Summary of published studies on EUS-guided drainage of pelvic abscess

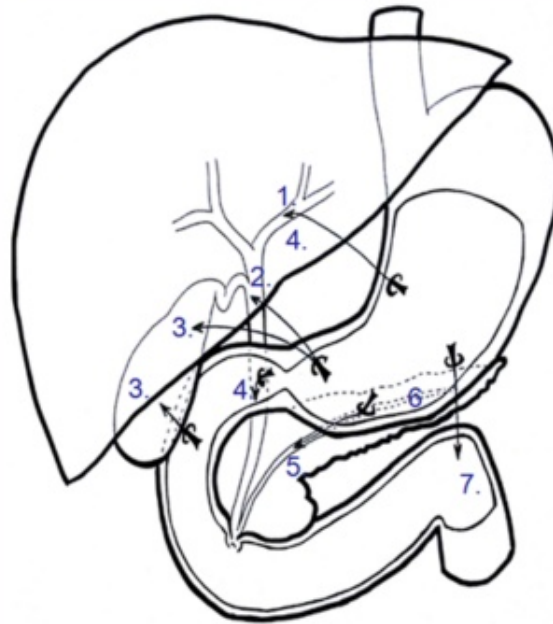
Study, y	Design	No. patients	Drainage modality	Technical success (%)	Treatment success (%)	Complications
Giovannini et al, <sup>15</sup> 2003	Retrospective	12	Stents	75	89	None
Varadarajulu and Drelichman, <sup>16</sup> 2007	Prospective	4	Drainage catheter	100	100	None
Tamir et al, <sup>17</sup> 2008	Prospective	4	Stents and drainage catheter	100	100	None

M Hospital Universitario Ramón y Cajal

None Ultrasonografía Endoscópica Avanzada

# ACCESO USE VB Y VP

## POTENTIAL ACCESSSES FOR ESCP



1. Hepatogastrostomy
2. Choledocho-duodeno/antrostomy
3. Cholecysto-duodeno/antrostomy
4. Rendez-Voux BD (TG/TD)
5. Pancreatogastrostomy
6. Rendez-Voux PD (TG/TD)
7. Gastrojejunostomy

*BD: Bile Duct; PD: Pancreatic Duct; TG: Transgastric; TD: Transduodena!*

# ACCESO USE VB Y VP

## STEPS FOR TRANSMURAL DRAINAGE

1. Duct puncture EUS-FNA:  
EUS Control X-ray Control



Figure 1. The left lobe of the liver accessed by EUS-guided FNA.

2. Aspiration & Contrast Injection

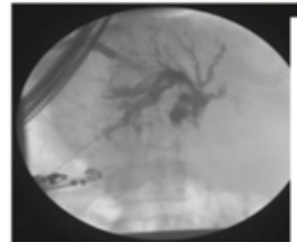


Figure 2. EUS-guided cholangiogram.

3. Advance Wire (Create Fistula)



Figure 3. Dilation of the transmural tract with a ECP cannula.

4. Advance and Release Stent

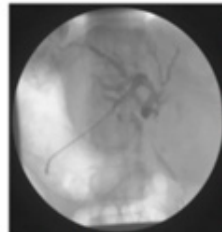
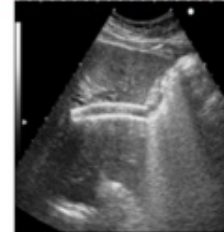


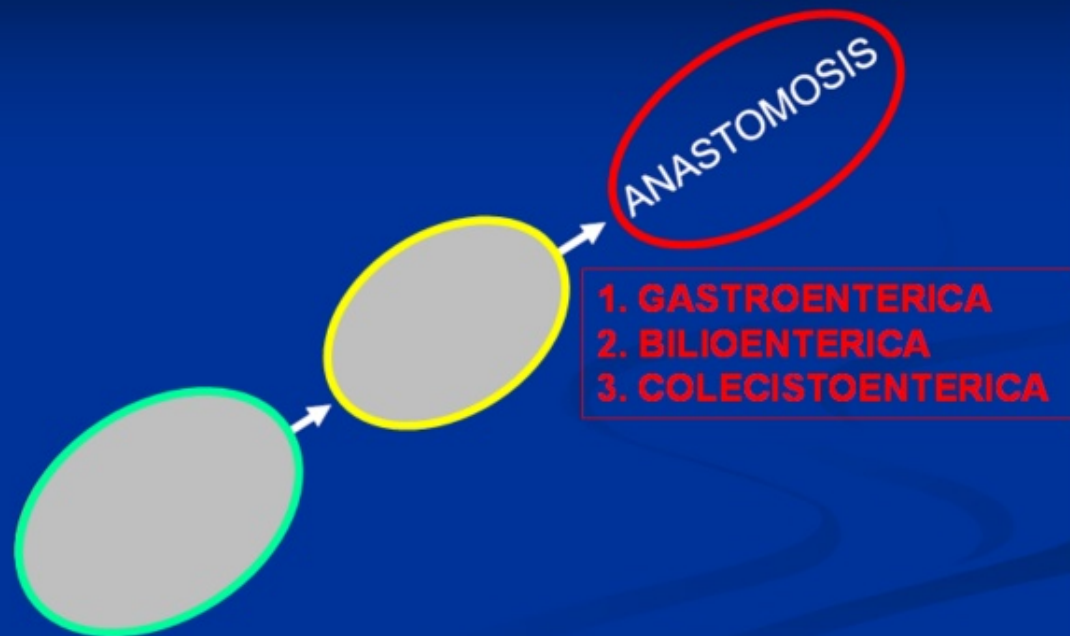
Figure 4. A TV transgastric stent is deployed.



TV transgastric stent is deployed with flow of bile as seen on endoscopy.

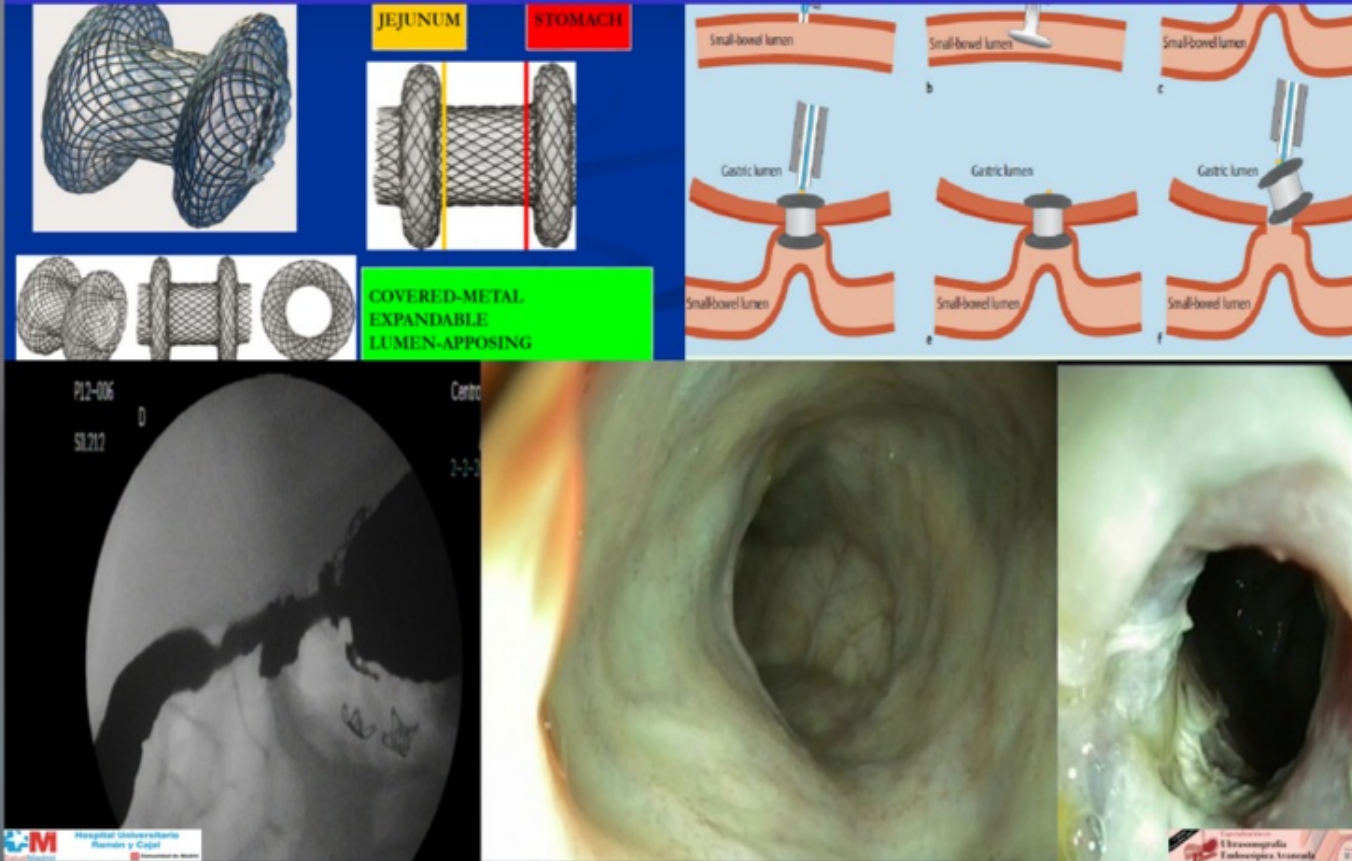


## THERAPEUTIC EUS: THE COMPLEXITY SCALE



MP

# GASTROENTEROANASTOMOSIS USE





# COLECISTOGASTROSTOMIA USE

*Endoscopy 2011*

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