LE COMPLICANZE DELLA COLANGIOPANCREATOGRAFIA RETROGRADA ENDOSCOPICA

09.30-10.00 Prevenzione e trattamento

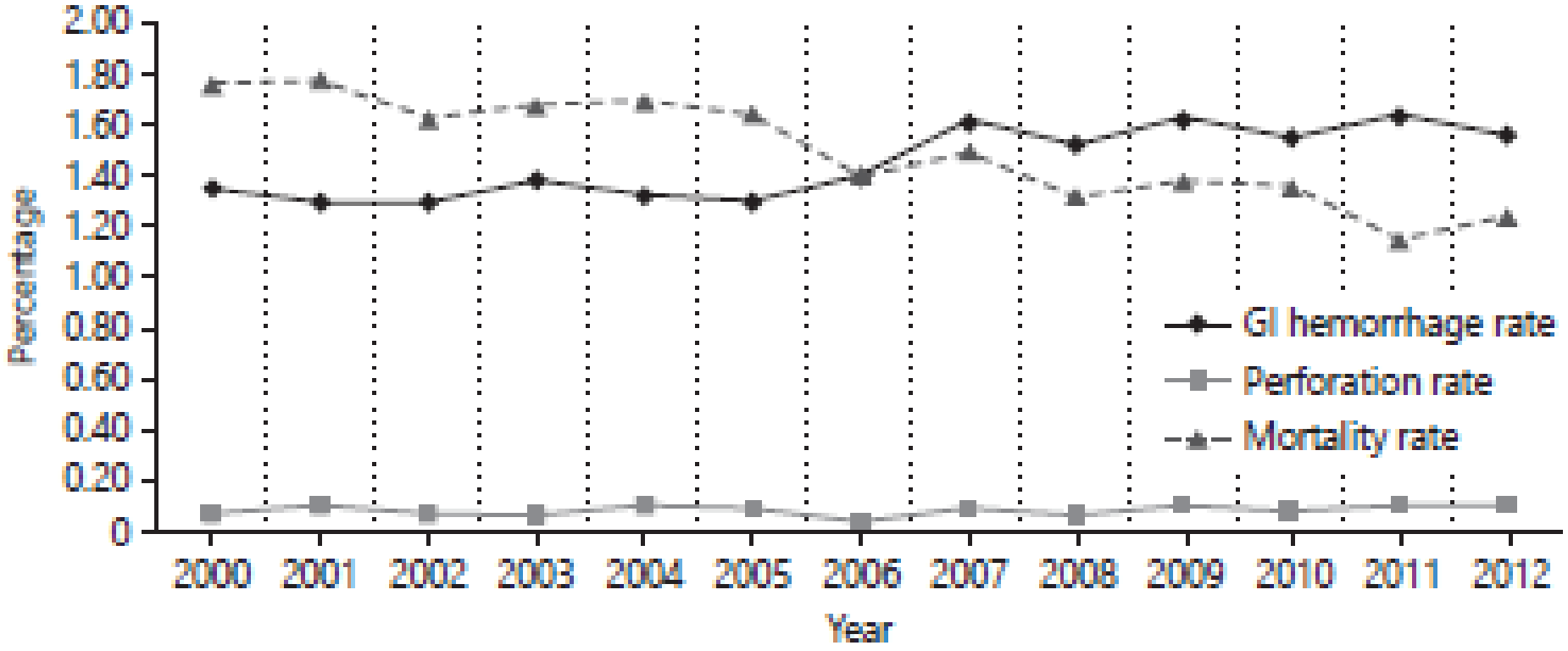
Massimiliano Mutignani (Milano)

S.C. di Endoscopia Digestiva ed Interventistica

Azienda Ospedaliera
Ospedale Niguarda Ca' Granda

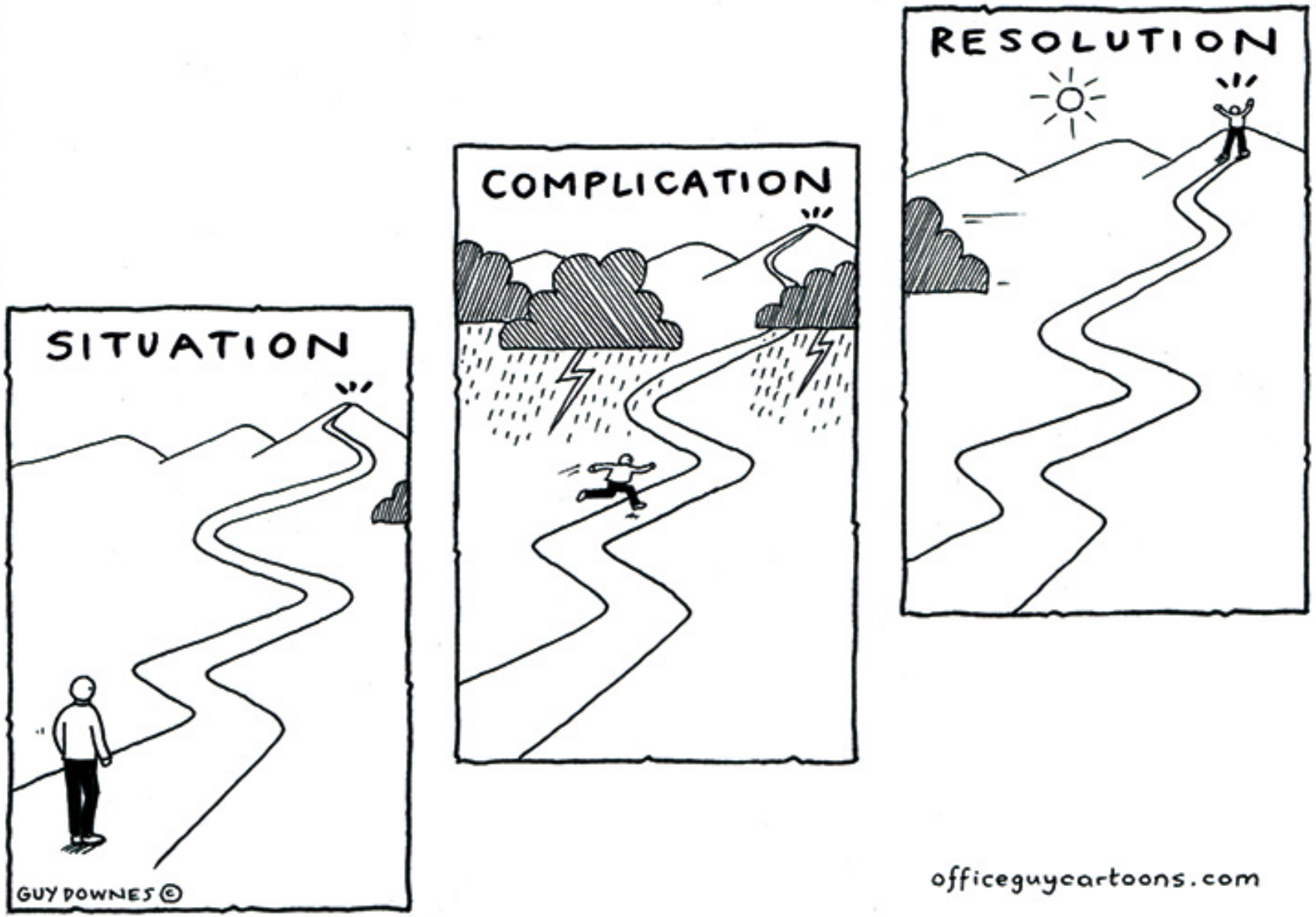
Trends in Post-Therapeutic Endoscopic Retrograde Cholangiopancreatography Gastrointestinal Hemorrhage, Perforation and Mortality from 2000 to 2012: A Nationwide Study

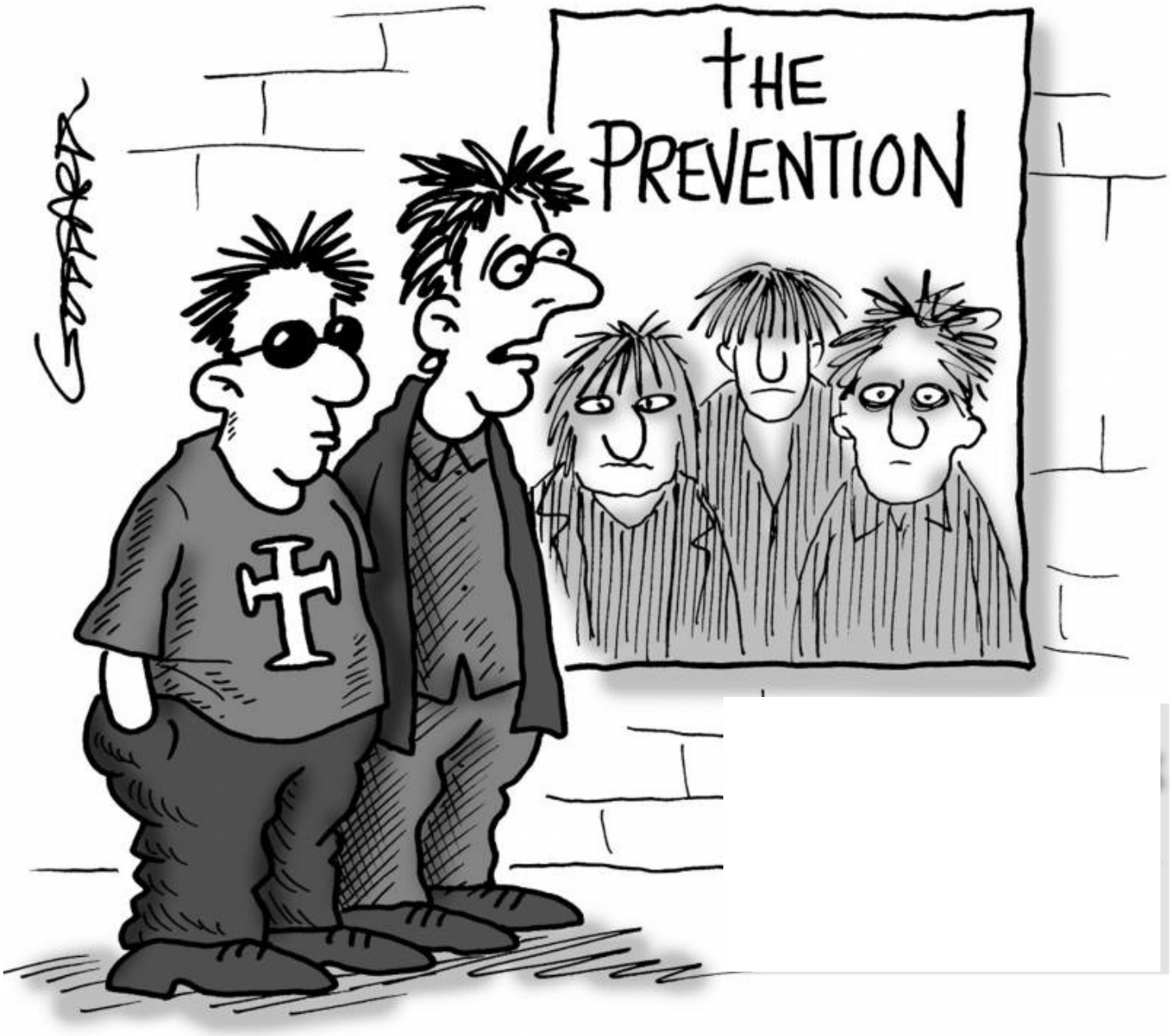
Faiz Afridi[a] Laura Rotundo[a] Mirela Feurdean[a] Sushil Ahlawat



Digestion 2018

How to manage ERCP complications?





"Apparently they're better than The Cure."

Post ERCP complications

- Acute pancreatitis
- Post ES bleeding
- Perforation

Complications of ERCP

GUIDELINE

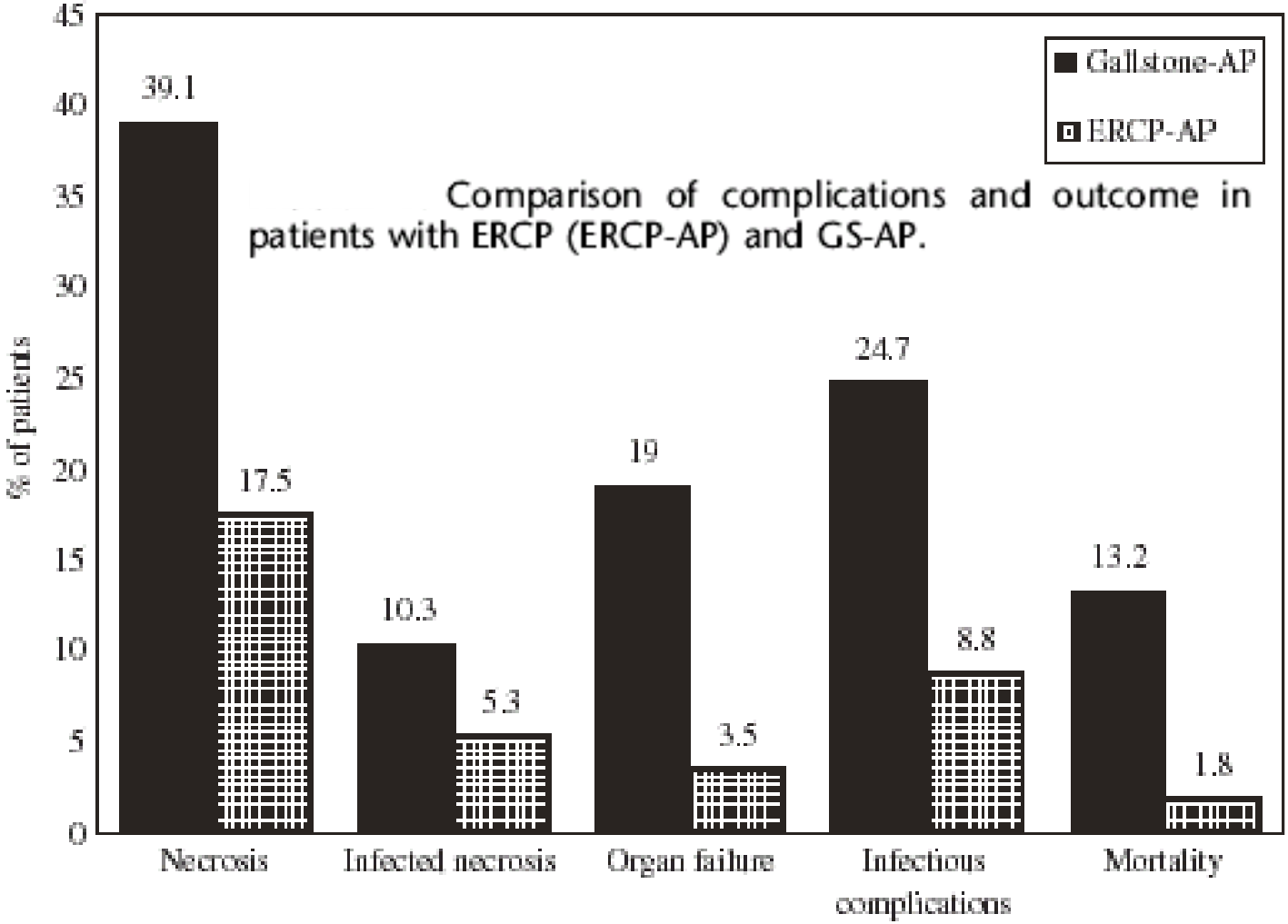
procedure.[17] By using this or similar definitions, the incidence of PEP in a meta-analysis of 21 prospective studies was approximately 3.5%[18] but ranges widely (1.6%-15.7%) depending on patient selection.[19,20] The rates of PEP in pediatric patients approach those seen in adults.[21]

PEP diagnosis

- Asymptomatic patients: no need to dose amylasis and lypase after ERCP.
- Post ERCP abdominal pain: clinical evaluation at 24 h → persistent pain: blood test (amylasis x 5 n.v.; wbc). If PEP: CT scan after 72 h
- Post ERCP severe pain: severe PEP with secondary compartment syndrome? Retroperitoneal perforation? → CT scan and blood test asap

Endoscopic Retrograde Cholangiopancreatography-induced Acute Pancreatitis Often has a Benign Outcome

57 acute pancreatitis on 1497 ERCP (3.8%)



V Bathia et al; J Clin Gastroent 2006

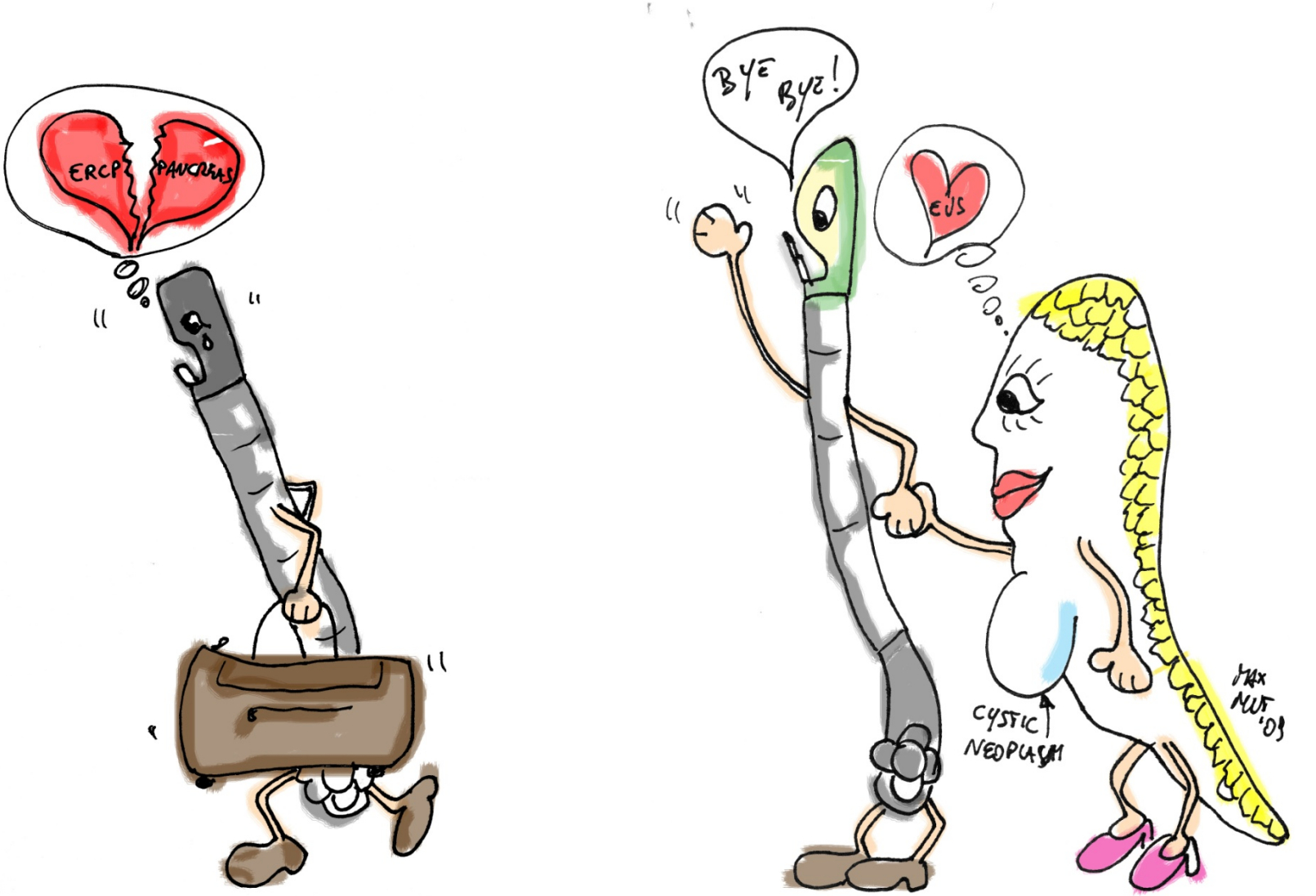
Post-ERCP pancreatitis

Unpredictable and unavoidable?

Can be prevented?

- **Patient selection**
- **Pharmacological prophylaxis and fluid therapy**
- **Technical maneuvers**

Diagnostic ERCP



Post-endoscopic retrograde cholangiopancreatography pancreatitis: A systematic review for prevention and treatment

Table 1 Patient-related risk factors

Definite	Possible	No risk
Young age	Absence of CBD stone	Normal/small CBD diameter
Female gender	Normal serum bilirubin	Pancreas divisum
Suspected SOD	Periampullary diverticulum	Allergy to contrast medium
Recurrent pancreatitis		
Absence of chronic pancreatitis		
History of previous PEP		

World J Gastroenterol 2019 August 7; 25(29): 4019-4042

Prophylaxis of post-ERCP pancreatitis: European Society of Gastrointestinal Endoscopy (ESGE) Guideline – Updated June 2014

Jean-Marc Dumonceau[1], Angelo Andriulli[2], B. Joseph Elmunzer[3], Alberto Mariani[4], Tobias Meister[5], Jacques Deviere[6], Tomasz Marek[7], Todd H. Baron[8], Cesare Hassan[9], Pier A. Testoni[4], Christine Kapral[10]

Table 1 Independent risk factors for post-endoscopic retrograde cholangiopancreatography (post-ERCP) pancreatitis (PEP).[1]

Procedure-related risk factors		
Definite risk factors		
Cannulation attempts duration >10 minutes[2]	1.76 (1.13 – 2.74)	3.8 % vs. 10.8 %
Pancreatic guidewire passages > 1	2.77 (1.79 – 4.30)	2.9 % vs. 9.5 %
Pancreatic injection	2.2 (1.60 – 3.01)	3.3 % vs. 1.7 %
Likely risk factors		
Precut sphincterotomy[3]	2.3 (1.4 – 3.7)	5.3 % vs. 3.1 %
Pancreatic sphincterotomy	3.07 (1.64 – 5.75)	2.6 % vs. 2.3 %
Biliary balloon sphincter dilation	4.51 (1.51 – 13.46)	9.3 % vs. 2.6 %
Failure to clear bile duct stones	3.35 (1.33 – 9.10)	1.7 % vs. 1.6 %
Intraductal ultrasound (IDUS)[4]	2.41 (1.33 – 4.39)	8.37 % vs. 2.76 %

Endoscopy 2014; 46: 799–815

Risk Factors for Post-ERCP Pancreatitis: A Prospective Multicenter Study

Chi-Liang Cheng, M.D.,[1] Stuart Sherman, M.D.,[1]

Table 3. Significant Risk Factors for Post-ERCP Pancreatitis by Multivariate Analysis Number of patients 1115

Risk Factors	Odds Ratio	95% Confidence Interval	*p* Value
Minor papilla sphincterotomy	3.8	2.003–7.106	<0.0001
Suspected sphincter of Oddi dysfunction	2.6	1.828–3.717	<0.0001
History of post-ERCP pancreatitis	2.0	1.186–3.448	0.01
Age <60 yr	1.6	1.033–2.402	0.04
≥2 pancreatic duct injections	1.5	1.046–2.103	0.03
Trainee involvement	1.5	1.029–2.057	0.03

Am J Gastroenterol 2006;101:139–147

What is impact of nonsteroidal anti-inflammatory drugs in the prevention of PEP: A meta-analysis of randomized controlled trials

Study or Subgroup	NSAIDs Events	NSAIDs Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Fixed, 95% CI	Year
Murray 2003	7	110	17	110	4.7%	0.41 [0.18, 0.95]	2003
Cheon 2007	17	105	17	102	4.8%	0.97 [0.53, 1.80]	2007
Sotoudehmanesh 2007	7	221	15	221	4.2%	0.47 [0.19, 1.12]	2007
Montaño Loza 2007	4	75	12	75	3.3%	0.33 [0.11, 0.99]	2007
Khoshbaten 2008	2	50	13	50	3.6%	0.15 [0.04, 0.65]	2008
Bhatia 2011	12	121	13	126	3.5%	0.96 [0.46, 2.02]	2011
Döbrönte 2012	11	130	11	98	3.5%	0.75 [0.34, 1.67]	2012
Elmunze 2012	27	295	52	307	14.1%	0.54 [0.35, 0.84]	2012
Otsuka 2012	2	51	10	53	2.7%	0.21 [0.05, 0.90]	2012
Döbrönte 2014	20	347	22	318	6.4%	0.83 [0.46, 1.50]	2014
Abu-Safieh 2014	6	89	12	93	3.3%	0.52 [0.20, 1.33]	2014
Andrade-Dávila 2015	4	82	17	84	4.7%	0.24 [0.08, 0.69]	2015
Lua 2015	7	69	4	75	1.1%	1.90 [0.58, 6.22]	2015
Park 2015	22	173	20	170	5.6%	1.08 [0.61, 1.91]	2015
Patai 2015	18	270	37	269	10.3%	0.48 [0.28, 0.83]	2015
Hosseini 2016	11	100	17	105	4.6%	0.68 [0.33, 1.38]	2016
UÇAR(2) 2016	1	50	7	50	1.9%	0.14 [0.02, 1.12]	2016
Mansour-Ghanaei 2016	12	162	28	162	7.8%	0.43 [0.23, 0.81]	2016
UÇAR(1) 2016	1	50	7	50	1.9%	0.14 [0.02, 1.12]	2016
Levenick 2016	16	223	11	226	3.0%	1.47 [0.70, 3.11]	2016
Quadros Onofrio 2017	5	224	5	223	1.4%	1.00 [0.29, 3.39]	2017
Kato 2017	10	85	13	85	3.6%	0.77 [0.36, 1.66]	2017
Total (95% CI)		**3082**		**3052**	**100.0%**	**0.61 [0.52, 0.72]**	
Total events	222		360				

Heterogeneity: $Chi^2 = 35.94$, $df = 21$ ($P = 0.02$); $I^2 = 42\%$

Test for overall effect: $Z = 6.03$ ($P < 0.00001$)

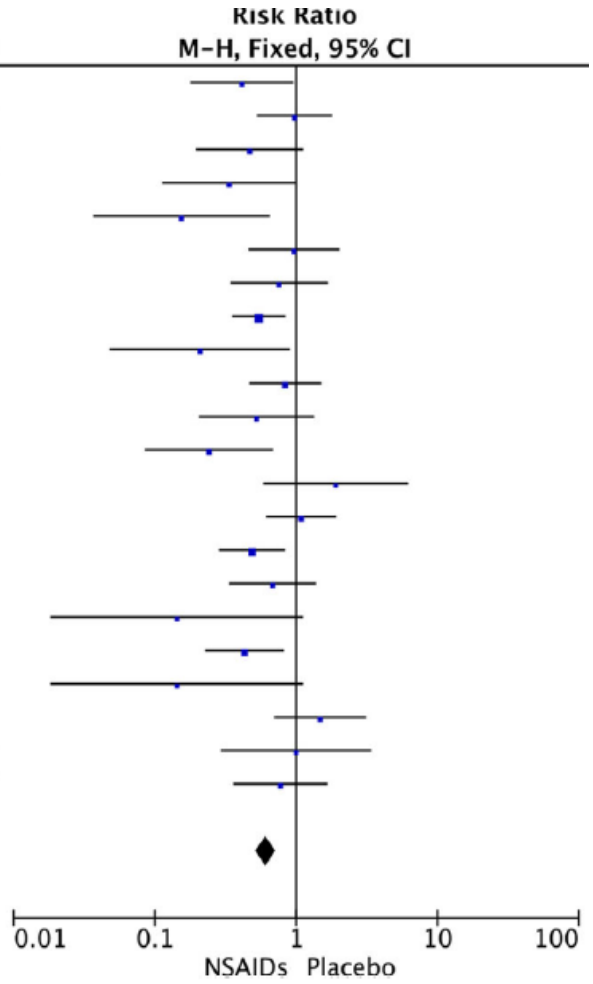
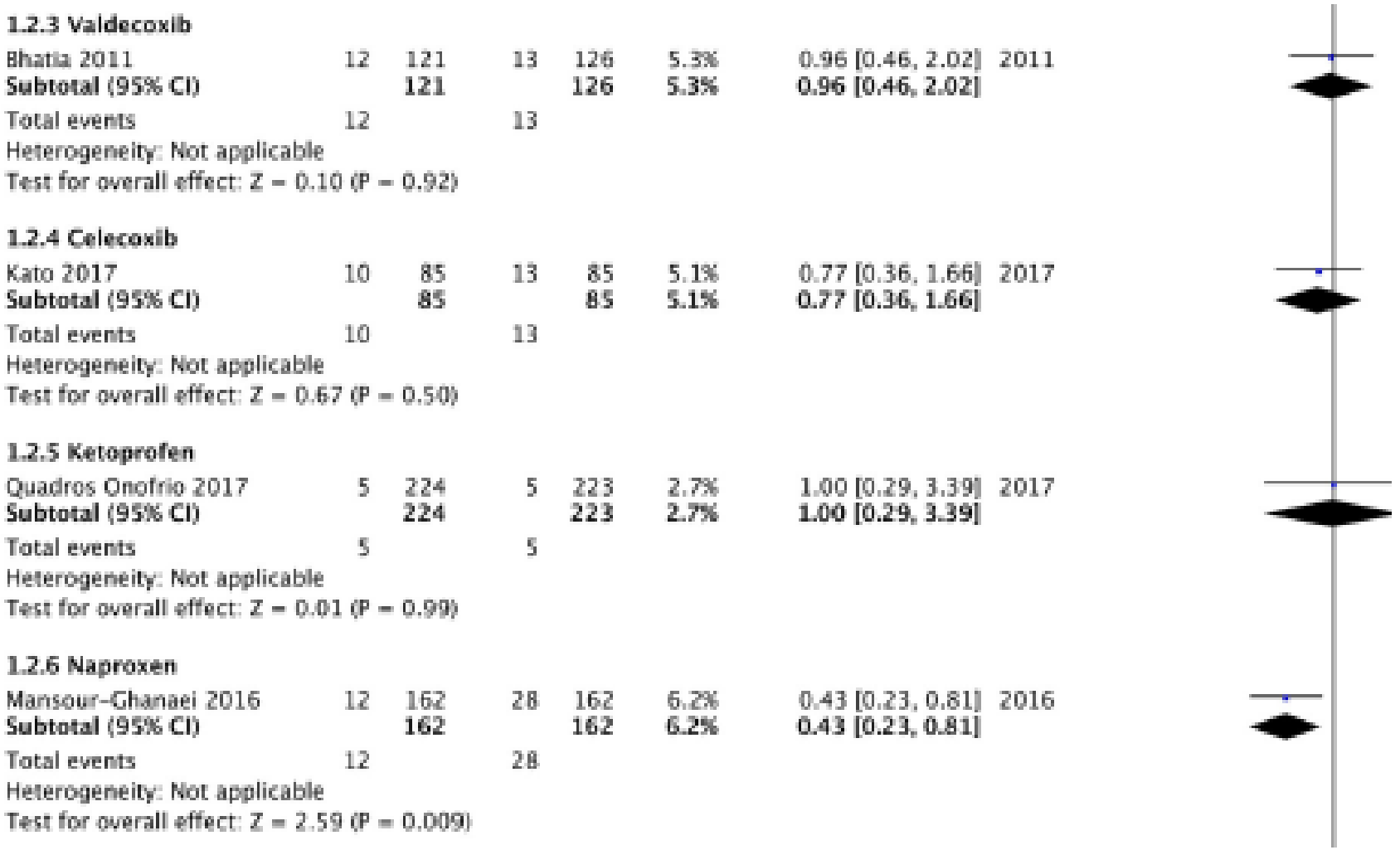


Fig. 3 Forest plot of the meta-analysis comparing NSAIDs and placebo for incidence of PEP

What is impact of nonsteroidal anti-inflammatory drugs in the prevention of PEP: A meta-analysis of randomized controlled trials



Lyu *et al. BMC Gastroenterology* (2018) 18:106

Prophylaxis of post-ERCP pancreatitis: European Society of Gastrointestinal Endoscopy (ESGE) Guideline – Updated June 2014

Jean-Marc Dumonceau[1], Angelo Andriulli[2], B. Joseph Elmunzer[3], Alberto Mariani[4], Tobias Meister[5], Jacques Deviere[6], Tomasz Marek[7], Todd H. Baron[8], Cesare Hassan[9], Pier A. Testoni[4], Christine Kapral[10]

5.2. Drugs with proven efficacy

5.2.1. Nonsteroidal anti-inflammatory drugs (NSAIDs)

► **Statement 2014:**

NSAIDs reduce the incidence of PEP in patients at high as well as low risk for PEP; effective PEP prophylaxis has only been demonstrated using diclofenac or indomethacin administered rectally (Evidence level 1++). ESGE recommends routine rectal administration of 100 mg of diclofenac or indomethacin immediately before or after ERCP in all patients without contraindication (Recommendation grade A).

Endoscopy 2014; 46: 799–815

Peri-Procedural Aggressive Hydration for Post Endoscopic Retrograde Cholangiopancreatography (ERCP) Pancreatitis Prophylaxsis: Meta-analysis of Randomized Controlled Trials

Dhruvil Radadiya [a, *], Kalpit Devani [b], Sumant Arora [c], Paris Charilaou [d], Bhaumik Brahmbhatt [e], Mark Young [b], Chakradhar Reddy [b]

Study or Subgroup	Aggressive Hydration Events	Total	Standard hydration Events	Total	Weight	Odds Ratio M-H, Random, 95% CI	Year
Buxbuam 2014	0	39	0	23		Not estimable	2014
Chuankrekkul 2015	0	30	0	30		Not estimable	2015
Choi 2016	1	255	0	255	31.6%	3.01 [0.12, 74.28]	2016
Rosa B 2016	0	35	0	33		Not estimable	2016
NCT02050048 2016	0	14	2	12	32.6%	0.14 [0.01, 3.34]	2016
Park 2018	4	266	0	129	35.9%	4.44 [0.24, 83.09]	2018
M Alciva-Leon 2018	0	266	0	129		Not estimable	2018
Total (95% CI)		**905**		**611**	**100.0%**	**1.29 [0.16, 10.69]**	
Total events	5		2				

Heterogeneity: Tau² = 1.02; Chi² = 2.82, df = 2 (P = 0.24); I² = 29%

Test for overall effect: Z = 0.24 (P = 0.81)

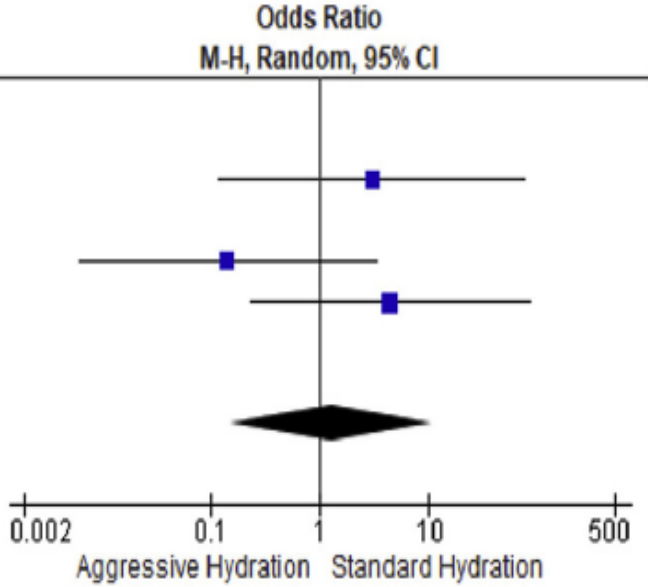


Fig. 8. Effect of hydration strategies on Fluid overload.

Pancreatology (2019)

A simple way of avoiding post-ERCP pancreatitis

Fausto Lella, MD, Francesco Bagnolo, MD, Elena Colombo, MD, Umberto Bonassi, MD

	Guide Wire		*CM injection*
Acute pancreatitis (n°)	*none*	*< 0.01*	*8*
mild	*-*		*6*
moderate	*-*		*1*
severe	*-*		*1*
Cannulation rate (%)	*100*		*100*
Cannulation time (min)	*?*		*?*

Gastrointest Endosc 2004

Prophylaxis of post-ERCP pancreatitis: European Society of Gastrointestinal Endoscopy (ESGE) Guideline – Updated June 2014

Jean-Marc Dumonceau[1], Angelo Andriulli[2], B. Joseph Elmunzer[3], Alberto Mariani[4], Tobias Meister[5], Jacques Deviere[6], Tomasz Marek[7], Todd H. Baron[8], Cesare Hassan[9], Pier A. Testoni[4], Christine Kapral[10]

7.1.2. Cannulation attempts

► **Statement 2014:**

ESGE recommends keeping the number of cannulation attempts as low as possible (Recommendation grade B).

7.2. Effect of difficult biliary cannulation

7.2.1 Definition

► **Statement 2014:**

ESGE recommends that future studies define difficult biliary cannulation in an intact papilla as any of the following: cannulation attempts of duration >5 minutes, >5 attempts, or 2 pancreatic guidewire passages.

Endoscopy 2014; 46: 799–815

Prophylaxis of post-ERCP pancreatitis: European Society of Gastrointestinal Endoscopy (ESGE) Guideline – Updated June 2014

Jean-Marc Dumonceau[1], Angelo Andriulli[2], B. Joseph Elmunzer[3], Alberto Mariani[4], Tobias Meister[5], Jacques Deviere[6], Tomasz Marek[7], Todd H. Baron[8], Cesare Hassan[9], Pier A. Testoni[4], Christine Kapral[10]

7.1.5. Cannulation techniques

► **Statement 2010:**

For deep biliary cannulation, the wire-guided technique reduces the risk of PEP and increases the success rate of primary cannulation when compared with the standard contrast-assisted method (Evidence level 1++). The wire-guided technique is recommended for deep biliary cannulation (Recommendation grade A).

► **Statement 2014:**

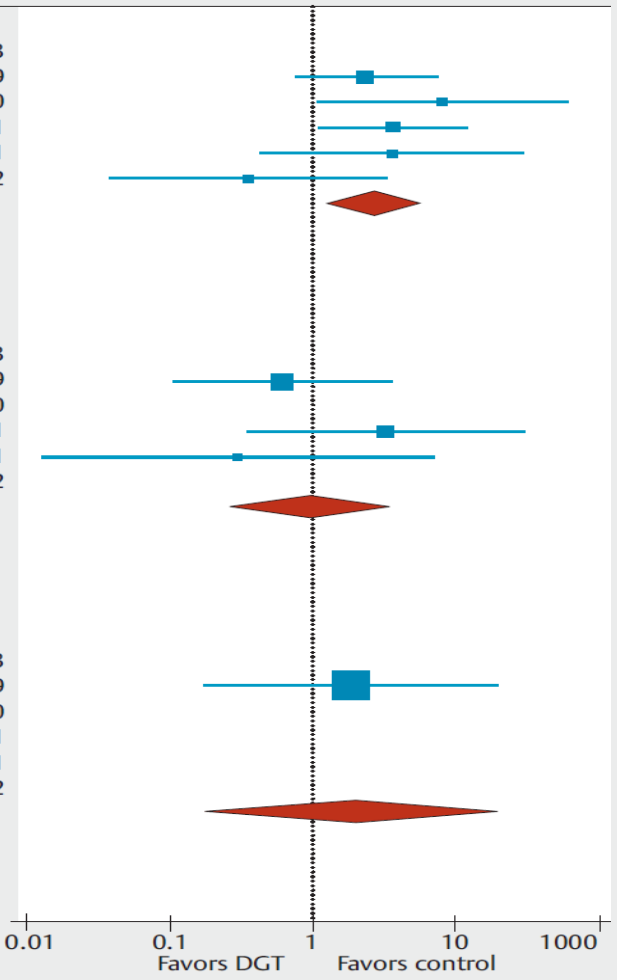
No changes.

Endoscopy 2014; 46: 799–815

Double-guidewire technique in difficult biliary cannulation for the prevention of post-ERCP pancreatitis: a systematic review and meta-analysis*

Frances Tse[1], Yuhong Yuan[1], Paul Moayyedi[1], Grigorios I. Leontiadis[1], Alan N. Barkun[2]

Study or Subgroup	DGT Events	DGT Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95 % CI	Year
1.2.1 Mild PEP							
Meada 2003	0	27	0	26		Not estimable	2003
Herreros de Tejada 2009	10	97	4	91	34.1 %	2.35 [0.76, 7.21]	2009
Ito 2010a	8	35	1	35	12.7 %	8.00 [1.09, 60.63]	2010
Yoo 2013	10	34	3	21	11.8 %	3.65 [1.09, 12.08]	2011
Angsuwatcharakon 2012	4	23	3	21	11.8 %	0.36 [0.04, 30.12]	2011
Cote 2012	1	42	3	45	10.7 %	0.36 [0.04, 3.30]	2012
Subtotal (95 % CI)		**258**		**255**	**100.0 %**	**2.70 [1.27, 5.76]**	
Total events	33		12				
Heterogeneity: Tau² = 0.11; Chi² = 4.66, df = 4 (*P* = 0.32); I² = 14 %							
Test for overall effect: Z = 2.57 (*P* = 0.01)							
1.2.2 Moderate PEP							
Meada 2003	0	27	0	26		Not estimable	2003
Herreros de Tejada 2009	2	97	3	91	51.3 %	0.63 [0.11, 3.66]	2009
Ito 2010a	0	35	0	35		Not estimable	2010
Yoo 2013	3	34	1	37	32.6 %	3.26 [0.36, 29.90]	2011
Angsuwatcharakon 2012	0	23	1	21	16.1 %	0.31 [0.01, 7.12]	2011
Cote 2012	0	42	0	45		Not estimable	2012
Subtotal (95 % CI)		**258**		**255**	**100.0 %**	**0.92 [0.27, 3.38]**	
Total events	5		5				
Heterogeneity: Tau² = 0.00; Chi² = 1.91, df = 2 (*P* = 0.38); I² = 0 %							
Test for overall effect: Z = 0.07 (*P* = 0.94)							
1.2.3 Severe PEP							
Meada 2003	0	27	0	26		Not estimable	2003
Herreros de Tejada 2009	2	97	1	91	100.0 %	1.88 [0.17, 20.34]	2009
Ito 2010a	0	35	0	35		Not estimable	2010
Yoo 2013	0	34	0	37		Not estimable	2011
Angsuwatcharakon 2012	0	23	0	21		Not estimable	2011
Cote 2012 95 % CI)	0	42	0	45		Not estimable	2012
Subtotal (95 % CI)		**258**		**255**	**100.0 %**	**1.88 [0.17, 20.34]**	
Total events	2		1				
Heterogeneity: Not applicable							
Test for overall effect: Z = 0.52 (*P* = 0.60)							



Post-endoscopic retrograde cholangiopancreatography (post-ERCP) pancreatitis

Endoscopy 2017; 49: 15–26

Pancreatic stents

Prophylaxis of post-ERCP pancreatitis: European Society of Gastrointestinal Endoscopy (ESGE) Guideline – Updated June 2014

Jean-Marc Dumonceau[1], Angelo Andriulli[2], B. Joseph Elmunzer[3], Alberto Mariani[4], Tobias Meister[5], Jacques Deviere[6], Tomasz Marek[7], Todd H. Baron[8], Cesare Hassan[9], Pier A. Testoni[4], Christine Kapral[10]

6. Pancreatic stent placement for PEP prophylaxis

▼

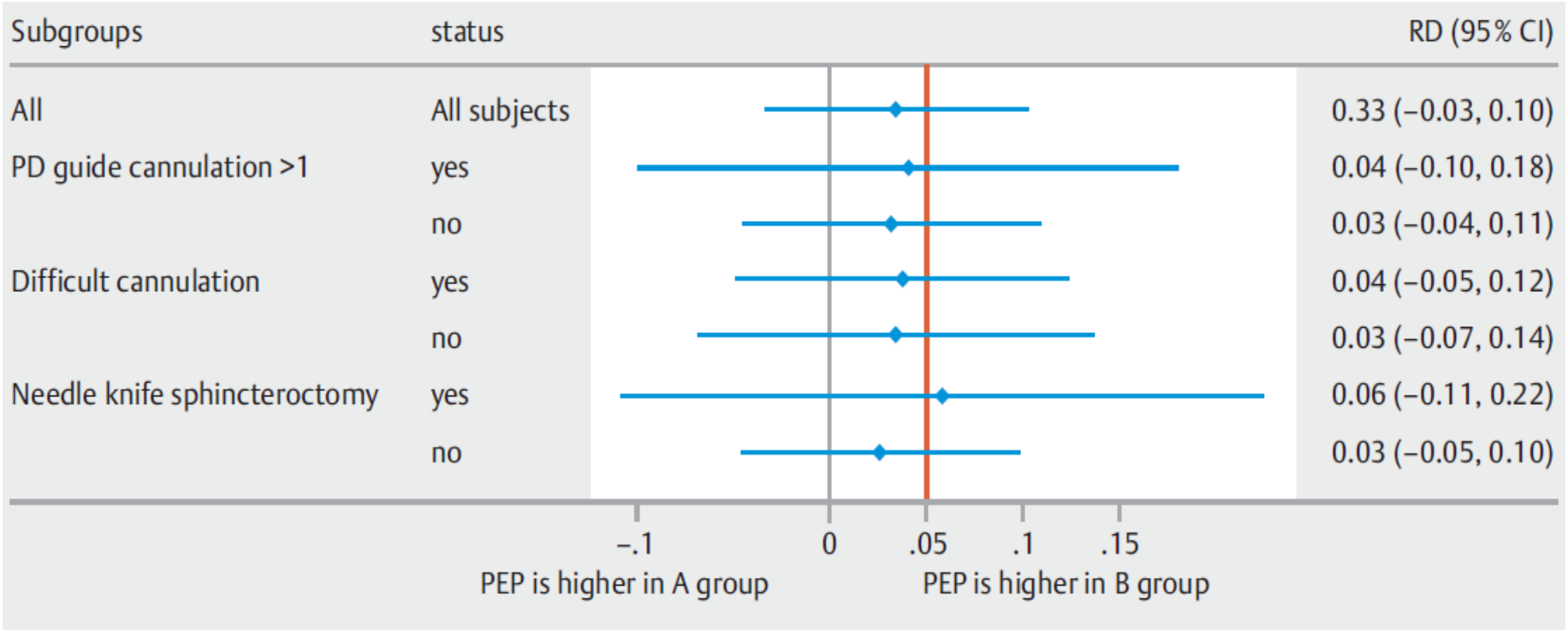
► **Statement 2014:**

Prophylactic pancreatic stenting decreases the risk of PEP in high risk and mixed-case groups; it nearly eliminates the risk of severe PEP. 5-Fr pancreatic stents are more efficacious than 3-Fr stents in preventing PEP. ESGE recommends the placement of 5-Fr pancreatic stents in cases at high risk of PEP. Passage of the stent from the pancreatic duct should be evaluated within 5 to 10 days of placement and retained stents should be promptly removed endoscopically (Evidence level 1+; Recommendation grade A).

Endoscopy 2014; 46: 799–815

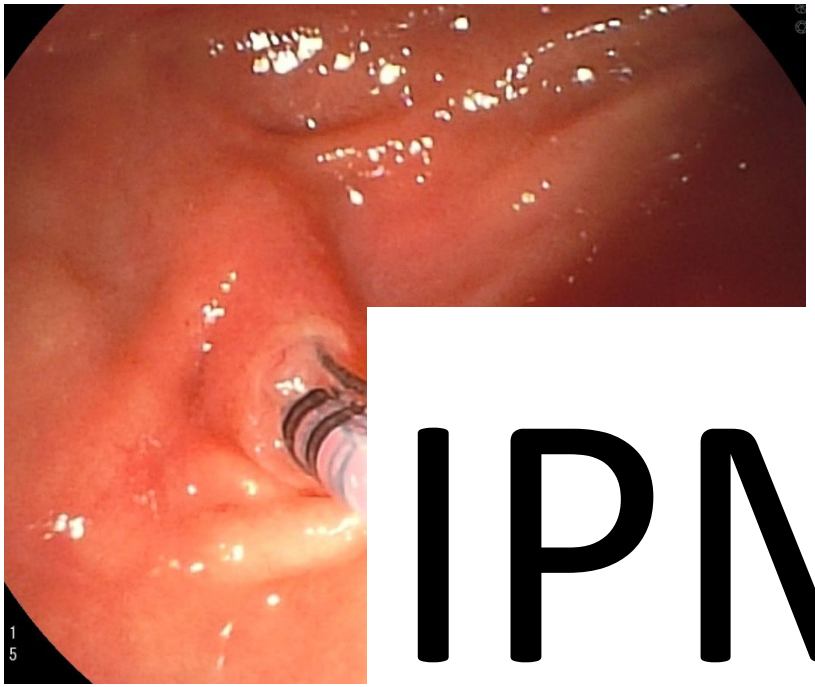
Pharmacological prophylaxis versus pancreatic duct stenting plus pharmacological prophylaxis for prevention of post-ERCP pancreatitis in high risk patients: a randomized trial

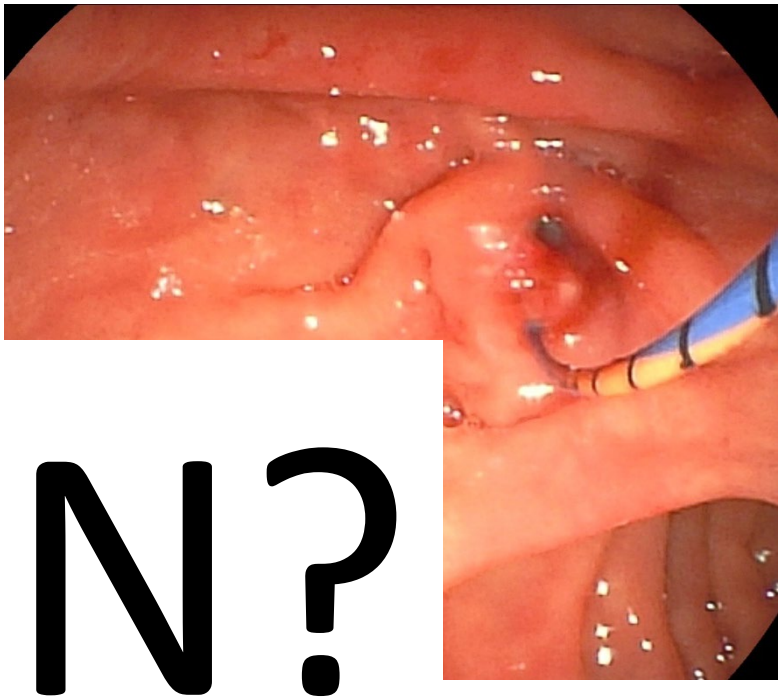
Rasoul Sotoudehmanesh[1,2], Ali Ali-Asgari[1,2], Morteza Khatibian[1,2], Mehdi Mohamadnejad[1,3], Shahin Merat[1,2,3], Anahita Sadeghi[1,2], Abbas Keshtkar[4], Mohammad Bagheri[1,2], Alireza Delavari[1,3], Mohammad Amani[1,3], Homayoon Vahedi[1,2], Siavosh Nasseri-Moghaddam[1,2,3], Alireza Sima[1,2], Mohamad A. Eloubeidi[5], Reza Malekzadeh[1,2,3]



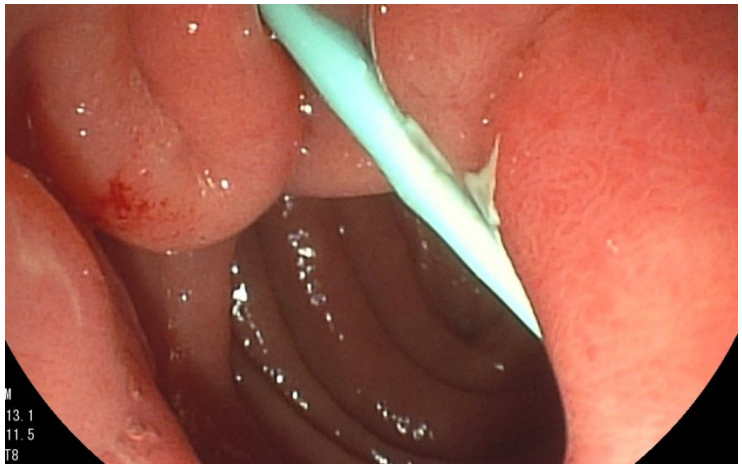
Characteristic	Group A[1] n = 207 NSAID-Stent	Group B[2] n = 207 NSAID

High risk patient for PEP: 5 fr pancreatic stent after EBS





IPMN?



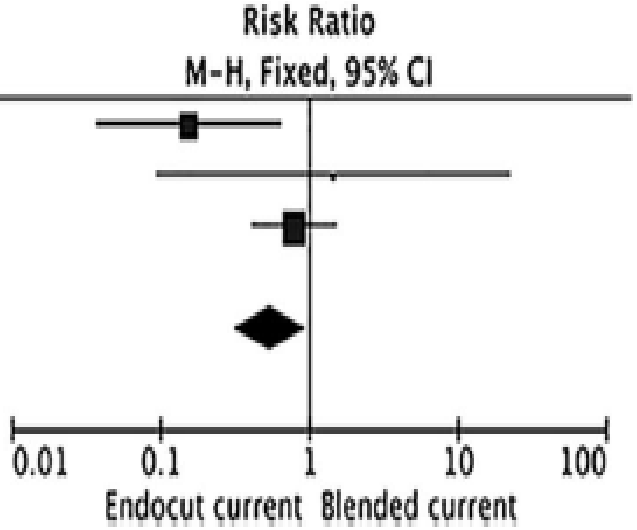
Endocut Versus Conventional Blended Electrosurgical Current for Endoscopic Biliary Sphincterotomy: A Meta-Analysis of Complications

De-feng Li[1,2,5] · Mei-feng Yang[3] · Xin Chang[4] · Nan-nan Wang[5] · Fang-fang Tan[5] · Hai-na Xie[5] · Xue Fang[4] · Shu-ling Wang[4] · Wei Fan[6] · Jian-yao Wang[1] · Zhi-chao Yu[1] · Cheng Wei[1] · Feng Xiong[1] · Ting-ting Liu[1] · Ming-han Luo[1] · Li-sheng Wang[1] · Zhao-shen Li[4] · Jun Yao[1] · Yu Bai[4]

Study or Subgroup	Endocut current Events	Total	Blended current Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
A.Kohler 1998	2	50	13	50	41.0%	0.15 [0.04, 0.65]
Hirotada Akiho 2006	1	55	1	79	2.6%	1.44 [0.09, 22.48]
Yoshiki Tanaka 2015	14	179	18	181	56.4%	0.79 [0.40, 1.53]
Total (95% CI)		284		310	100.0%	0.54 [0.31, 0.95]
Total events	17		32			

Heterogeneity: $Chi^2 = 4.62$, $df = 2$ ($P = 0.10$); $I^2 = 57\%$

Test for overall effect: $Z = 2.12$ ($P = 0.03$)



endoscopically evident bleeding.

Digestive Diseases and Sciences (2019) 64:2088–2094

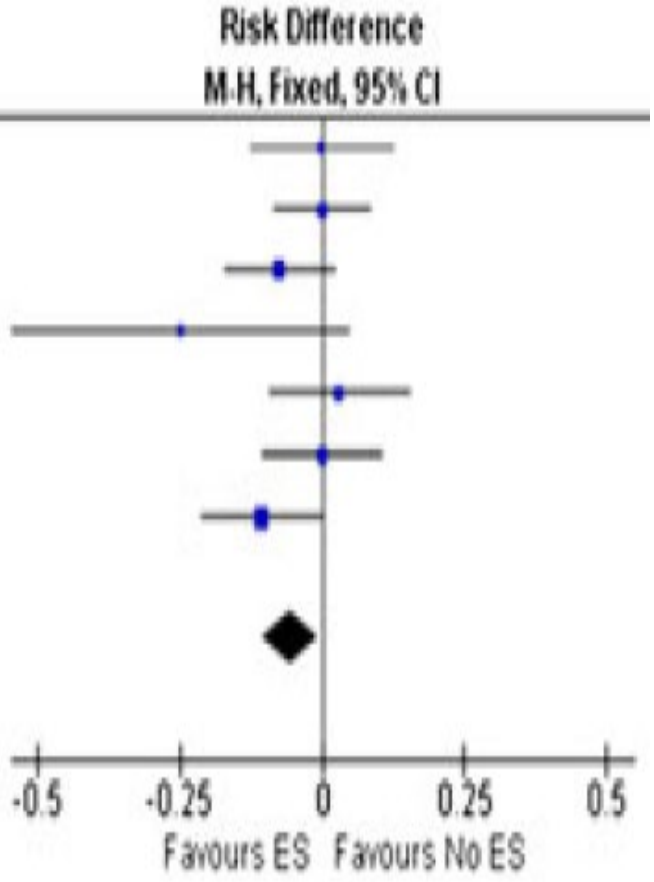
Does endoscopic sphincterotomy reduce the risk of post-endoscopic retrograde cholangiopancreatography pancreatitis after biliary stenting? A systematic review and meta-analysis

Aijaz Ahmed Sofi,[1] Ali Nawras,[1] Osama Habib Alaradi,[1] Yaseen Alastal,[2] Muhammed Ali Khan[1] and Wade M. Lee[2]

Study or Subgroup	ES Events	ES Total	No ES Events	No ES Total	Weight	Risk Difference M-H, Fixed, 95% CI
Agarwal 2006	0	18	0	12	8.3%	0.00 [-0.13, 0.13]
Bourke 1995	0	16	0	54	14.2%	0.00 [-0.08, 0.08]
Kaffes 2005	0	31	3	40	20.1%	-0.07 [-0.17, 0.02]
Kim 2014	0	22	2	8	6.8%	-0.25 [-0.55, 0.05]
Mavrogiannis 2006	2	28	1	24	14.9%	0.03 [-0.09, 0.15]
Ryan 1998	0	31	0	13	10.5%	0.00 [-0.11, 0.11]
Simmons 2008	1	42	6	46	25.3%	-0.11 [-0.21, 0.00]
Total (95% CI)		**188**		**197**	**100.0%**	**-0.05 [-0.10, -0.01]**
Total events	3		12			

Heterogeneity: $Chi^2 = 7.81$, $df = 6$ ($P = 0.25$); $I^2 = 23\%$

Test for overall effect: $Z = 2.18$ ($P = 0.03$)



Endoscopic sphincterotomy for bile leak

Digestive Endoscopy 2016; **28**: 394–404

Prevention of post-ERCP pancreatitis
"Bring to home"

- Careful patient selection (avoid unnecessary/inappropriate ERCP)
- Prefer guide-wire cannulation techniques
- Move the guidewire and inject dye kindly!
- Use pure cut or "endocut current" for Sphx
- Prophylaxis with NSAID always
- Pancreatic stent only in high risk patients
- Aggressive Hydratation
- Biliary stent without sphincterotomy if Wirsung is normal?

Post ERCP complications

- Acute pancreatitis
- Post ES bleeding
- Perforation

Post-Sphincterotomy Bleeding

Incidence ranges widely 1-48%!

Because of different definitions

Immediate

(If controlled is not a complication)

Delayed

(hours/days after the procedure)
The complication!

Bleeding Complications and Clinical Safety of Endoscopic Retrograde Cholangiopancreatography in Patients with Liver Cirrhosis

Ji Yeon Kim*, Hee Seung Lee*, Moon Jae Chung, Jeong Youp Park, Seung Woo Park, Si Young Song, and Seungmin Bang

Variables	Multivariate		
	Adjusted OR	95% CI	*p* value
Child-Pugh class			
A	1		
B	2.533	0.704–9.112	0.155
C	6.144	1.320–28.606	0.021
Albumin	0.539	0.156–1.867	0.330
Platelet	0.987	0.976–0.999	0.032
CKD	4.757	0.525–43.109	0.165
Anticoagulant drugs	1.690	0.257–11.116	0.585
EST	1.760	0.533–5.817	0.354
EPBD	0.552	0.052–5.889	0.623

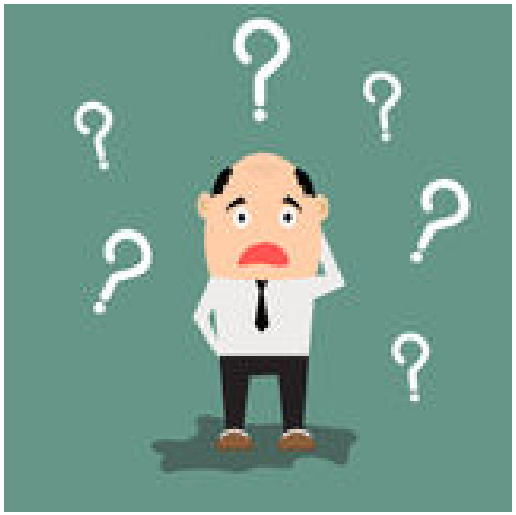
Yonsei Med J 2019 May;60(5):440-445

DOACs

DRUG	TRADE NAM	MECHANISM OF ACTION	PHARMACOKINETICS			ANTIDOTE
			ROUTE OF ADMINISTRATION	HALF LIFE (hr)	PEAK CONCENTRATION (hr)	
Dabigatran etexilate mesylate	Pradaxa	Direct thrombin inhibitor. Target— factor II	Oral	12–17	2–3	Idarucizumab—Praxbind
Rivaroxaban	Xarelto	Direct factor Xa inhibitor	Oral	7–13	2–4	
Apixaban	Eliquis	Direct factor Xa inhibitor	Oral	12	1–4	
Edoxaban	Lixiana	Direct factor Xa inhibitor	Oral	9–11	1–2	

When to resume DOACs?

No studies available
Conflicting guidelines
Real life data



Communication from the ASGE Standards of Practice Committee

GUIDELINE

The management of antithrombotic agents for patients undergoing GI endoscopy

There are no data to inform optimal timing of resumption of NOACs after endoscopic procedures. Because these agents have a short onset of action (Tables 7-10), if a NOAC cannot be restarted within 24 hours after a high-risk procedure because of concern regarding the adequate hemostasis, then thromboprophylaxis (ie, UFH bridge) should be considered for patients at high risk for thromboembolism.[53,54]

ASGE, Gastrointestinal Endoscopy 2016

Endoscopy in patients on antiplatelet or anticoagulant therapy, including direct oral anticoagulants: British Society of Gastroenterology (BSG) and European Society of Gastrointestinal Endoscopy (ESGE) guidelines

Veitch AM, Vanbiervliet G, Gershlick AH, et al. Gut 2016

It is of the utmost importance that clinicians are aware that unlike reintroduction of warfarin, which results in delayed anticoagulation for several days, a therapeutic intensity of anticoagulation is restored within 3 h of taking a therapeutic dose of a DOAC. Because of the high risk of bleeding associated with therapeutic intensity anticoagulation after an invasive procedure, we suggest a delay in reintroducing a DOAC after a high-risk procedure. This delay will depend on the risk of haemorrhage specific to the procedure and will usually be 24–48 h. For procedures with a significant risk of delayed haemorrhage such as EMR or ESD, a longer period of discontinuation may be considered in the context that DOAC patients are in a relatively low thrombotic risk category.

Periendoscopic management of direct oral anticoagulants: a prospective cohort study

Franco Radaelli,[1] Lorenzo Fuccio,[2] Silvia Paggi,[1] Cesare Hassan,[3] Alessandro Repici,[4] Emanuele Rondonotti,[1] Rossella Semeraro,[4] Milena Di Leo,[4] Andrea Anderloni,[4] Arnaldo Amato,[1] Cristina Trovato,[5] Ivana Bravi,[5] Andrea Buda,[6] Mario de Bellis,[7] Valentina D'Angelo,[7] Sergio Segato,[8] Ottaviano Tarantino,[9] Alessandro Musso,[10] Renato Fasoli,[11] Leonardo Frazzoni,[2] Elisa Liverani,[2] Carlo Fabbri,[12] Emilio Di Giulio,[13] Gianluca Esposito,[13] Flavia Pigò,[14] Andrea Iannone,[15] Francesco Dentali,[16] on behalf of Bowell Group

Fourth, we showed the unsafety of heparin bridging in DOAC patients, consistent with data from post hoc analysis of randomised trials, observational registries[20 21] and a recent large nationwide database analysis.[22] However, with the overall very low rates of thromboembolic events, it is not conceivable that heparin bridging could significantly impact thromboembolic risk, as already demonstrated for warfarin patients.[23] When considering the lack of effect of such bridging on the thromboembolic risk, the risk/benefit of such intervention appears unsuitable for clinical practice. Noteworthy, we observed a comparable median CHA_2DS_2-VASc score between NVAF patients who were given heparin bridging and those who were not. Thus, it is conceivable that the use of LMWH bridging more likely reflects a scarce knowledge of the guidelines rather than a perceived higher risk of thromboembolism.

Radaelli F, Fuccio L, Paggi S, et al. Gut 2019

When to resume DOACs?

- ERCP without sphyncterotomy 7 (2.1% of low-risk procedures)
- ERCP with sphincterotomy 19 (9.4% of high-risk procedures)
- Incidence almost twice as high in patients with resumption of anticoagulation earlier than recommended by the BSG/ESGE guidelines (14.3% vs 6.6%, p=0.27 ns).
- unsafety of heparin bridging in DOAC patients,

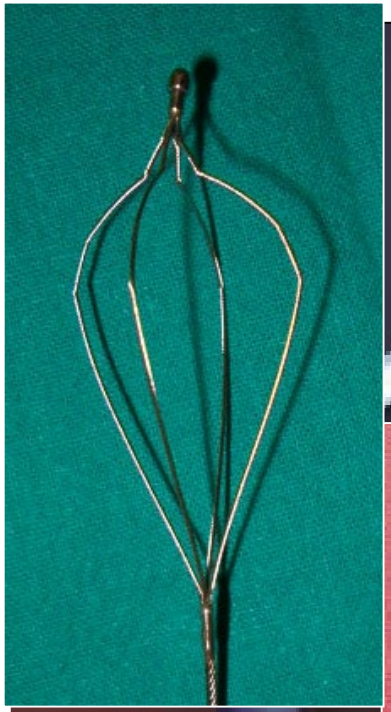
Table 5 Risk of delayed major bleeding according to the timing of direct oral anticoagulant resumption

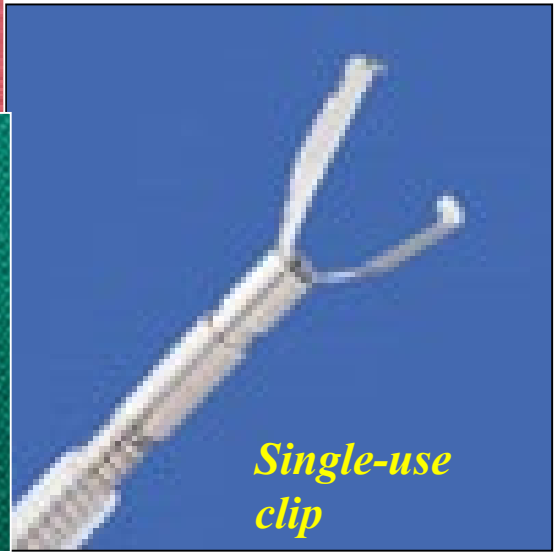
	Patients with delayed bleeding according to the first dose after procedure			
	As recommended	Later	Earlier	Overall
Low-risk procedures n/N (%) (95% CI)	1/188 (0.5) (0 to 2.9)	1/139 (0.7) (0 to 3.9)	–	2/327 (0.6) (0.1 to 2.2)
High-risk procedures n/N (%) (95% CI)	9/136 (6.6) (3.1 to 12.2)	4/52 (7.7) (2.1 to 18.5)	2/14 (14.3) (1.8 to 42.8)	15/202 (7.4) (4.6 to 11.9)

Radaelli F, Fuccio L, Paggi S, et al. Gut 2019

Post-Sphincterotomy Bleeding

How to treat





Treating delayed endoscopic sphincterotomy-induced bleeding: Epinephrine injection with or without thermotherapy

Yung-Kuan Tsou, Cheng-Hui Lin, Nai-Jen Liu, Jui-Hsiang Tang, Kai-Feng Sung, Chi-Liang Cheng, Ching-Song Lee

retrospectively investigated

	Epinephrine injection group (n = 26)	Combination therapy group (n = 33)	P value
Initial hemostasis	25 (96.2)	33 (100)	0.44
Re-bleeding[1]	4 (16.0)	4 (12.1)	0.72
Embolization or surgery	3 (11.5)	1 (3.0)	0.31
Bleeding-related death	0	0	1
Transfusion requirement (U)	3.5 ± 4.6	3.5 ± 4.5	0.94

World J Gastroenterol 2009

Endoclip therapy of post-sphincterotomy bleeding using a transparent cap-fitted forward-viewing gastroscope

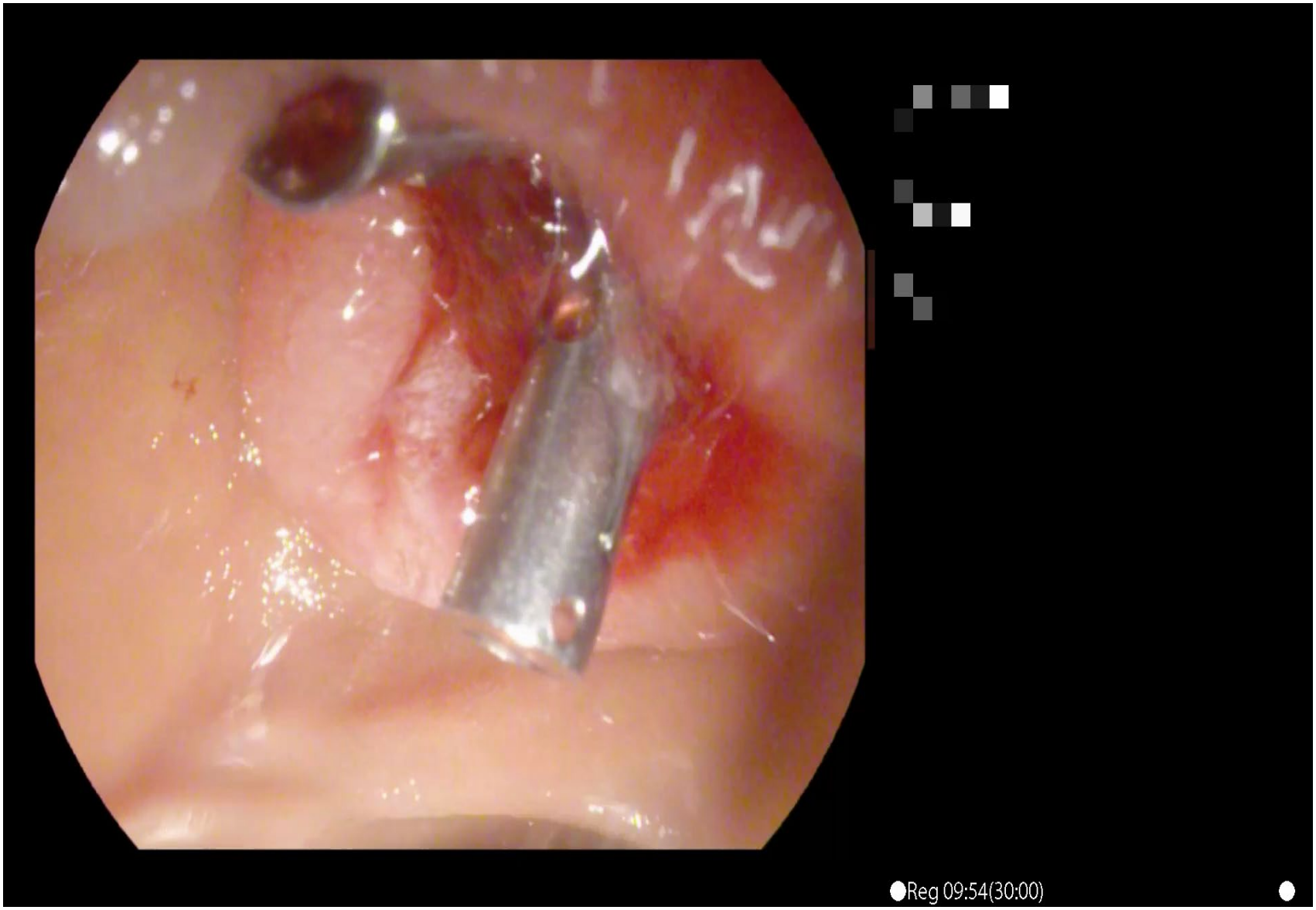
Hyung Ku Chon[1] · Tae Hyeon Kim

	Early uncontrolled hemorrhage	Delayed hemorrhage
No. of patients	45	12
Median number of clips used (range)	1.7 (1–3)	2.1 (1–3)
Delayed bleeding after clipping	0 (0)	0 (0)
Severe adverse complications after clipping[a]	0 (0)	0 (0)
Death	0 (0)	0 (0)
Successful, *n*/*N* (%)	45/45 (100)	12/12 (100)

Surg Endosc (2017) 31:2783–2788

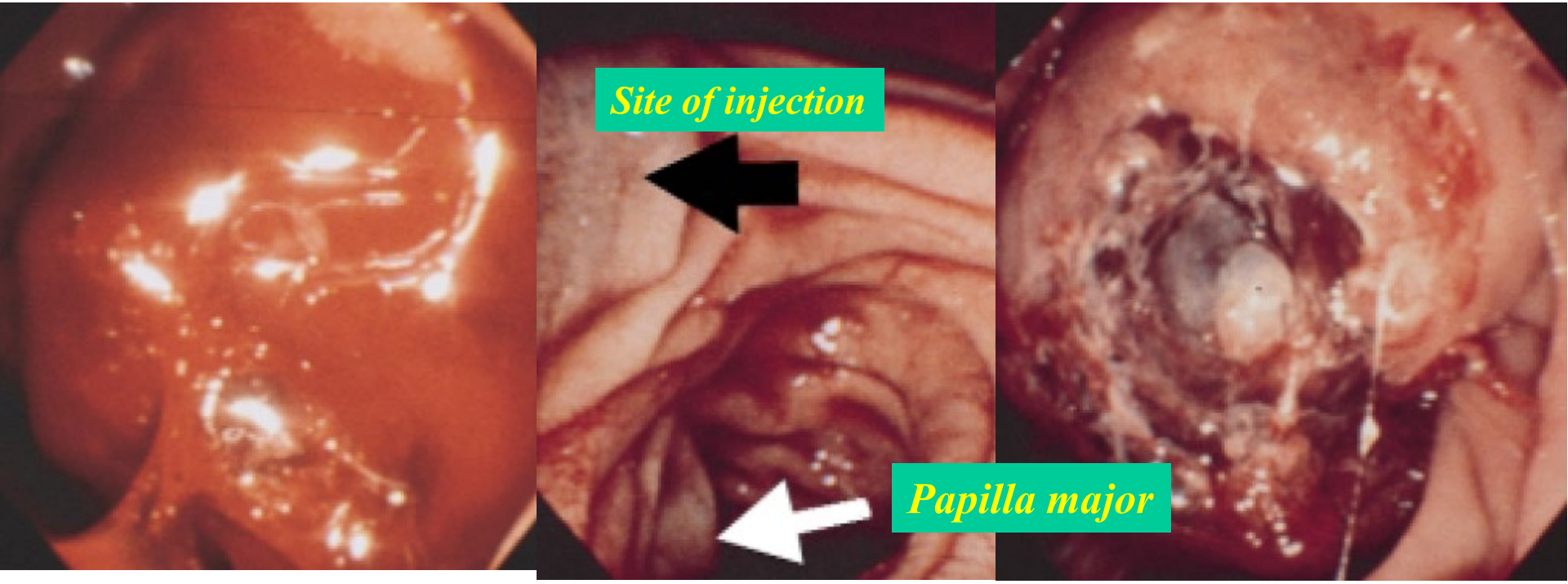
Post-Sphincterotomy Bleeding

Where to inject, burn, close



Effective hemostatic injection above the bleeding site for uncontrolled bleeding after endoscopic sphincterotomy

Mitsunobu Matsushita, MD, Kiyoshi Hajiro, MD, Hiroshi Takakuwa, MD, Akiyoshi Nishio, MD



GASTROINTESTINAL ENDOSCOPY VOLUME 51, NO. 2, 2000

Retrospective Cohort Study

Predictors of re-bleeding after endoscopic hemostasis for delayed post-endoscopic sphincterotomy bleeding

Mu-Hsien Lee, Yung-Kuan Tsou, Cheng-Hui Lin, Ching-Song Lee, Nai-Jen Liu, Kai-Feng Sung, Hao-Tsai Cheng

	Re-bleeding (n = 35)	No re-bleeding (n = 126)	P value
Age (yr)	63.0 (52.0-70.0)	57.0 (46.5-71.0)	0.121
Sex (male)	23 (65.7)	82 (65.1)	0.944
White blood cell count ($\times 10^3/\mu L$)	8.1 (5.6-10.0)	8.1 (6.0-10.7)	0.673
Platelet count ($\times 10^3/\mu L$)	225 (122-262)	215 (160-268)	0.320
INR	1.1 (1.0-1.5)	1.1 (1.0-1.2)	0.075
Total bilirubin (mg/dL)	10.9 (2.3-22.3)	6.5 (1.1-15.8)	0.002
ESRD	3 (8.6)	10 (7.9)	1.000
Decompensated liver cirrhosis	4 (11.4%)	4 (3.2)	0.047
Use of anti-platelet regimen			
Before ES	3 (8.6)	3 (2.4)	0.117
Within 3 d after ES	2 (5.7)	2 (1.6)	0.206
Cholangitis before ES	13 (37.1)	58 (46.0)	0.349
Bleeding diathesis	16 (45.8)	22 (17.5)	< 0.001

Endoscopic hemostasis with fibrin glue for refractory postsphincterotomy and postpapillectomy bleeding

M. Mutignani, T. Seerden, A. Tringali, D. Feisal, V. Perri, P. Familiari, G. Costamagna

TABLE 1. Summary of fibrin glue therapy for refractory postsphincterotomy bleeding

Age (M/F)	Indication ERCP	Intervention	First endoscopic hemostasis	Endoscopic hemostasis of refractory bleeding	Fibrin glue–related complication
30 (F)	Pancreas divisum–pancreatitis	ES papilla minor + NPD	3 mL epinephrine* + 2 clips	Gold probe + 5 mL fibrin glue	None
37 (F)	Common bile duct stones	ES + stone extraction + NBD	4 mL epinephrine* + monopolar coagulation tip Dormia	5 mL epinephrine* + 2 clips + 5 mL fibrin glue	Fibrin glue clot in common bile duct
96 (F)	Common bile duct stones	ES + stone extraction + NBD	4 mL epinephrine* + 3 clips	4 mL fibrin glue	None

ES, endoscopic sphincterotomy; M/F, male/female; NBD, nasobiliary drainage; NPD, nasopancreatic drainage.
*1:10,000 concentration.

Magic powders
Floseal, hemospray and other…

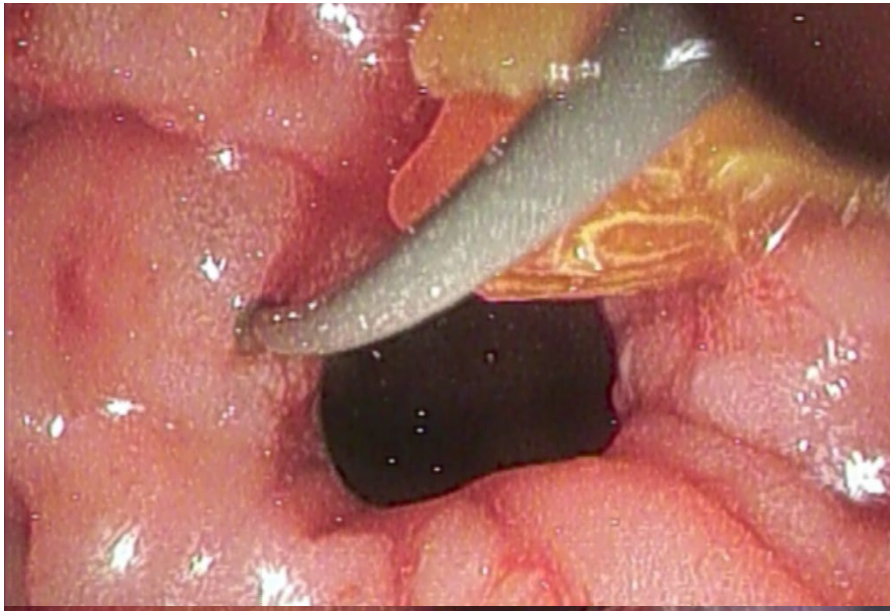
Hemostatic spray powder TC-325 for GI bleeding in a nationwide study: survival and predictors of failure via competing risks analysis

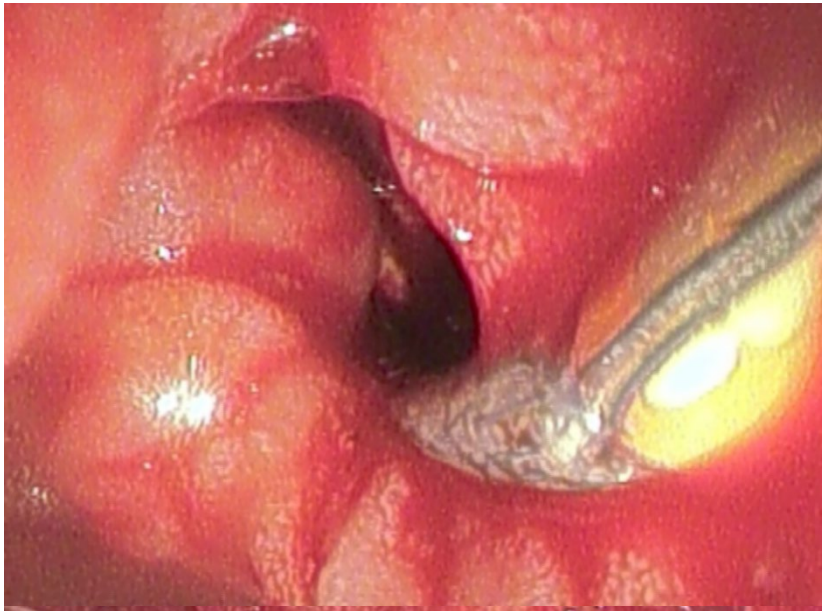
Enrique Rodríguez de Santiago, MD, MSc,[1,2] Diego Burgos-Santamaría, MD, PhD,[1]

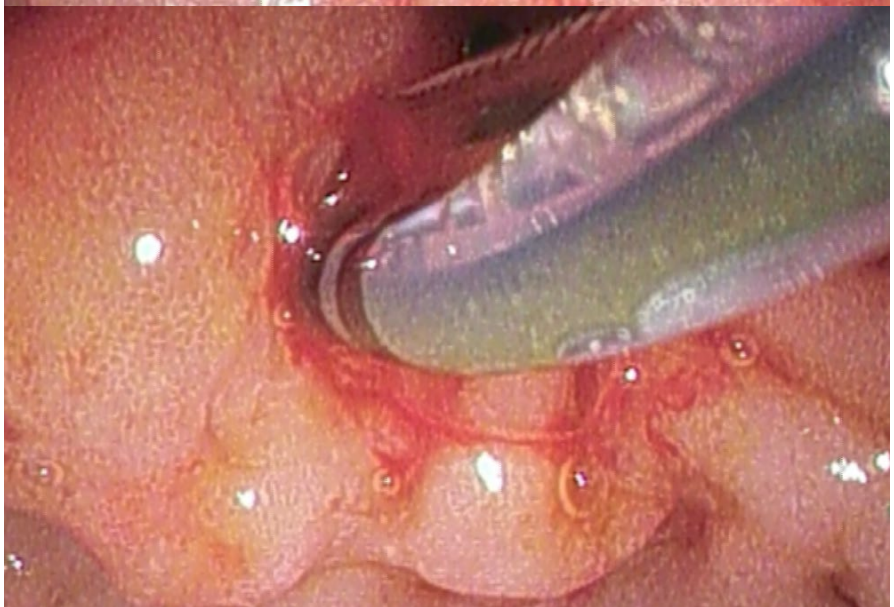
retrospective study

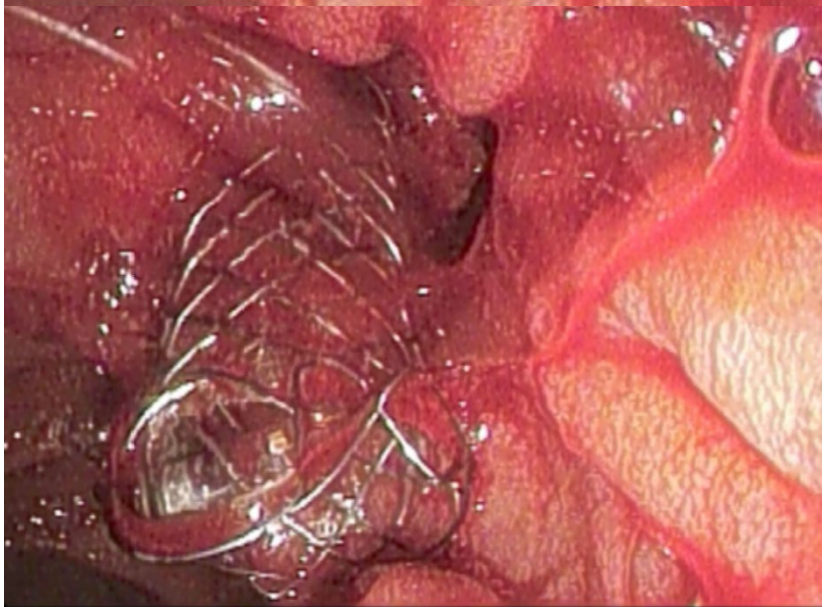
Cause	Population, n (%)	Intraprocedural hemostasis, % (95% confidence interval)
Overall	261 (100)	93.5 (89.5-96.4)
First-line therapy	70 (26.8)	96.3 (87-99)
Rescue therapy	191 (73.2)	92.6 (88-95)
Approved indication	207 (79.3)	92.8% (88-96)
Off-label indication	54 (20.7)	90.6 (80-96)

Post EBS bleeding: SEMS









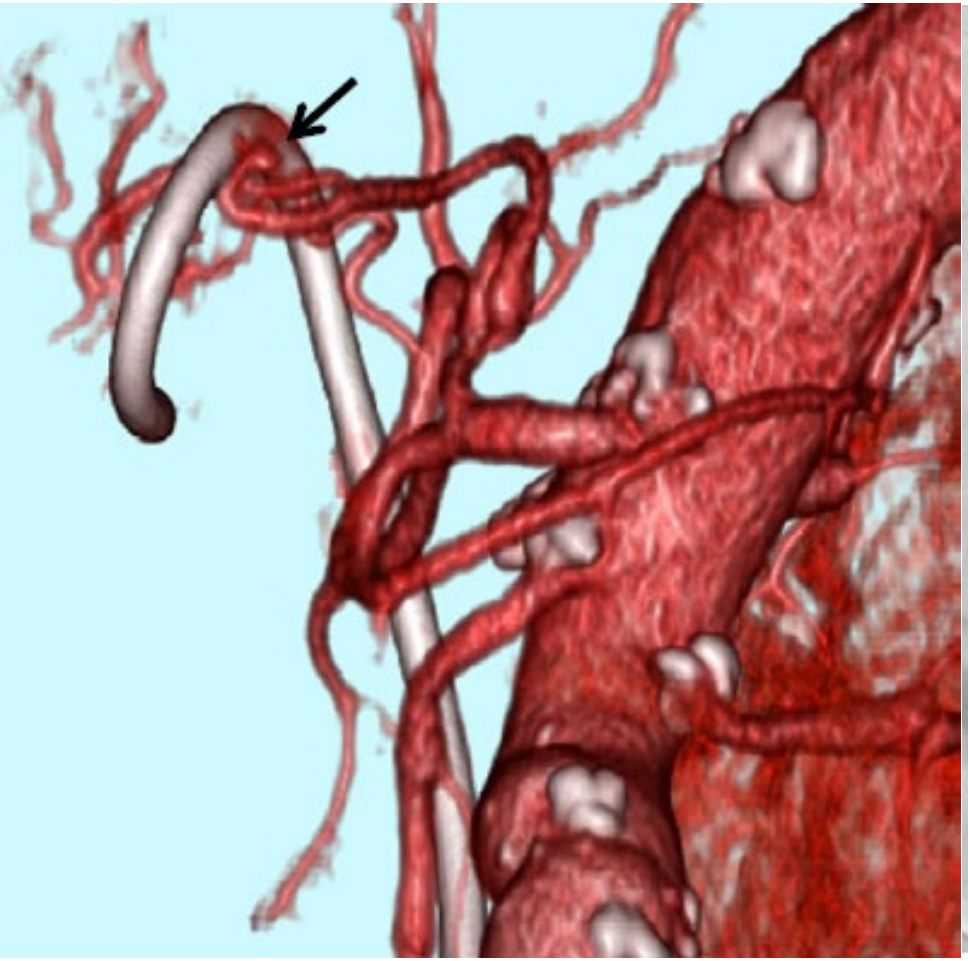
Selective Embolization for Post-Endoscopic Sphincterotomy Bleeding: Technical Aspects and Clinical Efficacy

Young Ho So, MD[1], Young Ho Choi, MD[1], Jin Wook Chung, MD[2], Hwan Jun Jae, MD[2]
Soon-Young Song, MD[3], Jae Hyung Park, MD[2]

No	Sex/ Age	Underlying Disease	Endoscopic Procedure	Coagulo-pathy	Onset of Bleeding	Bleeding Branch Origin	No. of Bleeding Branch	Embolization	Embolic Material	Outcome
1	M/59	CBD stone	Stone removal	No	4 day	Posterior PDA	1	Covering proximal and distal portion of bleeding branch origin	Coil	No rebleeding
2	F/85	GB cancer	Stent insertion	Yes	Immediate	Posterior PDA	1	At just proximal to bleeding branch origin	Gelfoam	No rebleeding
3	F/65	CBD stricture	Stent insertion	Yes	8 day	Posterior PDA	1	Covering proximal and distal portion of bleeding branch origin	NBCA	No rebleeding (expire due to sepsis)
4	M/53	CBD stone	Stone removal	No	1 day	Posterior PDA	1	Superselective	NBCA	No rebleeding
5	F/74	CBD stone	Stone removal	No	1 day	Anterior PDA	1*	Covering proximal and distal portion of bleeding branch origin	NBCA, coil	Rebleeding (No rebleeding after 2nd embolization)
6	F/70	Pancreatic cancer	Stent insertion	No	1 day	Anterior PDA	1*	At just proximal to bleeding branch origin	Gelfoam	Rebleeding (No rebleeding after 2nd embolization)
7	M/45	CBD stone	Stone removal	Yes	2 day	Posterior PDA	2**	Superselective	NBCA	No rebleeding (expire due to sepsis)
8	M/52	CBD stricture	ENBD insertion	No	3 day	Anterior PDA	1	Superselective	NBCA	No rebleeding
9	M/64	CBD stone	Stone removal	No	Immediate	Posterior PDA	1	Covering proximal and distal portion of bleeding branch origin	Coil	No rebleeding
10	M/66	GB cancer	ENBD insertion	No	3 day	Anterior and posterior PDA	2	Distal embolization of bleeding branch origin and subsequent embolization	Coil, Gelfoam	No rebleeding (expire due to disease progression)

Recurrent Bleeding from a Hepatic Artery Pseudoaneurysm after Biliary Stent Placement

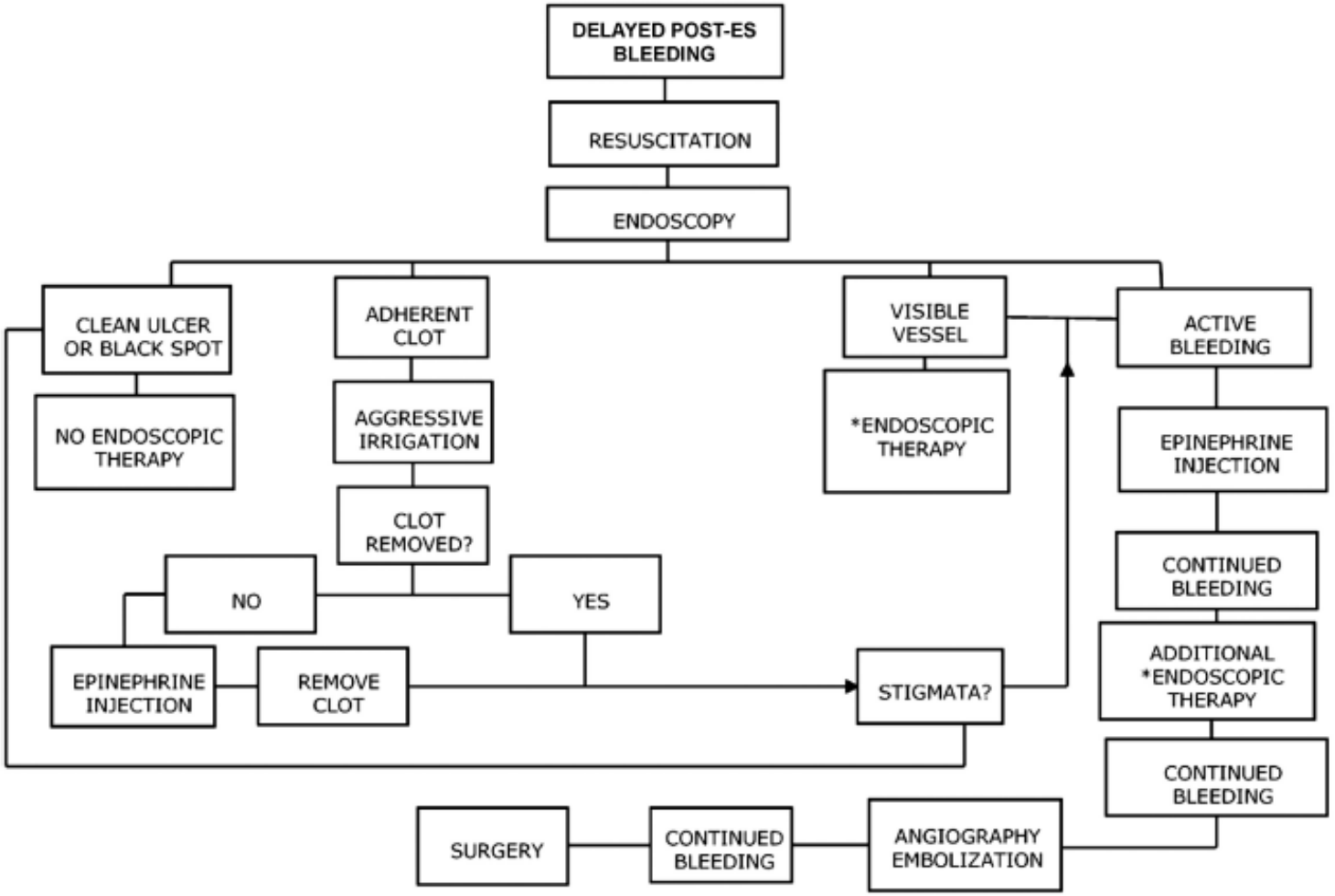
Kenji Yamauchi, Daisuke Uchida, Hironari Kato and Hiroyuki Okada



Intern Med 57: 49-52, 2018

Post-Sphincterotomy Bleeding: Who, What, When, and How

Lincoln E.V.V.C. Ferreira, M.D., Ph.D. and Todd H. Baron, M.D.



Am J Gastroenterol 2007;102:2850–2858

Post ERCP complications

- Acute pancreatitis
- Post ES bleeding
- Perforation

Perforations following endoscopic retrograde cholangiopancreatography: a single institution experience and surgical recommendations

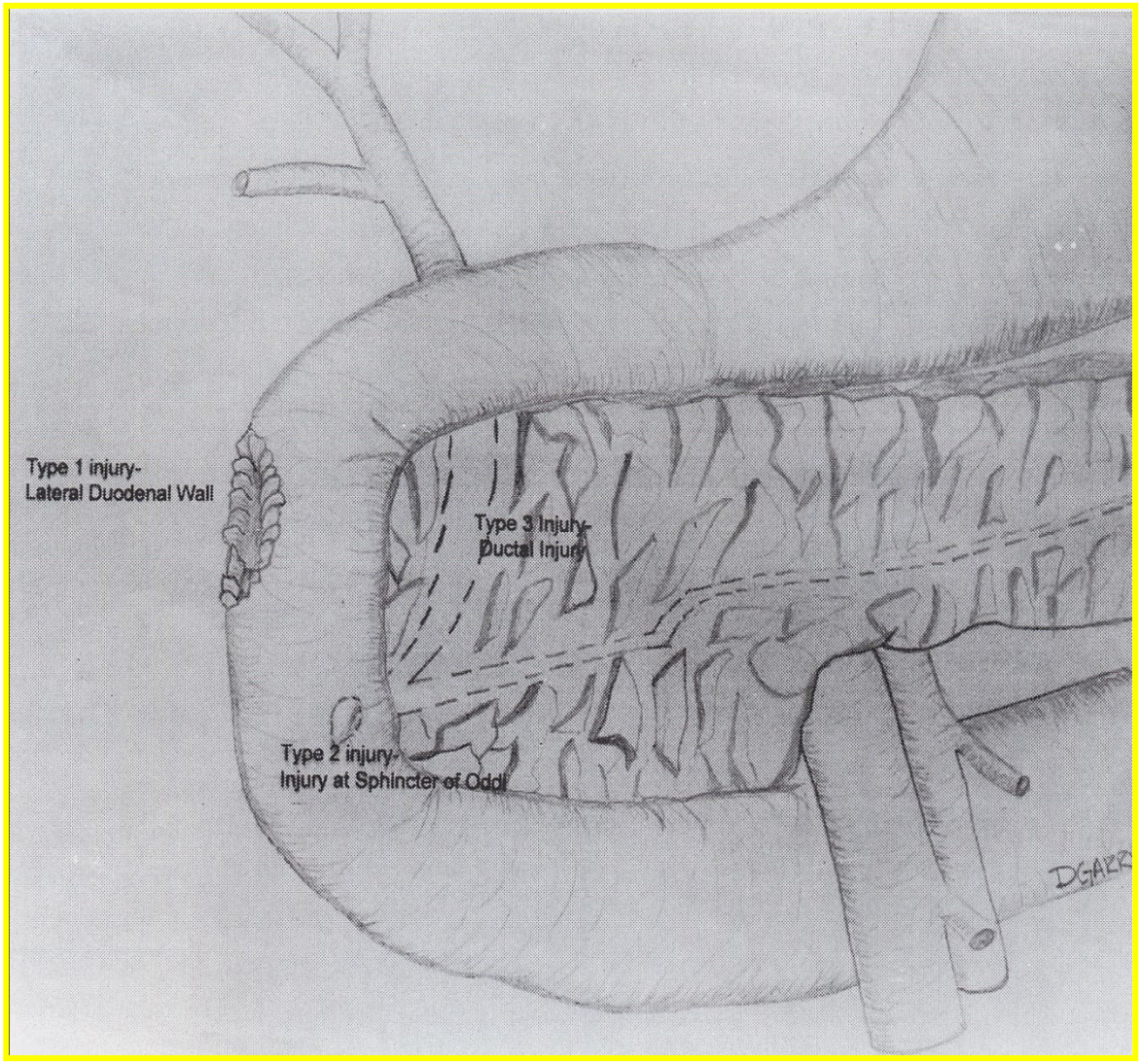
Rafi Miller, M.D.[a], Andrew Zbar, M.D.[b,*], Yoram Klein, M.D.[a], Victor Buyeviz, Ehud Melzer, M.D.[c], Bruce N. Mosenkis, M.D.[c], Eli Mavor, M.D.[a]

Table 2 Reported perforation rates with ERCP

Study	Year	Years of study	Number of ERCPs	Perforations	Operations	Mortality
Chaudhary and Aranya[9]	1996	10	750	10 (1.3%)	10 (100%)	2 (20%)
Loperfido et al[7]	1998	2	3,356	28 (0.83%)	10 (35.7%)	4 (14.3%)
Stapfer et al[13]	2000	5	1,413	14 (0.99%)	9 (64.3%)	2 (14.3%)
Preetha et al[16]	2003	9	4,030	18 (0.45%)	18 (100%)	3 (16.7%)
Christensen et al[17]	2004	2	1,177	13 (1.1%)	2 (15.4%)	1 (7.7%)
Wu et al[18]	2006	6	6,620	30 (0.45%)	10 (33.3%)	5 (16.7%)
Fatima et al[8]	2007	11	12,427	76 (0.6%)	22 (28.9%)	5 (6.6%)
Cotton et al[4]	2009	12	11,497	16 (0.14%)	11 (68.8%)	1 (6.3%)
Morgan et al[12]	2009	13	12,817	24 (0.2%)	10 (41.7%)	1 (4.2%)
Present series	2011	16	1,638	25 (1.6%)	8 (29.6%)	8 (29.6%)

The American Journal of Surgery (2013) 206, 180-186

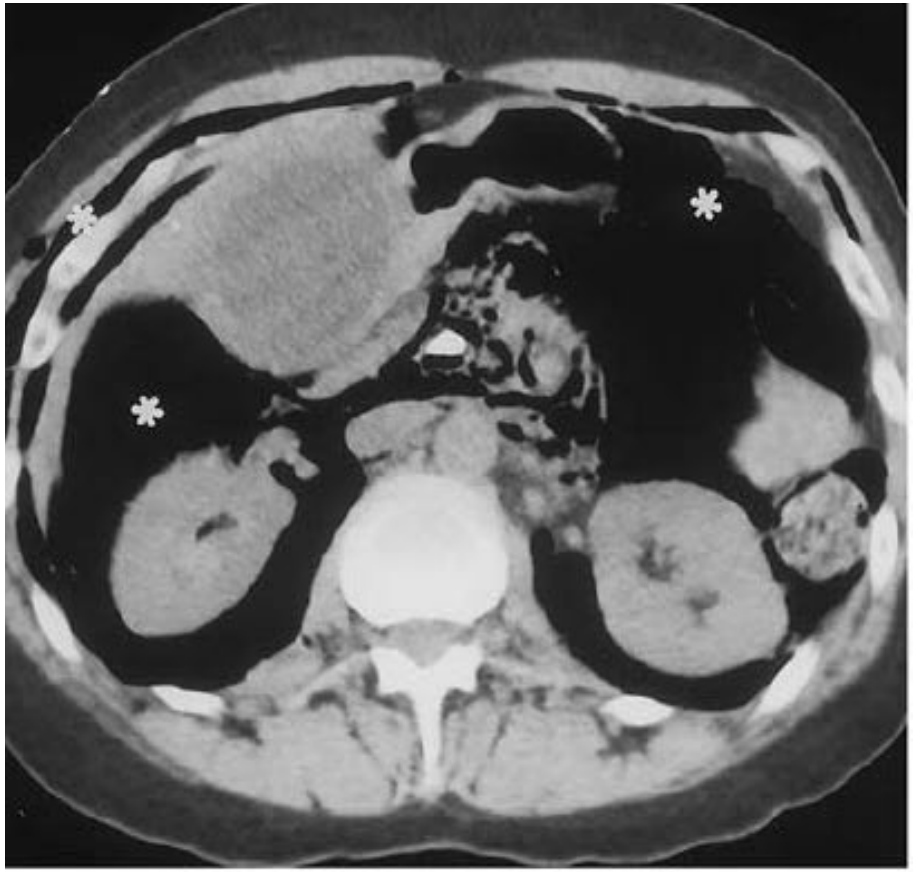
Duodenal perforation due to ERCP: classification



Stapfer et al. Management of duodenal perforation after ERCP and sphincterotomy. Ann Surg 2000

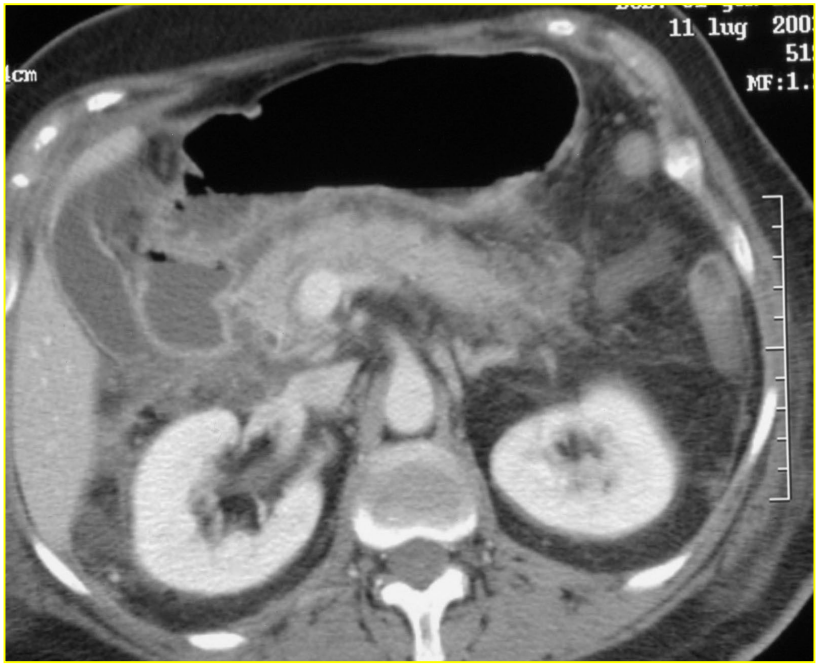
Rx abdomen

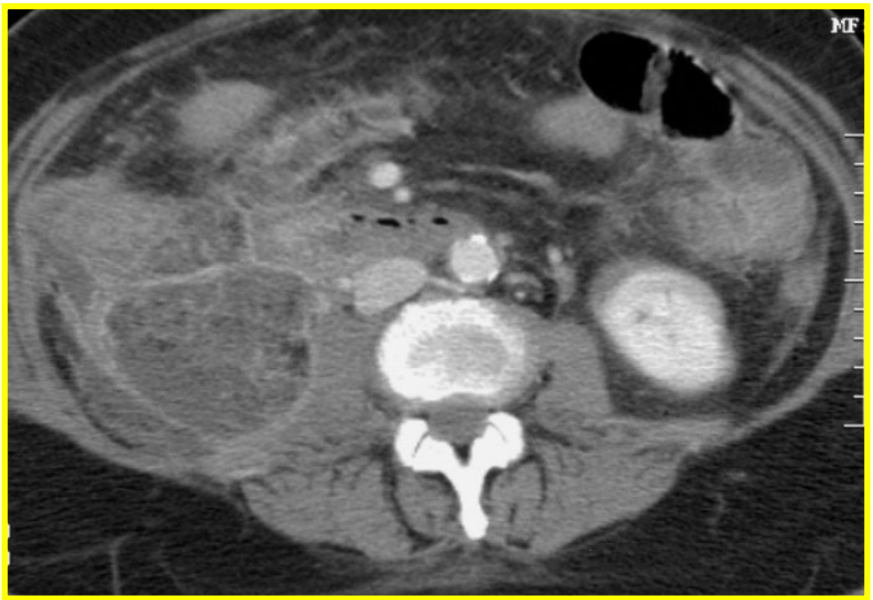
Suspect of post ERCP perforation: CT scan



Duodenal perforation

with retroperitoneal fluid collection





Duodenal perforation Type I

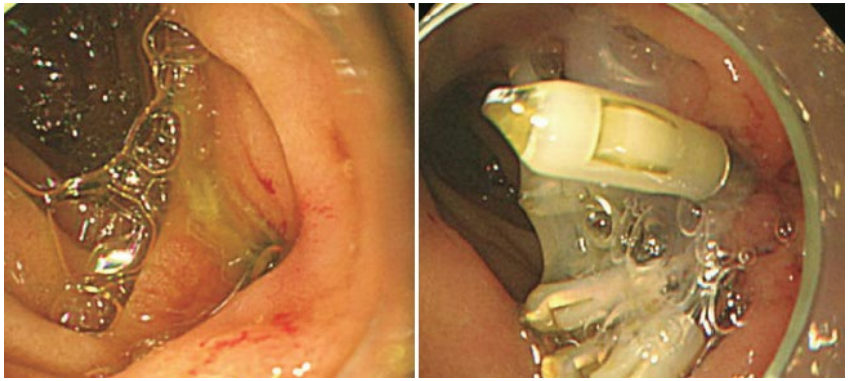
What to do?

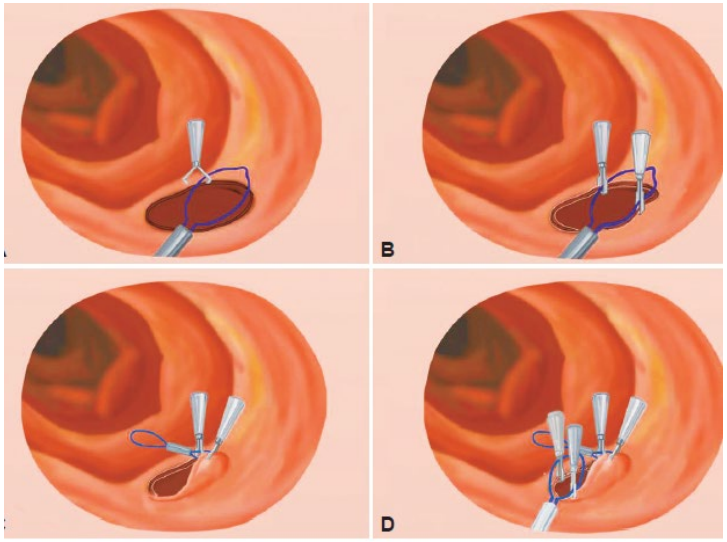
Duodenal perforation Type I

What to do?

Immediate primary endoscopic repair or surgery asap!!!

Primary endoscopic repair





Duodenal perforation Type II

What to do?

Duodenal perforation Type II: what to do?

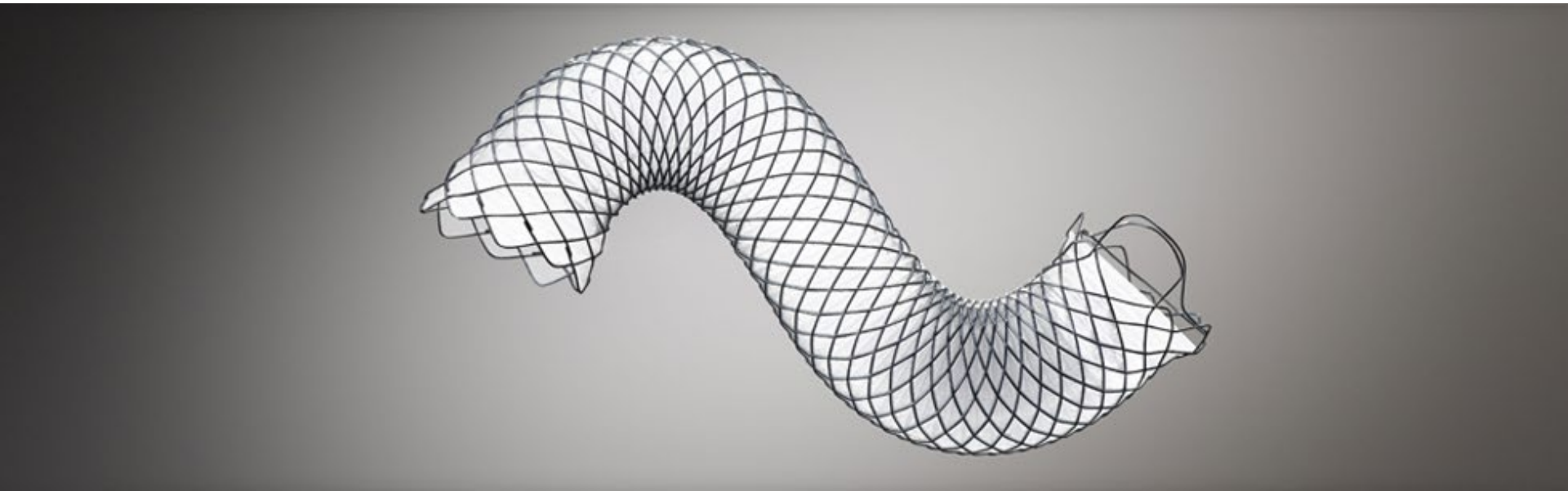
- PPI/somathostatin
- Antibiotics
- Parenteral nutrition
- Nas[illegible]e
- Naso biliary drainage or percutaneous drainage

EXPIRED

Duodenal perforation Type II

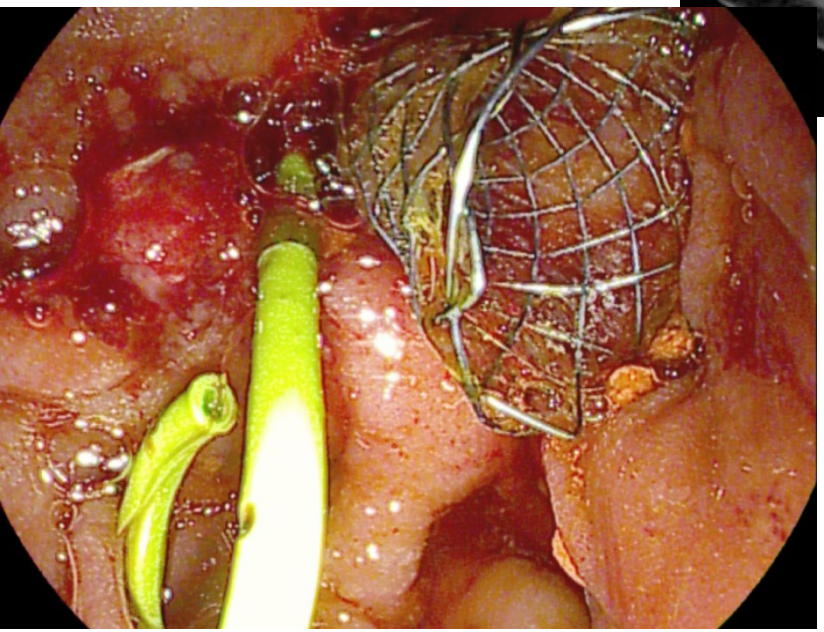
But nowdays?

(only in case of early diagnosis without sign of sepsis!!!!)



Duodenal perforation Type II after papillectomy

Bleeding 10 hours after papillectomy



Duodenal perforation Type II after papillectomy

6 days after perforation

Stapfer type II perforation after DASE

Temporary FC-SEMS for type II ERCP-related perforations: a case series from two referral centers and review of the literature

Alberto Tringali, Margherita Pizzicannella, Gianluca Andrisani, Marcello Cintolo, Cesare Hassan, Douglas Adler, Lorenzo Dioscoridi, Monica Pandolfi, Massimiliano Mutignani & Francesco Di Matteo

Table 3. Overall primary and secondary outcomes and between two groups.

	Overall *n/N* (%)	FC-SEMS *n/N* (%)	FC-SEMS + EBD *n/N* (%)	*p* value
Primary outcomes				
Mortality procedure-related	0/16(0%)	0/10 (0%)	0/6 (0%)	1
Need for surgery	0/16 (0%)	0/10(0%)	0/6 (0%)	1
Secondary outcomes	*n/N* (%)			
Success rate				
Clinical	16/16 (100%)	10/10 (100%)	6/6 (100%)	1
Technical	16/16 (100%)	10/10 (100%)	6/6 (100%)	1
Complication-related procedure	2/16 (12.5%)	1/10 (10%)	1/6 (16%)	1
Pancreatitis mild	2/16 (12.5%)	1/10 (10%	1/6 (16%)	
Cholangitis	0/16	0/10	0/6	
Fever	3/16 (18.7%)	0/10 (0%)	3/6 (50%)	.05
	Median (range)			
Hospital stay (days) Median (range)	10 (4–21)	10.5 (6–21)	8.5 (4–20)	.38
Time to post-operative feeding (days) Median (range)	4 (2–15)	4 (2–9)	6.5 (3–15)	.04
Time to stent removal (days) Median (range)	43 (2–105)	44 (5–105)	20 (2–35)	
Time to NBD removal (days) Median (range)			8 (4–16)	

SCANDINAVIAN JOURNAL OF GASTROENTEROLOGY
2018, VOL. 53, NO. 6, 760–767

C-SEMS in type II post ERCP perforation

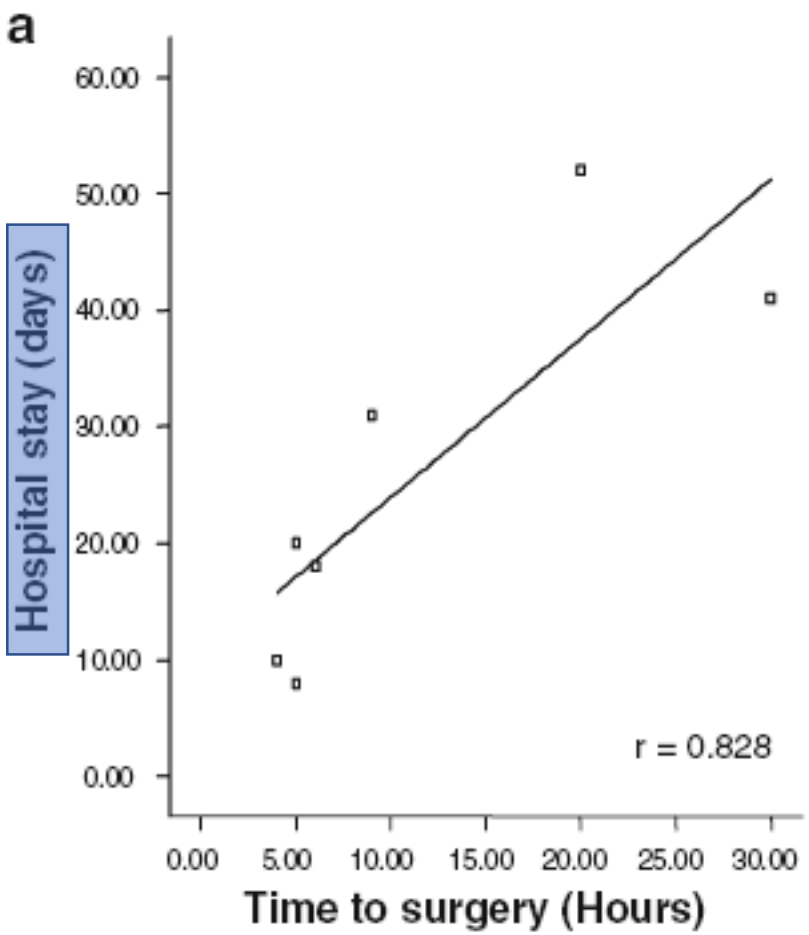
Is there an I.O. contamination of the retroperitoneal space?

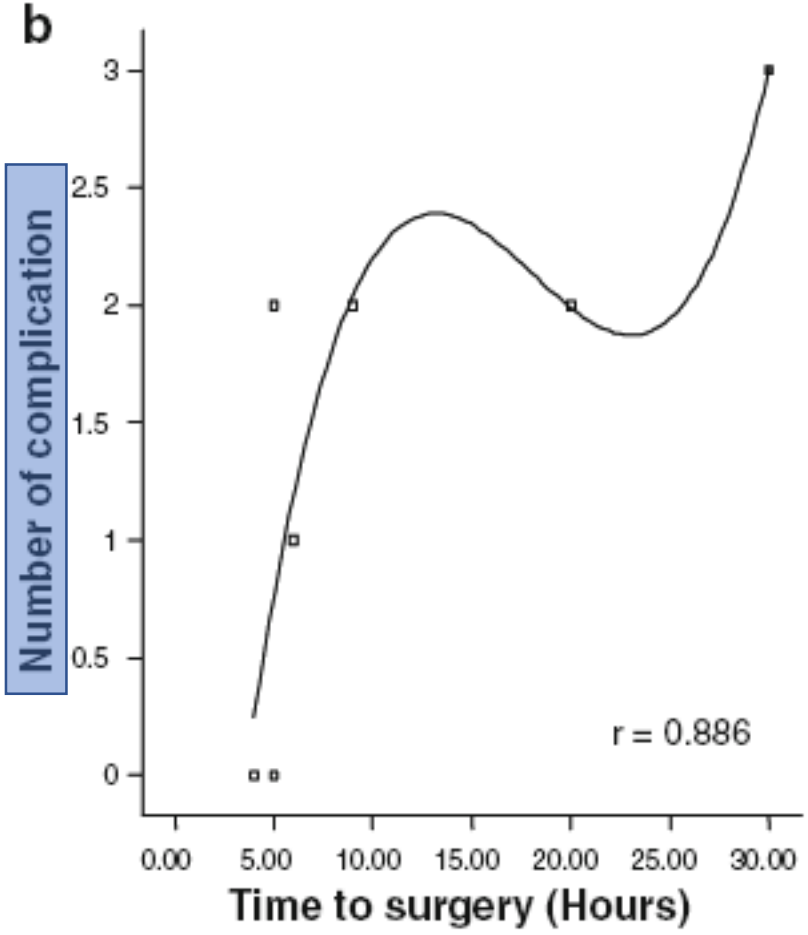
Post ERCP perforation Indication for surgery/percutaneous drainage

- Type I perforation not repaired endoscopically
- Fever/sepsis
- Retroperitoneal fluid collection
- Peritonitis

Management of ERCP-Related Perforations: Outcomes of Single Institution in Korea

Ji Hun Kim · Byung Moo Yoo · Jin Hong Kim · Myung Wook Kim · Wook Hwan Kim





J Gastrointest Surg (2009) 13:728–734

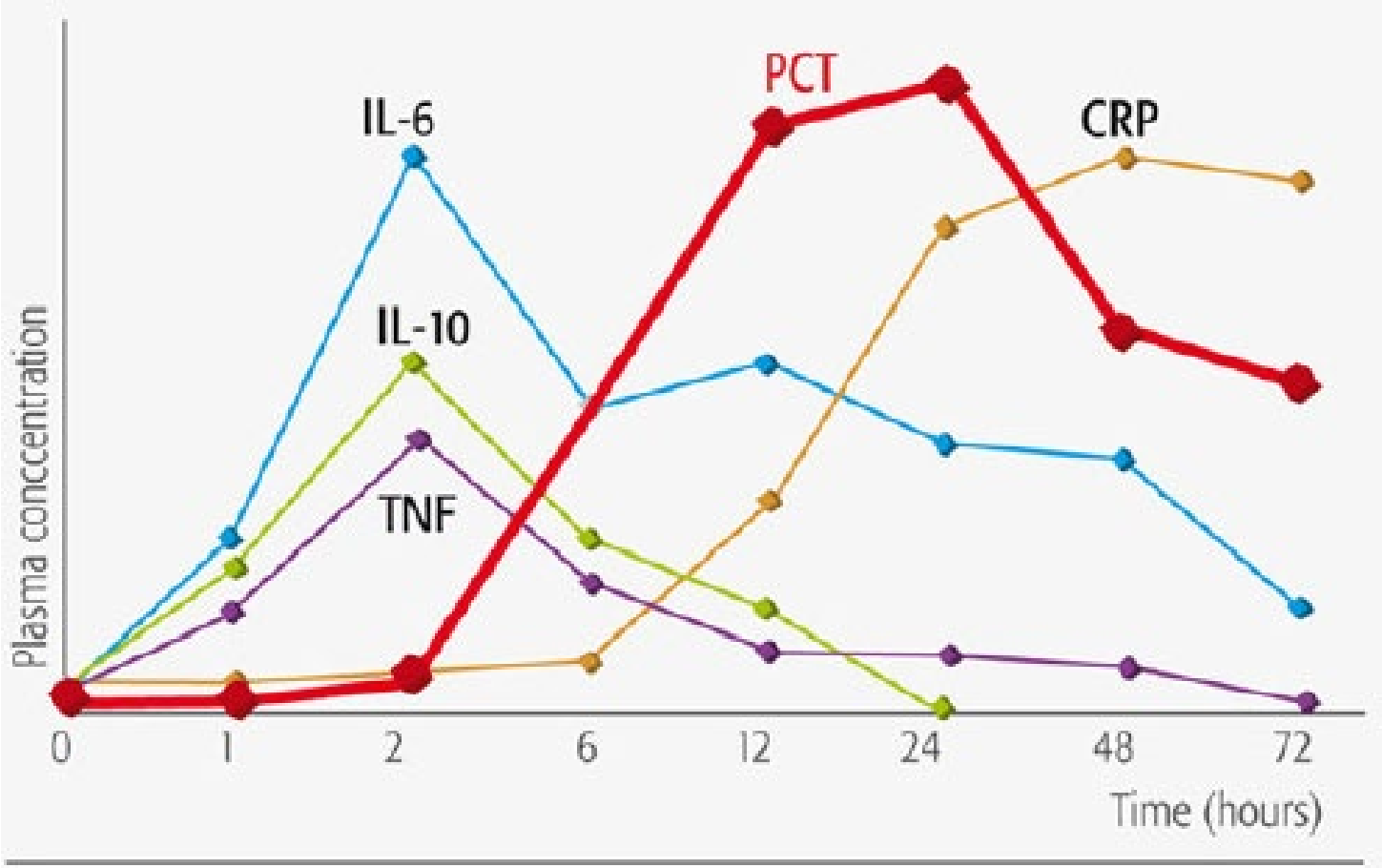
Post ERCP perforation indication for surgery

- Type I perforation not repaired endoscopically
- Fever/sepsis
- Retroperitoneal fluid collection
- Peritonitis

Do we need to wait for this symptoms before to operate?

Procalcitonin Monitoring as a Guide for Antimicrobial Therapy: A Review of Current Literature

Elizabeth W. Covington,* Megan Z. Roberts, and Jenny Dong



Kinetic profiles of different biomarkers of bacterial infection.

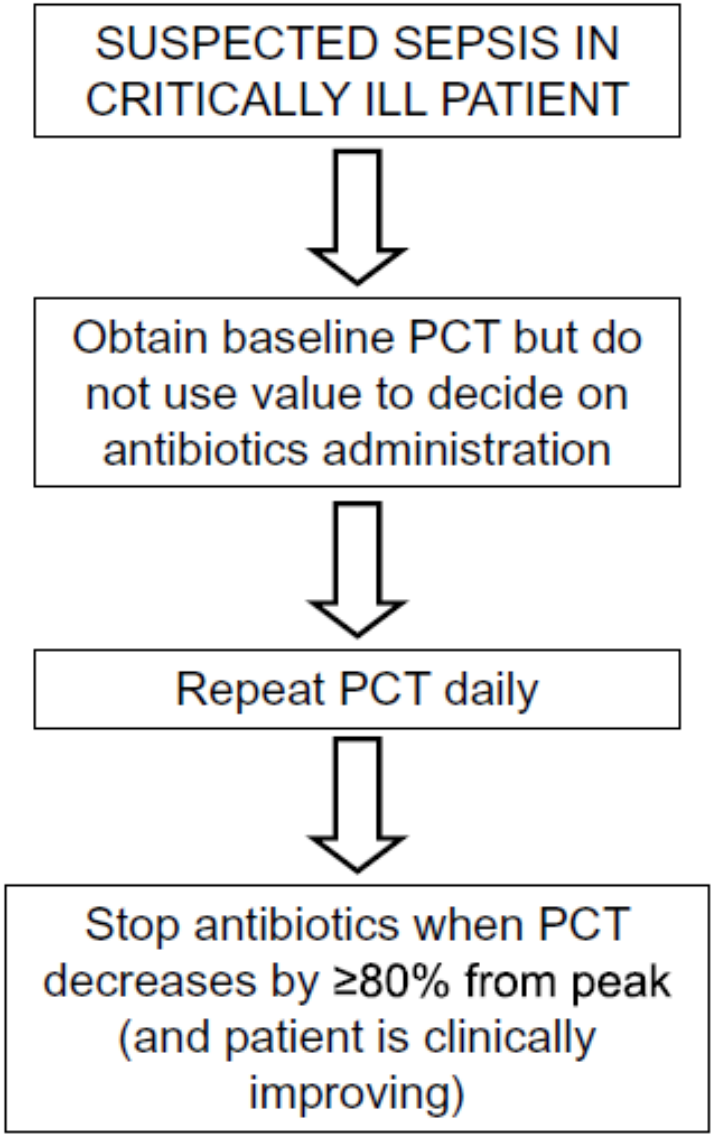
PHARMACOTHERAPY Volume 38, Number 5, 2018

Procalcitonin: Between evidence and critical issues

Elena Aloisio*, Alberto Dolci, Mauro Panteghini

Data from published meta-analyses evaluating the di

Authors, year [ref]	No. of studies	No. of subjects	icity (95% CI)	+LR (95% CI)	-LR (95% CI)
Uzzan et al[a], 2006 [15]	25	2699		–	–
Jones et al., 2007 [16]	17	2008	0.60–0.79)	–	–
Tang et al., 2007 [17]	14	1602	0.67–0.76)	3.03 (2.51–3.65)	0.43 (0.37–0.48)
Wacker et al., 2013 [18]	30	3244	0.74–0.84)	4.00	0.29
Hoeboer et al., 2015 [19]	58	16,514	0.64–0.72)	–	–
Ren et al., 2015 [20]	8	566	0.84–0.92)	5.75 (3.79–8.72)	0.33 (0.15–0.77)
Liu et al., 2016 [21]	59	7376	0.74–0.81)	–	–
Cabral et al., 2016 [22]	14	–	0.62–0.69)	–	–
Wu et al., 2017 [23]	13	2915	0.73–0.85)	–	–
Tan et al., 2019 [24]	9	1368	0.60–0.88)	3.42 (1.79–6.52)	0.27 (0.16–0.45)



Clinica Chimica Acta 496 (2019) 7–12

Predicting Bacterial Versus Viral Infection, or None of the Above

Stefan Riedel,

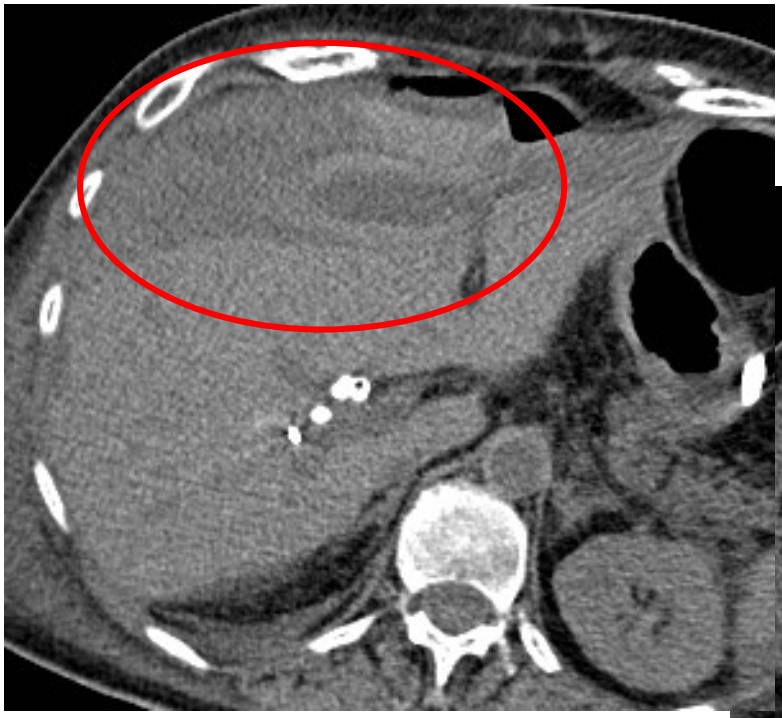
Biomarker	Source	Sens.	Spec.	AUC	LR+	LR-	Limitations
C-reactive protein[21]	Metaanalysis ($n = 1386$)	0.75	0.67	–	2.43	0.42	Slow kinetic, independent of infection severity, increased in many inflammatory diseases
Procalcitonin[35]	Metaanalysis ($n = 3244$)	0.77	0.79	0.89	4.0	0.29	Increased in various non-infectious causes of SIRS (i.e., cardiac arrest, severe trauma)
Interleukin-6[57]	Cohort study ($n = 327$)	0.82	0.75	0.86	–	–	Limited data, conflicting results
sTREM-1[78]	Metaanalysis ($n = 1795$)	0.79	0.80	0.87	4.0	0.26	Present in inflammatory disease without infection
LBP[57]	Cohort study ($n = 327$)	0.57	0.85	0.73	–	–	Non-specific marker of inflammation
suPAR[98]	Cohort study ($n = 273$)	–	–	0.62	–	–	Limited data; low diagnostic value for sepsis

Clin Lab Med 39 (2019) 453–472

Stapfer type II and III perforation

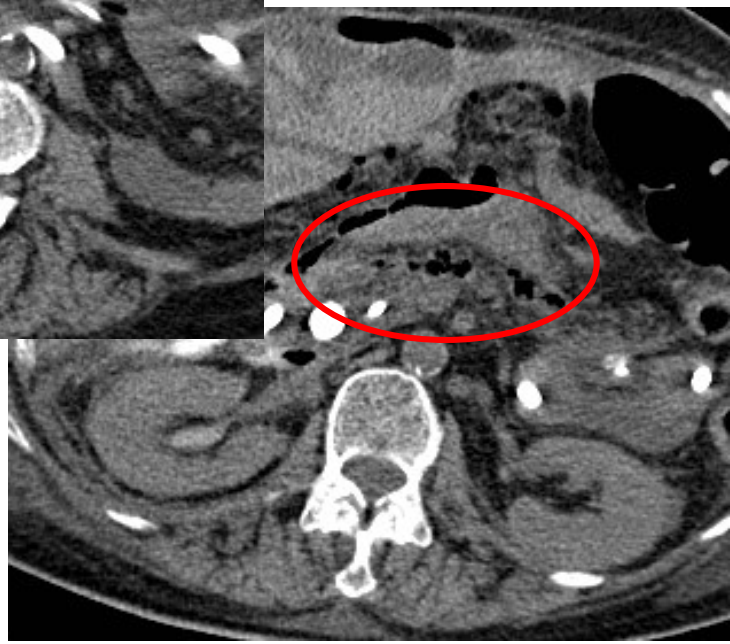
10 days after the ERCP, admission in our ICU with OTI

Perihepatic hematoma



Perirenal fat imbibition

Retroperitoneal free air



Procalcitonin and

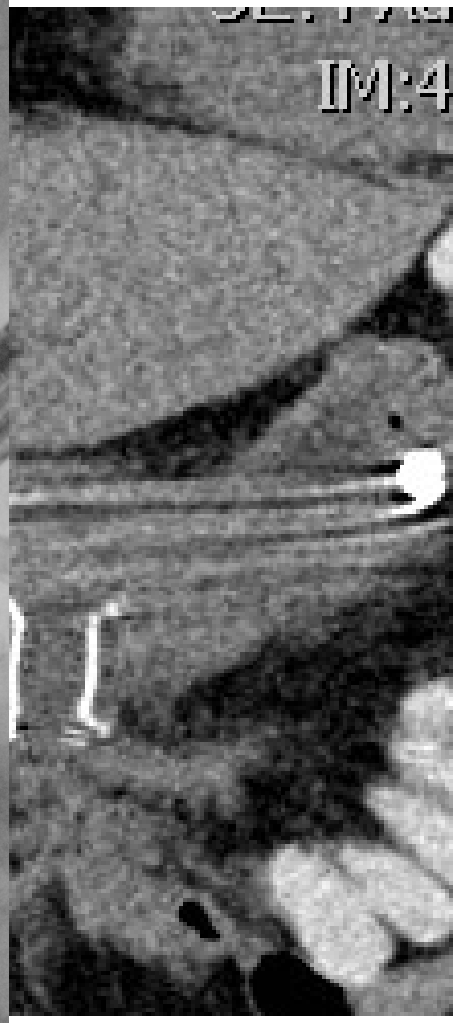
Lactate normal

Stapfer type II and III perforation

1 fc-SEMS

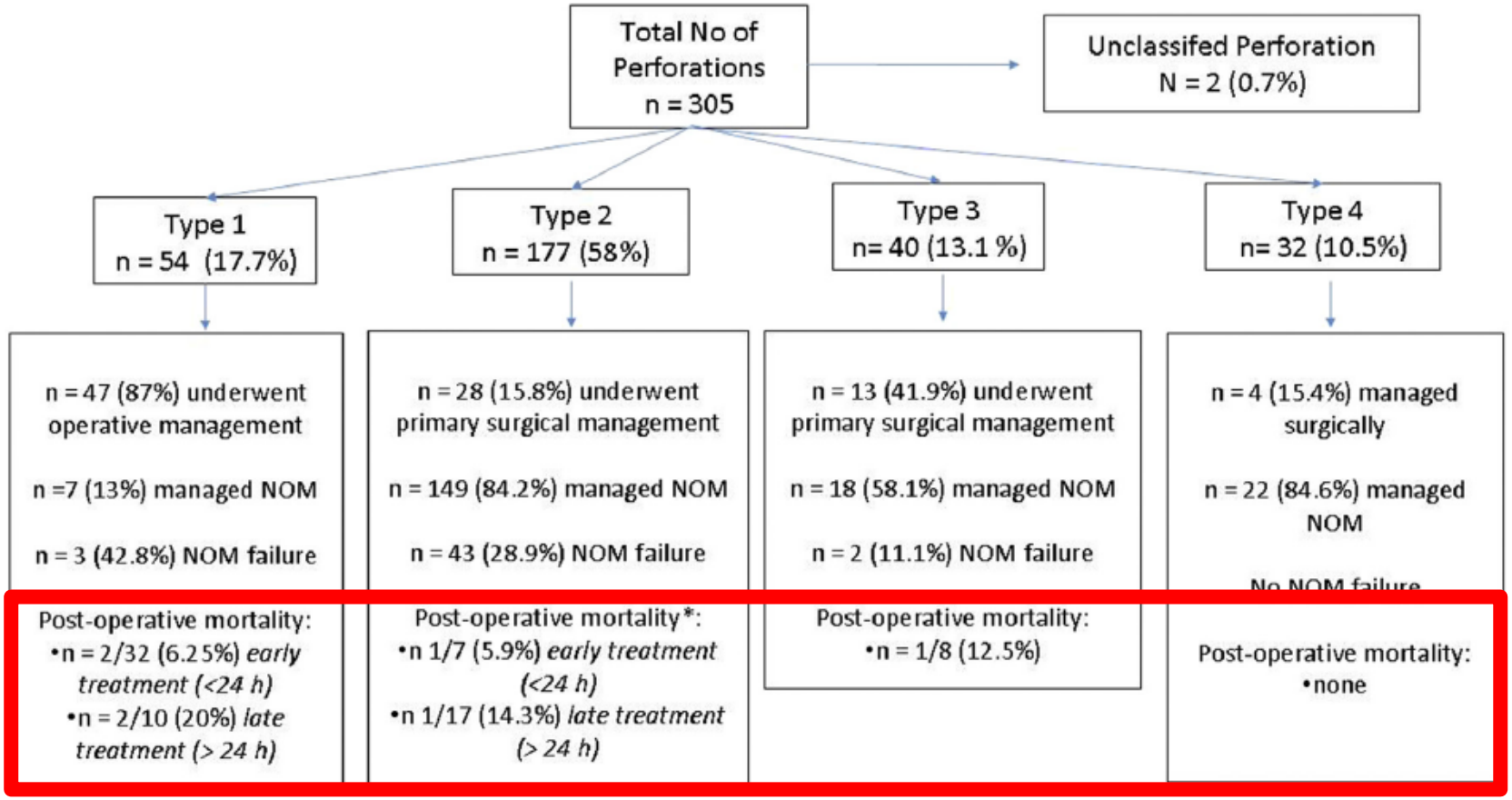
4 plastic st

6 month later

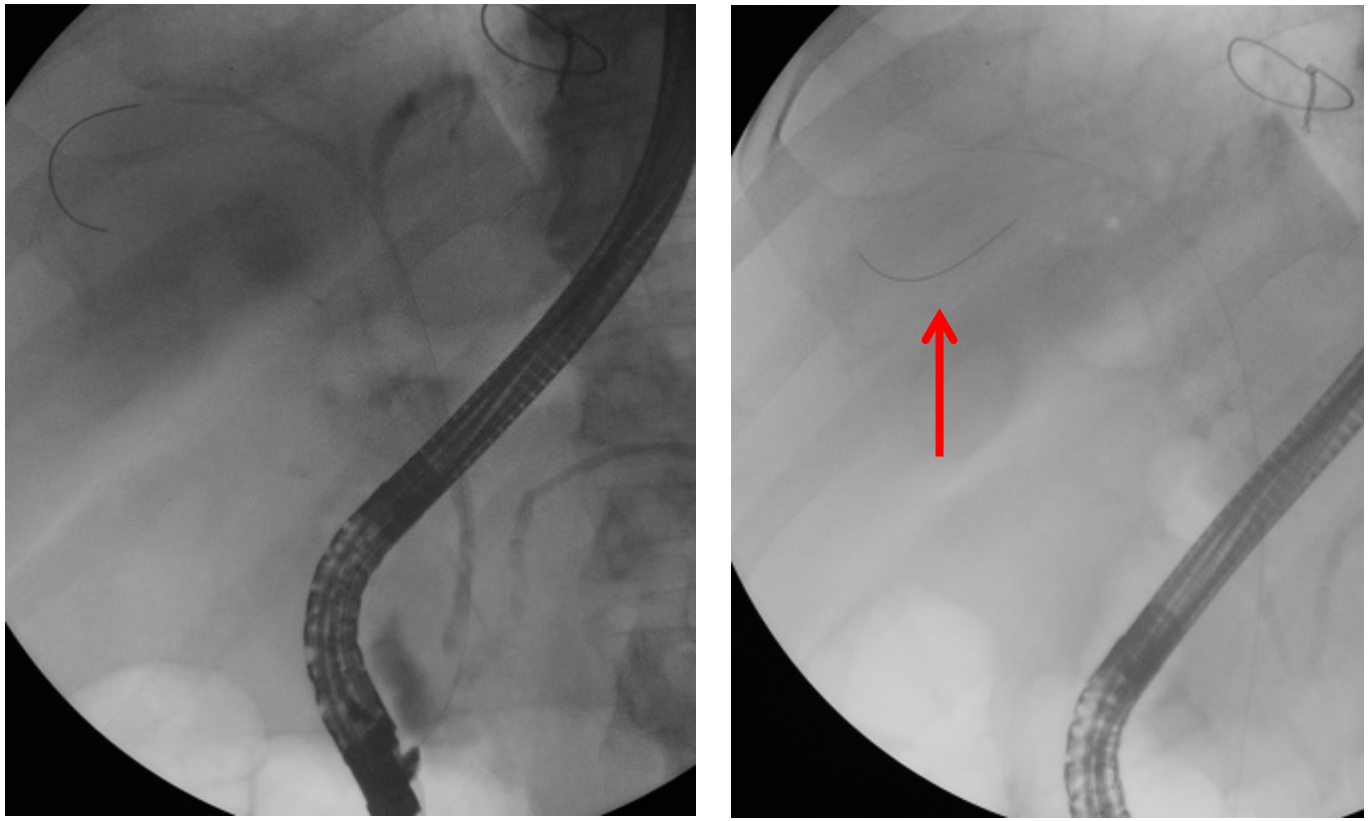


A systematic review of the management and outcome of ERCP related duodenal perforations using a standardized classification system☆

Roberto Cirocchi [a], *Michael Denis Kelly* [b], *Ewen A. Griffiths* [c], *Renata Tabola* [d], *Massimo Sartelli* [e], *Luigi Carlini* [f], *Stefania Ghersi Salomone Di Saverio* [h,*]



Type III post ERCP perforation



Guide wire into the liver

Type III post ERCP perforation

Intrahepatic and subglissonian infected hematoma

Systematic review: Features, diagnosis, management and prognosis of hepatic hematoma, a rare complication of ERCP

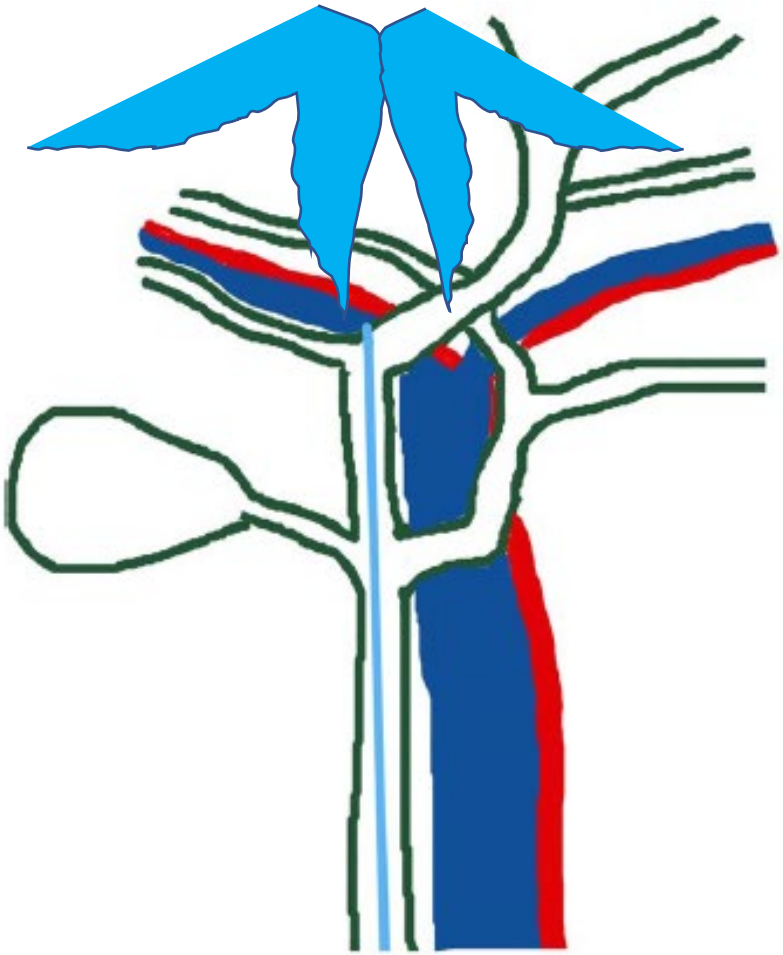
Nicola Imperatore[a,b,*], Giancarlo Micheletto[c,d], Gianpiero Manes[b]
Davide Giuseppe Redaelli[b], Elisa Reitano[d], Germana de Nucci[b]

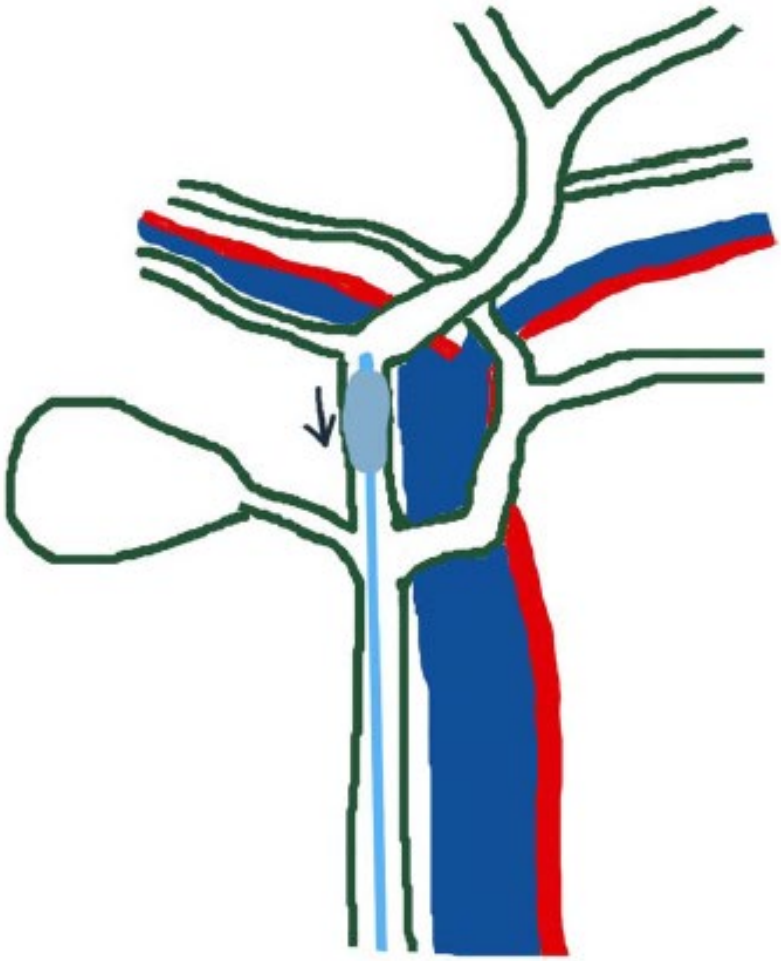
Study	Gender	Age	Indication for ERCP	Procedure	Type of guide-wire	Symptoms onset	Anticoagulant drugs	First symptom	Diagnosis	Site	Dimension (mm)	Treatment	Antibiotics	Dea
Ortega Deballon et al. [6]	M	81	Choledocolithiasis	Sphincterotomy	–	–	No	Abdominal pain	CT scan	–	–	Percutaneous drainage	Yes	No
Horn and Peña [7]	F	88	Pancreatic mass	Sphincterotomy + biliary stent	0.035-in.	48 h	No	Abdominal pain + anaemia	CT scan	Right lobe	–	Conservative	Yes	No
Chi and Waxman [8]	F	43	Pancreatic cancer	Sphincterotomy + biliary stent	0.035 in. straight tip	5 h	No	Abdominal pain	CT scan	Right lobe	80 × 150	Embolization	Yes	No
Ertuğrul et al. [9]	M	41	Cholangiocarcinoma	Biliary stent	–	48 h	No	Abdominal pain + fever	CT scan	Right lobe	78 × 41	Conservative	Yes	No
Priego et al. [10]	F	30	Choledocolithiasis	Sphincterotomy	–	–	No	Abdominal pain + hypotension	CT scan	Right lobe	47 × 110	Surgery	Yes	No
Petit-Laurent et al. [11]	M	98	Choledocolithiasis	Sphincterotomy	–	48 h	Yes	Abdominal pain + fever	US + CT scan	–	–	Percutaneous drainage	–	No
Bhati et al. [12]	F	51	Choledocolithiasis	Sphincterotomy	–	48 h	No	Abdominal pain + hypotension	CT scan	Right lobe	100 × 130	Percutaneous drainage	–	No
Del-Rosi et al. [13]	F	28	Choledocolithiasis	Sphincterotomy + biliary stent	–	48 h	No	Abdominal pain + hypotension	–	–	120 × 60	Conservative	Yes	No
Papachristou and Baron [14]	M	69	Cholangiocarcinoma	Sphincterotomy + biliary stent	0.035 in. soft-tipped hydrophilic	48 h	No	Abdominal pain + anaemia	CT scan	Right lobe	169 × 150	Conservative	–	–
McArthur and Mills [15]	M	71	Choledocolithiasis	Sphincterotomy + biliary stent	0.035 in., 450 cm length straight tip	12 h	No	Abdominal pain	CT scan	Right lobe	50 × 30	Conservative	Yes	No
De La Serna-Higuera et al. [16]	F	71	Choledocolithiasis	Sphincterotomy	0.035 in.	48 h	No	Abdominal pain	US + CT scan	Right lobe	140 × 80	Conservative	Yes	No
Cárdenas et al. [17]	F	54	Bile leak after liver transplantation	Sphincterotomy + biliary stent	–	24 h	No	Abdominal pain + anaemia	CT scan	–	90 × 20	Conservative	Yes	No
De Mayo et al. [18]	M	96	Ampullary adenoma	Sphincterotomy	–	4 h	No	Abdominal pain	–	–	170 × 130	Conservative	Yes	No
Yrribery-Ureña et al. [19]	F	46	Choledocolithiasis	Sphincterotomy	–	48 h	No	Abdominal pain + anaemia	–	–	–	Surgery	–	–
Nari et al. [20]	F	15	Acute biliary pancreatitis	–	–	–	No	Abdominal pain + fever	CT scan	Right lobe	135 × 49	Conservative	Yes	No
Saa et al. [21]	–	92	Choledocolithiasis	Sphincterotomy	–	24 h	No	Anaemia	–	–	–	Percutaneous drainage + surgery	No	Yes
Revuelto Rey et al. [22]	M	41	Choledocolithiasis	Sphincterotomy	–	6 h	No	Abdominal pain + anaemia	CT scan	Right lobe	130 × 110	Conservative	Yes	No
Baudet et al. [23]	F	69	Choledocolithiasis	Sphincterotomy	0.035 in. soft-tipped hydrophilic	4 h	No	Abdominal pain + anaemia + fever	US + CT scan	Right lobe	160 × 65	Embolization + surgery	Yes	No
Pérez-Legaz et al. [24]	F	72	Choledocolithiasis	Sphincterotomy	–	2 h	No	Abdominal pain + anaemia	CT scan	Right lobe	80 × 80	Surgery	–	No
Del Pozo et al. [25]	F	76	Choledocolithiasis	Sphincterotomy	0.035 in.	120 h	Yes	Abdominal pain	CT scan	Right lobe	–	Conservative	Yes	No
Manikam et al. [26]	F	42	Choledocolithiasis	Sphincterotomy + biliary stent	–	40 h	No	Abdominal pain + fever	CT scan	Right lobe	–	Percutaneous drainage	Yes	No
Orellana et al. [27]	M	96	Ampullary adenoma	Biliary stent	–	4 h	No	Abdominal pain	CT scan	Right lobe	170 × 130	Conservative	Yes	No
	M	49	Biliary stent occlusion	Stent exchange	–	2 h	No	Abdominal pain + hypotension	CT scan	Right lobe	–	Embolization	–	No
	F	55	Gallbladder cancer	Stent exchange	–	–	No	Abdominal pain	CT scan	Right lobe	–	Conservative	–	No
Bartolo-Rangel et al. [28]	F	62	Cholangitis	Sphincterotomy	–	–	No	Anaemia + hypotension	CT scan	Right lobe	–	Surgery	–	Yes
Patil et al. [29]	M	50	Cholangitis	Sphincterotomy	–	48 h	No	Abdominal pain	CT scan	Right lobe	50 × 30	Percutaneous drainage	Yes	No
Oliveira Ferreira et al. [30]	M	84	Choledocolithiasis	Sphincterotomy	0.035 in. straight tip	240 h	Yes	Abdominal pain + anaemia	CT scan	Right lobe	90 × 100	Percutaneous drainage	Yes	Yes
Fei and Li [31]	M	56	Choledocolithiasis	Sphincterotomy	0.035 in.	2 h	No	Fever	CT scan	Right lobe	130 × 60	Percutaneous drainage	Yes	No
Klimovà et al. [32]	M	54	Wirsung stone	Sphincterotomy	0.035 in.	6 h	No	Abdominal pain + anaemia + hypotension	CT scan	Right lobe	190 × 178	Embolization + Percutaneous drainage + surgery	Yes	No

Digestive and Liver Disease 50 (2018) 997–1003

Subcapsular Hepatic Hematoma Post-ERCP: Case Report and Review of the Literature

C. Sommariva[1] · A. Lauro[1] · N. Pagano[1] · S. Vaccari[1] · V. D'Andrea[2] · I. R. Marino[3] · M. Cervellera[1] · V. Tonini[1]





Digestive Diseases and Sciences (2019) 64:2114–2119

Cardiac and cerebral air embolism from endoscopic retrograde cholangio-pancreatography

Josef Finsterer, Claudia Stöllberger and Adam Bastovansky

Table 1 Endoscopic retrograde cholangio-pancreatographies with air embolism so far reported

Reference	Age/sex	DOE (min)	AP	Complications	RF	POE	PFO	Outcome
Simmons [3]	Not available	Not mentioned	BS	VAE	BS, BDS	Not mentioned	Not mentioned	Survived
Merine and Fishman [4]	39/female	Not mentioned	BS	VAE	BS, PC	Not mentioned	Not mentioned	Survived
Barthet *et al.* [5]	31/male	Not mentioned	BS	VAE	BS	Not mentioned	Not mentioned	Survived
Herman *et al.* [6]	Not available	Not mentioned	BS	VAE	BS	Not mentioned	Not mentioned	Survived
Kennedy *et al.* [7]	63/female	~45	BS	VAE/SAE	BS	Papillary veins	Not mentioned	Dead
Mohammedi *et al.* [8]	27/male	90	BS	VAE/SAE	BS, trauma	Hepatic veins	Absent	Survived
Nayagam *et al.* [9]	57/male	?	Stenting	VAE/SAE	Not mentioned	Not mentioned	Not mentioned	Dead
Siddiqui *et al.* [10]	43/female	Not mentioned	BS/LB	VAE	LB, carcinoma	Bilio-venous fistula	Absent	Dead
Giuly *et al.* [11]	60/female	Not mentioned[b]	Stenting /BS/ dilation	VAE	Stenting/varices	Choledochal varices	Not mentioned	Survived
Stabile *et al.* [12]	65/male	45	BS/PTC	VAE/SAE	PTC	Bilio-venous fistula	Absent	Dead
Rabe *et al.* [13]	87/male	Not mentioned	Stenting removal	VAE/SAE	Stenting	Not mentioned	PFO	Survived
Rabe *et al.* [13]	54/male	Not mentioned	Stenting	VAE/SAE	BII, PC, caveroma, BDS	Bile duct	Absent	Dead
Tan *et al.* [14]	82/female	Not mentioned[b]	Stenting	VAE/SAE	Stenting, stenosis	Not mentioned[b]	Not mentioned	Dead
Argüelles García *et al.* [15]	Not mentioned[a]	Not mentioned[a]	None	VAE/SAE	Not mentioned[a]	Not mentioned[a]	Not mentioned	Dead
Bisceglia *et al.* [16]	78/male	Not mentioned	BDS	VAE/SAE	CE/CG/BS	Duodeno-biliary fistula	Absent	Dead
Romberg [17]	53/male	Not mentioned	Stenting	VAE/SAE	Stenting	Porto-biliary fistula	Absent	Survived
Goins *et al.* [18]	72/female	20	None	VAE/SAE	Carcinoma	Bilio-venous fistula	Not mentioned	Survived
Cha *et al.* [19]	50/female	Not mentioned	None	VAE/SAE	BDS, stenosis	Bilio-venous fistula	Not mentioned	Dead
Van Boxel *et al.* [20]	82/male	20	Stenting	VAE/SAE	Stenting, CG	Not mentioned	Not mentioned	Survived
Personal communication	59/female	~45	Stenting/CG/BE	VAE/SAE	Stenting/CG/BE	Bilio-venous fistula	PFOs	Dead

Incidence of Venous Air Embolism During Endoscopic Retrograde Cholangiopancreatography

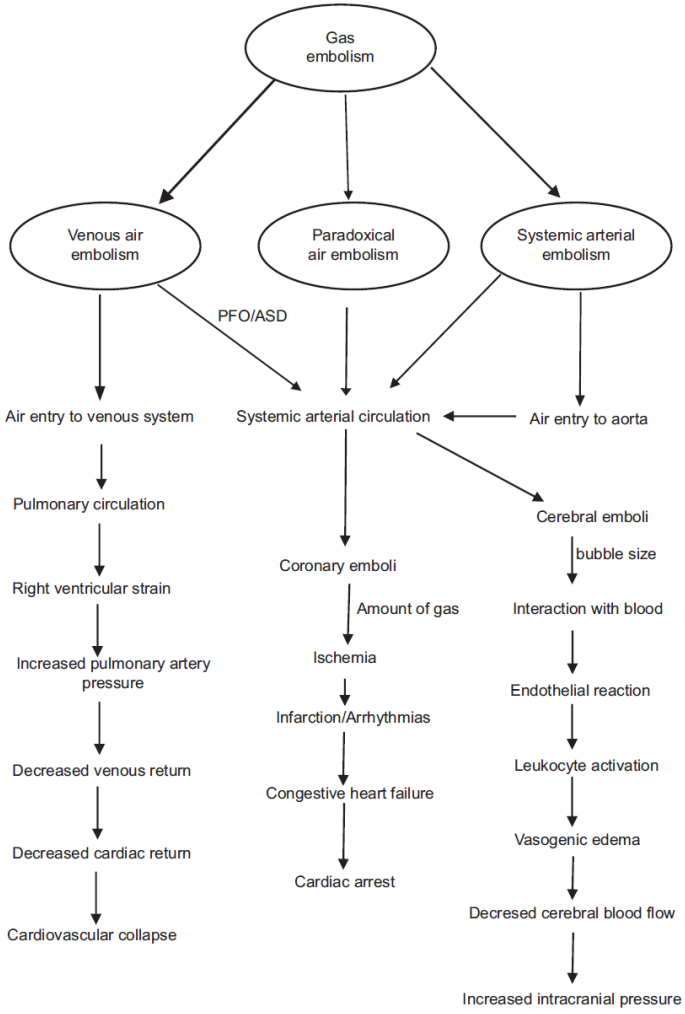
Lubana K. Afreen, BS,* Ayesha S. Bryant, MSPH, MD,* Tetsuzo Nakayama, MD,* Timothy J. Ness, MD, PhD,* Keith A. Jones, MD,* Charity J. Morgan, PhD,† Charles M. Wilcox, MD,‡ and Mark C. Phillips, MD*

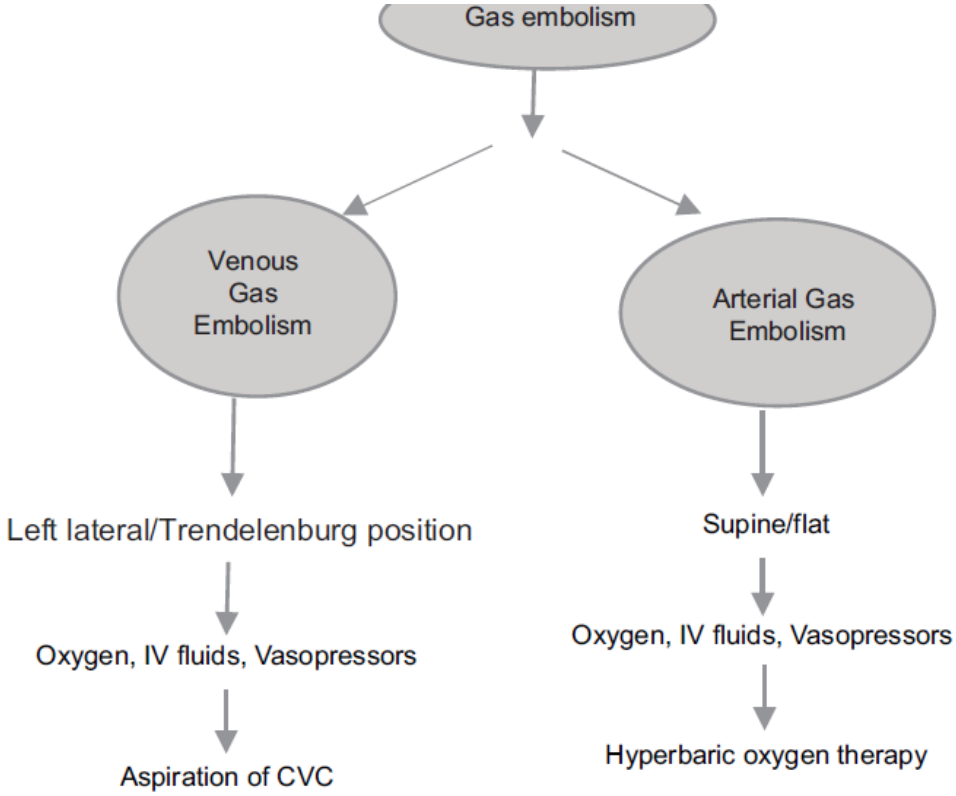
Table 2. VAE Incidence Rates by Procedure

Procedure	VAE[a]	Procedures Performed	Incidence (%)	*P* Value[b]
Stent removal and replacement	8	180	4.4	.052
Initial stent placement	5	354	1.4	.168
Sphincterotomy	7	322	2.2	.821
Gallstone removal	5	214	2.3	.999
Dilation	5	146	3.4	.368
Biopsy	3	60	5.0	.165
Cholangioscopy	3	33	9.1	**.040**
Necrosectomy	1	13	7.7	.270
Stent removal only	0	151	0	-
Diagnostic only	0	49	0	-

Gas embolism during endoscopic retrograde cholangiopancreatography: diagnosis and management

Gandhi Lanke[a], Douglas G. Adler[b]

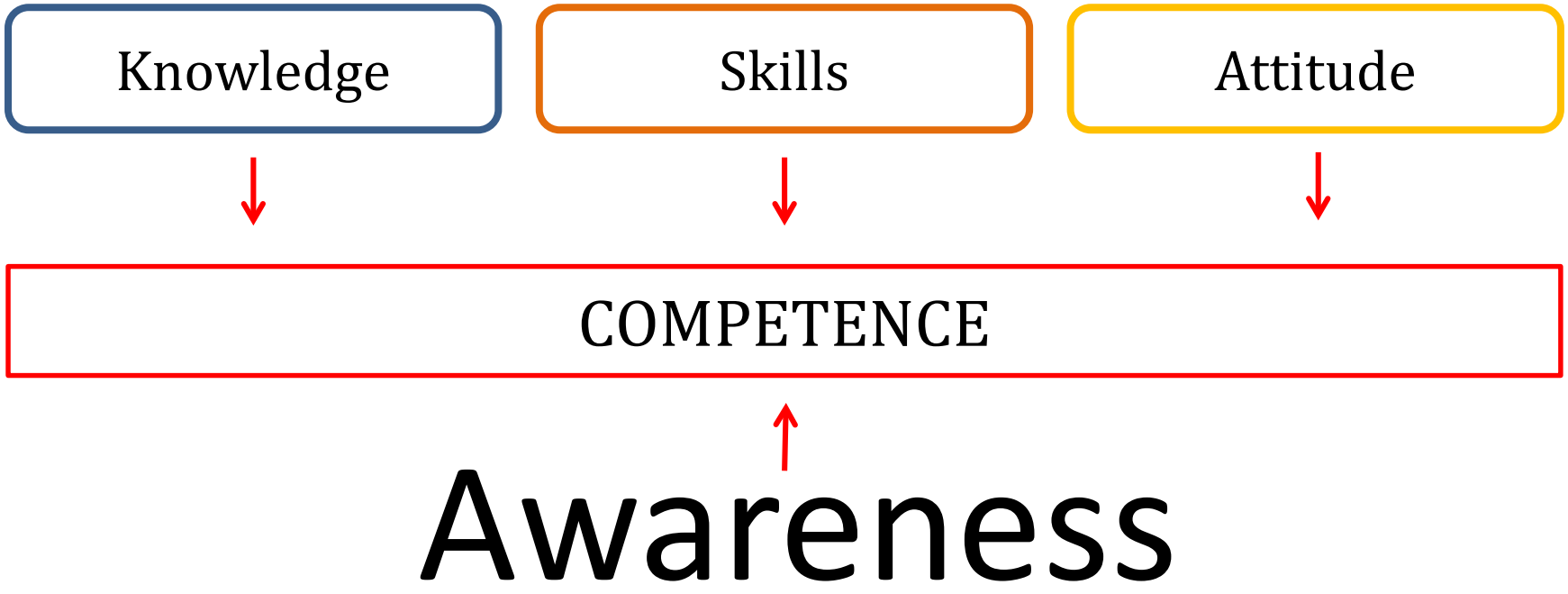




Annals of Gastroenterology (2019) **32,** 156-167

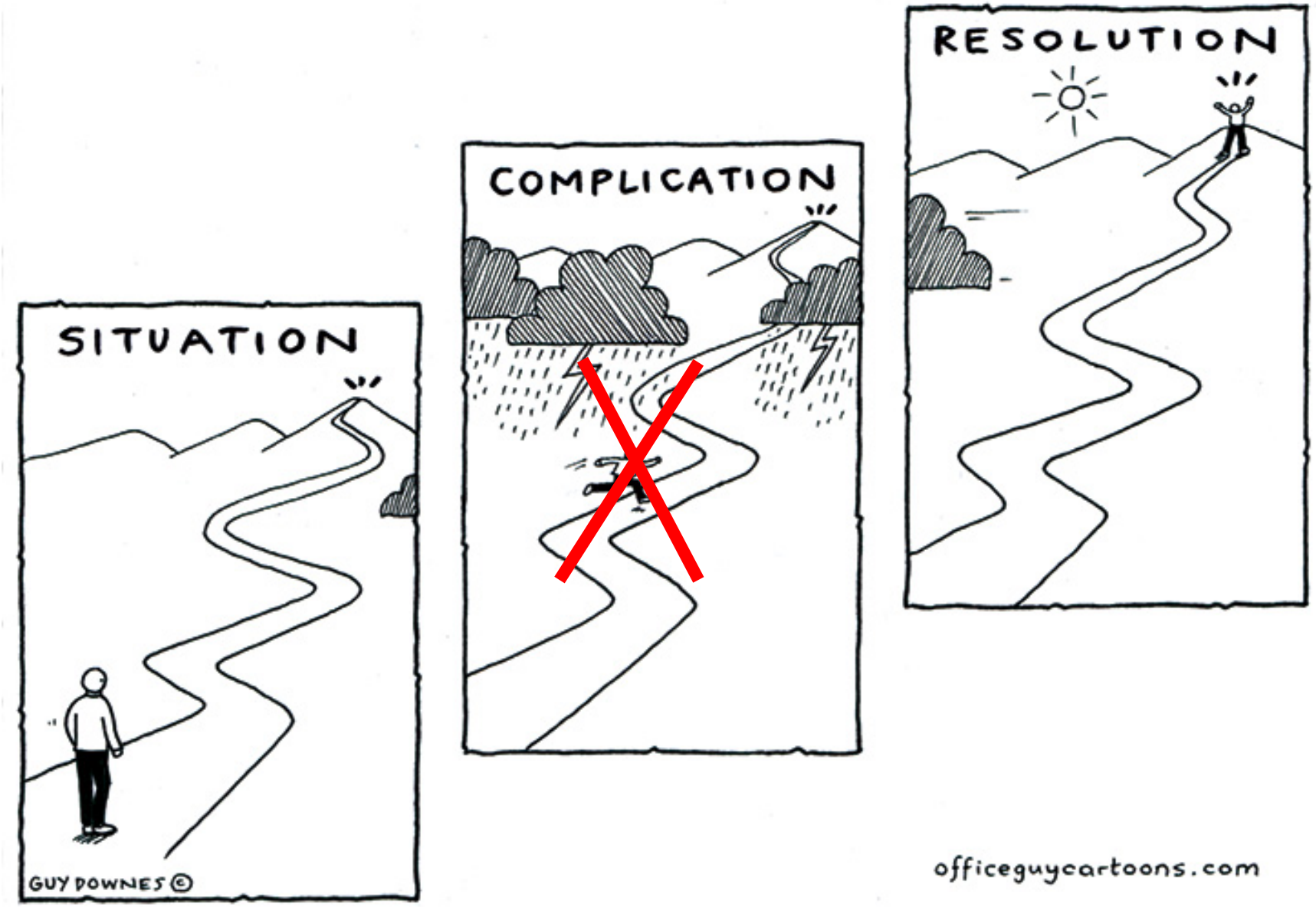
Definition of training

A satisfactory training process must involve



J.R.B. GREEN & THE UK ERCP STAKEHOLDERS

How to manage ERCP complications?



Complications to ERCP

Una scomoda verità ***Una comoda bugia***