COMPLICANZE DELL'ENDOSCOPIA DEL TRATTO DIGESTIVO

PERFORAZIONI E STENOSI

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A comprehensive approach to the management of acute endoscopic perforations (with videos) CME

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The only method to prevent iatrogenic luminal perforation at the time of endoscopy is the avoidance of endoscopic procedures. Luminal perforation is among the most feared adverse events of GI endoscopy, and the rationale for this is multifactorial: (1) it may carry significant mor-

surgery (NOTES), luminal perforation is a component of the procedure that can be readily managed endoscopically.[2] On the other hand, surgical exploration and repair are generally required in patients in whom endoscopic measures are unsuccessful or technically not feasible in

"We don't plan to fail; we just fail to plan."
—Unknown

Algorithm for the Management of Endoscopic Perforations: A Quality Improvement Project

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Perforations are an uncommon but serious complication of endoscopy. Although they are well recognized, no universally accepted strategy for their management exists. The need for management algorithms in situations that call for multiple interventions in a short time, with coordinated effort encompassing multiple providers from different specialties, has long been recognized, but no such clinical care pathway has been developed for the management of endoscopic perforations. Since perforations are uncommon, a predetermined plan of action can streamline

General policy

ESGE recommends that each center implements a written policy regarding the management of iatrogenic perforations, including the definition of procedures that carry a high risk of this complication. This policy should be shared with the radiologists and surgeons at each center.

awareness of the risk factors,

prompt availability

adequate radiological imaging, clinical, endoscopic & surgical competence

relatively rare, **not a completely unpredictable**

detect subtle perforations may result in diagnostic delay. Thus the management team for iatrogenic perforations seems to resemble that of stroke and gastrointestinal bleeding units, where prompt collaboration and availability of required competences has led to better clinical outcomes [5, 6]. The availability of dedicated protocols may also represent a structural quality indicator for the health system.

Endoscopic Iatrogenic Perforation multidisciplinary approach

Reporting

▼

In the case of an endoscopically identified perforation, ESGE recommends that the endoscopist reports: its size and location with a picture; endoscopic treatment that might have been possible; whether carbon dioxide or air was used for insufflation; and the standard report information.

1. ***the "EVENT"***
2. **the CLOSURE ATTEMPT & outcome**
   = better outcomes **=** guide to further interventions
   if no / incomplete (medico-legal issues fears) = delay & worse outcome

3. COMMUNICATION, EARLY
   between providers: DIRECT (no via physicians in training)
   with the familiy and relatives: SINGLE DESIGNED PERSON

Endo Perforation definition

presence of gas or luminal contents outside the GI tract

CLASSIFICATION

endo	timing	
intra	**early (<12-24h)**	**Endo VISIBLE** (most cases) *endo closure*
post	**delayed (>24h)**	**CLINICO-RADIOLOGIC** *surgery*

size, cause … definition not clinically relevant

Perforation
be prepared, always

1. Check Bowel prep or reschedule
2. Remove fluids
   - Suck & drying the operating field segment & upstream and downstream segments,
   - move to non-dependent position (prevent fluid escape) (conscious sedation helps!)
3. Use CO_2
4. Achieve scope stability / good manouvrability
5. Review pt features (demographics, comorbidities, prior surgical procedures)

Iqbal CW, Arch Surg 2008
Byeon JS. Clin Endosc 2013
Raju GS, Saito Y, Matsuda T et al. GIE 2011

Perforation
Endo closure

1. DO NOT PANIC! *for faculty & trainees alike*
2. *TALK to NURSE*
3. *call "expert" operator*

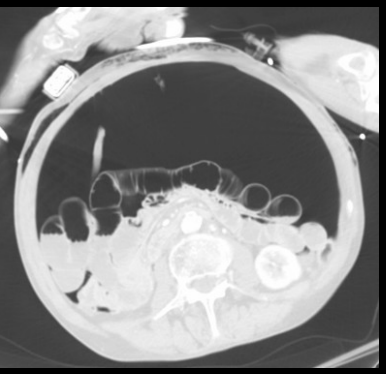
CLOSE **wo delay**
EFFICIENTLY as far as possible

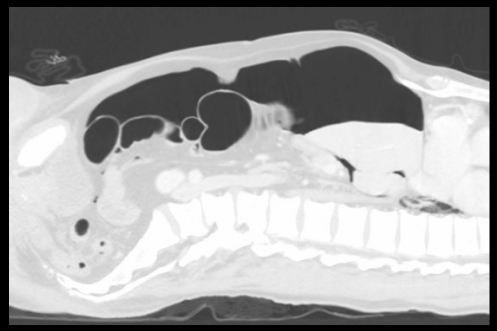
- *Administer anti-peristaltic drugs*
- *expose the base to allow for proper clip placement*
- *inspect, ensure it is tight*

Byeon JS. Clin Endosc 2013
Raju GS, Saito Y, Matsuda T et al. GIE 2011

Perforation: Close & Decompress
Tension Pneumoperitoneum = urgency

http://www.wikiradiography.com





Clinical signs

- dyspnea / shoulder pain
- tympanic rigid abdomen
- hypovolemic shock (compressed vena cava)
- jugular vein congestion

<20% can be managed non-surgically

- 16G-20G venous catheter (plastic sheath)
- 2 cm below the umbilicus in the midline (through the linea alba)
- 5 cm superior and medial to the anterior superior iliac spines

Lin BW. J Emerg Med 2010;
Saito Y. Digestive Endoscopy 2007

Perforation after endo closure conservative management & follow-up

- hospitalization nearly always
- antibiotics IV (1° line: ciprofloxacin and metronidazole)
- nothing by mouth,
- parenteral nutrition in undernourished pts or in well-nourished pts with expected non-alimentation for ≥7 days
- DIVERT luminal contents from esoph, stomach, duodenum
  - *NOT IF CLOSURE HAS BEEN OBTAINED risk of dislodging clips (TTS)*
  - *NOT BLINDLY, under control*
- **CLOSE MULTIDISCIPLINARY MONITORING**

Postop. Perforation clinical presentation

intraop. / early (within 12h... 24h)

- unusual abdominal
- abd. pain + distension,
- chest pain,
- subcutaneous air/crepitus (emphysema)
- shortness of breath,
- hemodynamic instability (hypotension/tachycardia)

high index of suspicion

delayed (>24h)

- systemic inflammatory response,
- acute abd pain (peritoneal irritation); back / flank pain
- hypotension,
- mental confusion

Postop. Perforation
Diagnosis: suspicion + CT scan

WITH oral or rectal water-soluble contrast

NO IV contrast

Kowalczyk L. AJG 2011

Zissin R. Eur J Radiol 2008

Kim DH. Curr Probl Diagn Radiol 2008

TIMING	intraop.: after endoscopy
	postop./delayed: suggestive symptoms/signs
Volume	non proportional to perforation (related to closure)
Site	can dissect into distant spaces
Evolution	pneumoperitoneum: 1 wk but up to several wks

Perforation after endo
timing of surgery = general pt condition

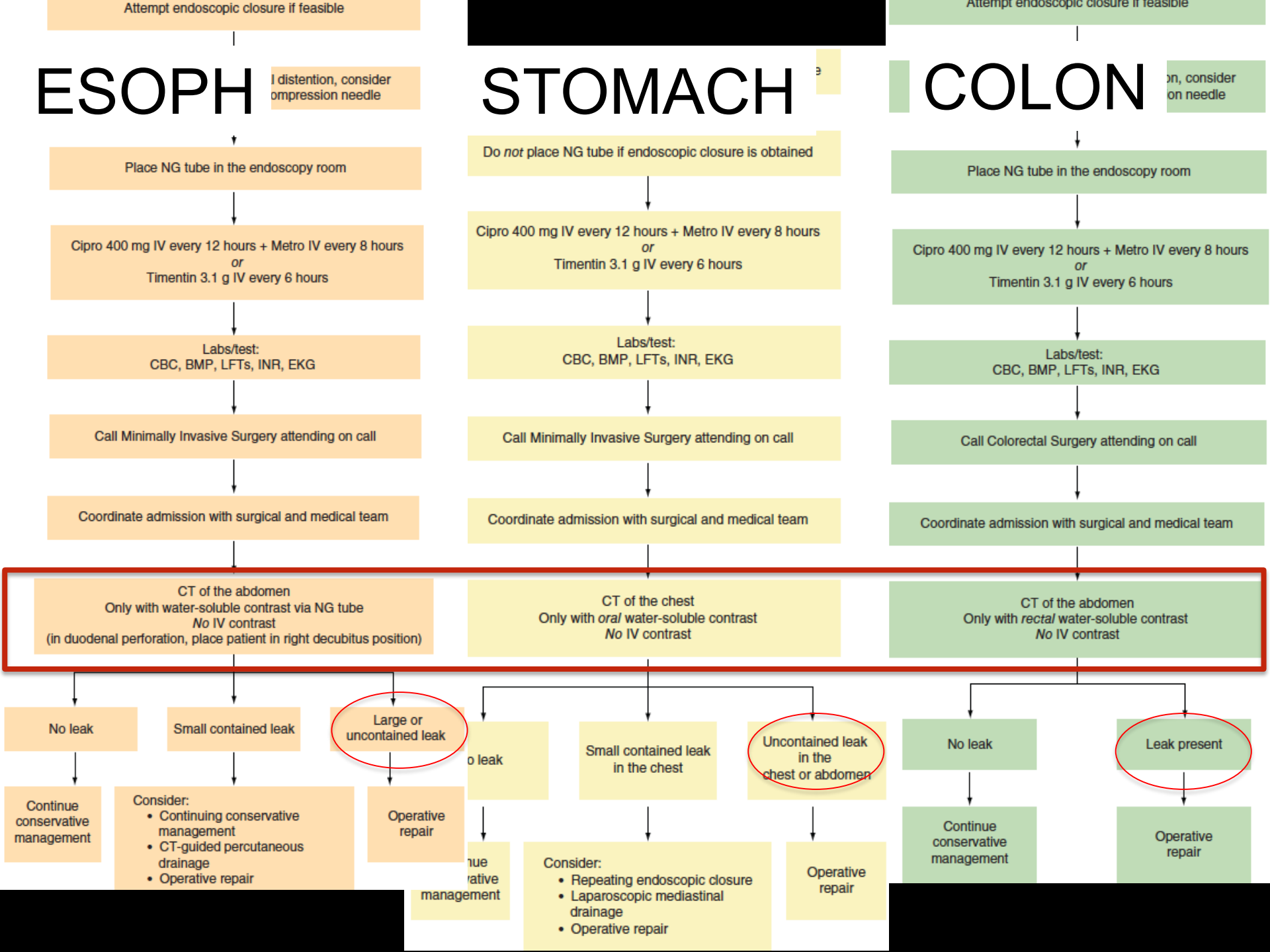
the general clinical condition of the patient. In the case of no or failed endoscopic closure of the iatrogenic perforation, and in patients whose clinical condition is deteriorating, hospitalization and surgical consultation are recommended.

Early surgery preferred if

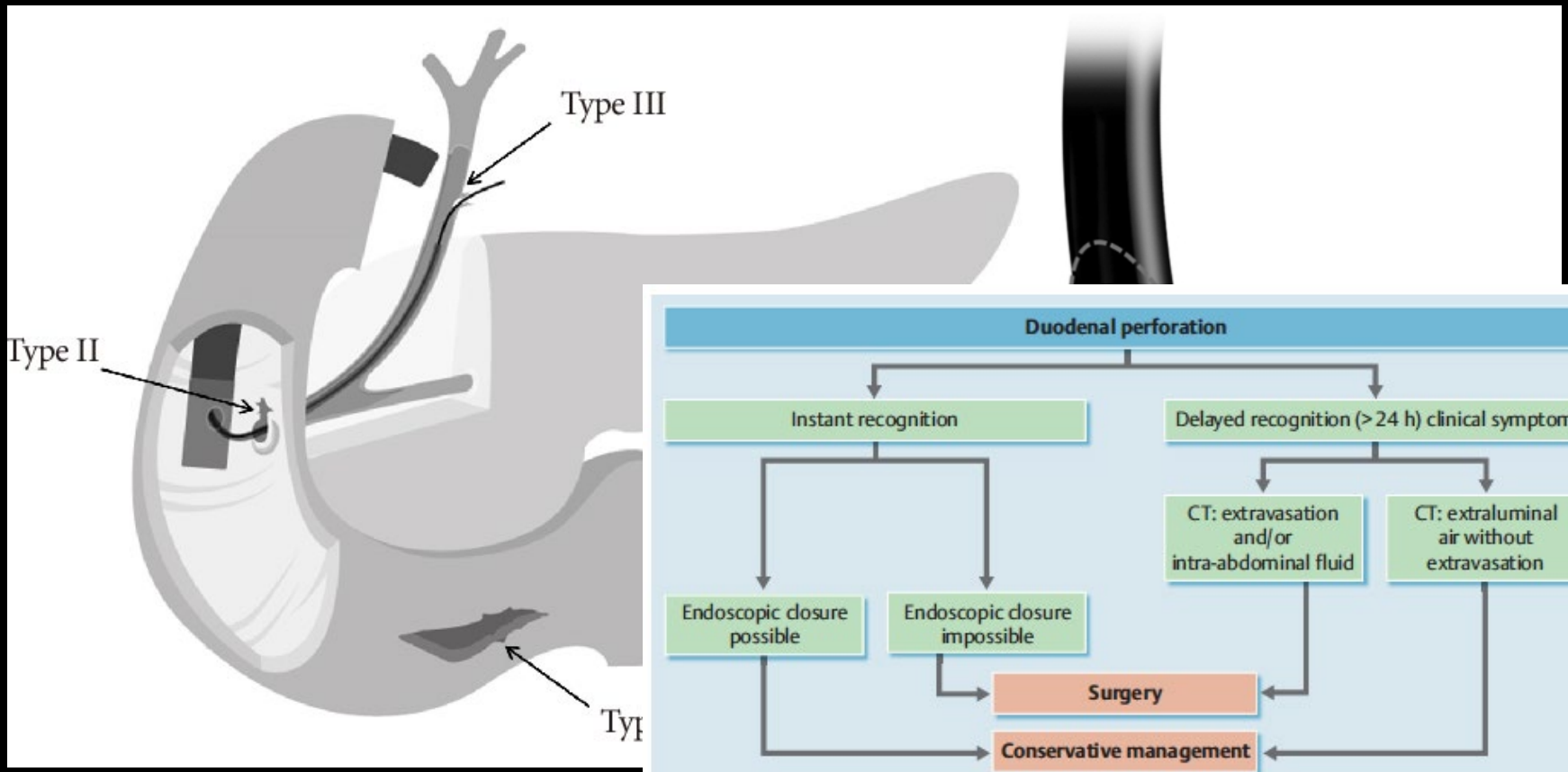
- active leak (increasing volume) after closure
- free fluid
- contrast (water soluble) extravasation

concomitant pathology

- large neoplasm likely to be a carcinoma,
- unremitting colitis,
- perforation complicating an obstructing colonic lesion
- EoE (surgical repair is require in 40% of cases - Runge TM, JCG 2017)


Attempt endoscopic closure if feasible
ESOPH
l distention, consider
ompression needle
Place NG tube in the endoscopy room
Cipro 400 mg IV every 12 hours + Metro IV every 8 hours
or
Timentin 3.1 g IV every 6 hours
Labs/test:
CBC, BMP, LFTs, INR, EKG
Call Minimally Invasive Surgery attending on call
Coordinate admission with surgical and medical team
CT of the abdomen
Only with water-soluble contrast via NG tube
No IV contrast
(in duodenal perforation, place patient in right decubitus position)
No leak
Small contained leak
Large or
uncontained leak
Continue
conservative
management
Consider:
• Continuing conservative management
• CT-guided percutaneous drainage
• Operative repair
Operative
repair
STOMACH
Do not place NG tube if endoscopic closure is obtained
Cipro 400 mg IV every 12 hours + Metro IV every 8 hours
or
Timentin 3.1 g IV every 6 hours
Labs/test:
CBC, BMP, LFTs, INR, EKG
Call Minimally Invasive Surgery attending on call
Coordinate admission with surgical and medical team
CT of the chest
Only with oral water-soluble contrast
No IV contrast
o leak
Small contained leak
in the chest
Uncontained leak
in the
chest or abdomen
ue
rative
management
Consider:
• Repeating endoscopic closure
• Laparoscopic mediastinal drainage
• Operative repair
Operative
repair
COLON
on, consider
on needle
Attempt endoscopic closure if feasible
Place NG tube in the endoscopy room
Cipro 400 mg IV every 12 hours + Metro IV every 8 hours
or
Timentin 3.1 g IV every 6 hours
Labs/test:
CBC, BMP, LFTs, INR, EKG
Call Colorectal Surgery attending on call
Coordinate admission with surgical and medical team
CT of the abdomen
Only with rectal water-soluble contrast
No IV contrast
No leak
Leak present
Continue
conservative
management
Operative
repair

duodenal perforation
lateral wall: Stapfer type I - by the scope itself



Size: Large
Mortality: high
Main risk: Billroth II gastrectomy

Avgerinos DV. Surg Endosc 2009

delayed perf. g-ESD

Author, year	Patients	Lesions	Delayed perforation cases (%)	Emergency surgery cases (%)
Onozato (2016)[98]	160	171	1 (0.6)	0 (0)
Uedo (2007)[65]	143	143	1 (0.7)	ND
Kato (2011)[113]	468	468	2 (0.43)	2 (100)
Hanaoka (2010)[114]	1159	1329	6 (0.45)	5 (83.3)
Yoo (2012)[108]	729	823	1 (0.12)	1 (100)
Ohta (2012)[102]	1500	1795	1 (0.06)	1 (100)
Kosaka (2014)[122]	438	438	1 (0.2)	1 (100)
Chinda (2015)[123]	307	318	1 (0.3)	ND
Miyagi (2015)[124]	22	2730	1 (0.04)	ND
Suzuki (2015)[115]	4943	4943	7 (0.1)	3 (42.9)
Sumiyoshi (2017)[125]	177	209	1 (0.6)	1 (100)
Yamamoto (2017)[126]	1158	1199	5 (0.42)	0 (0)

1329 g-ESDs

delayed perf **6 (0.45%)**

upper third/ lesser curvature 5

emergency surgery **5 (83%)**

probably due to:

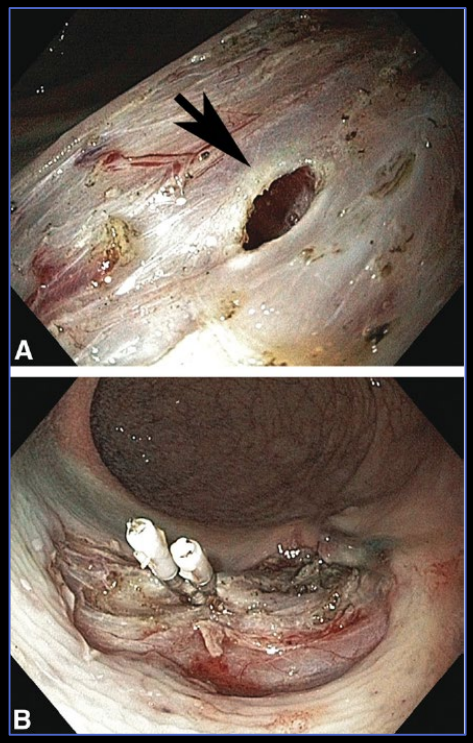
1) Ischemic damage
2) increased thermic coagulation

PREVENTION?

NGT for decompression (24 hrs)

Hanaoka N, et al. Endoscopy 2010

Endoscopic Closure Techniques
size does matter



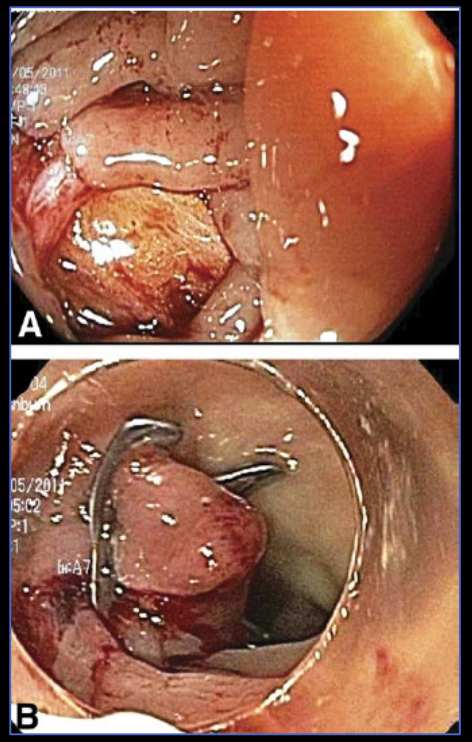
TTS clip

from 3 to 25 defects

limits: limited wingspan
fibrotic tissue

Qadeer MA. GIE 2007

Daram SR. Surg Endosc 2013



OTS clip

<20 mm Esoph.

5-20 mm Stomach

up to 30 mm Colon

Voermans RP. CGH 2012

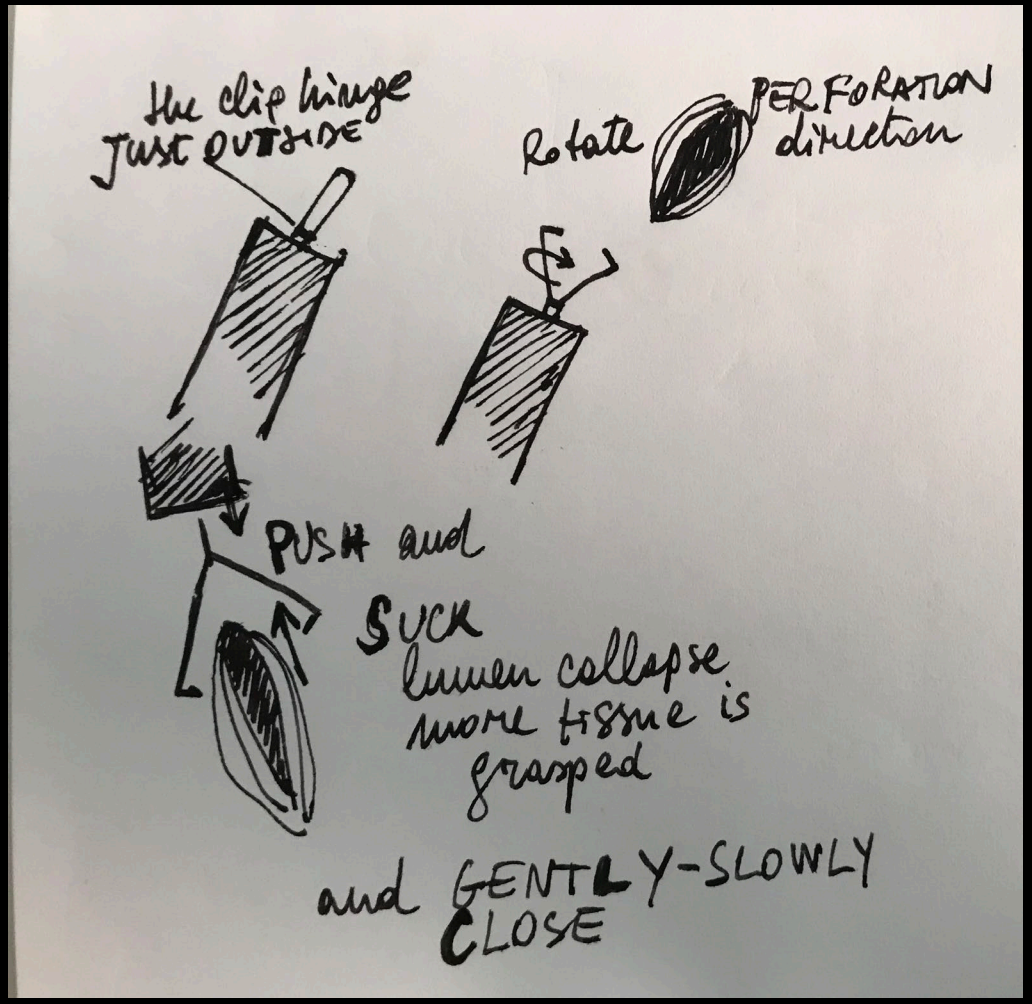
g-Perforations
TTS clip

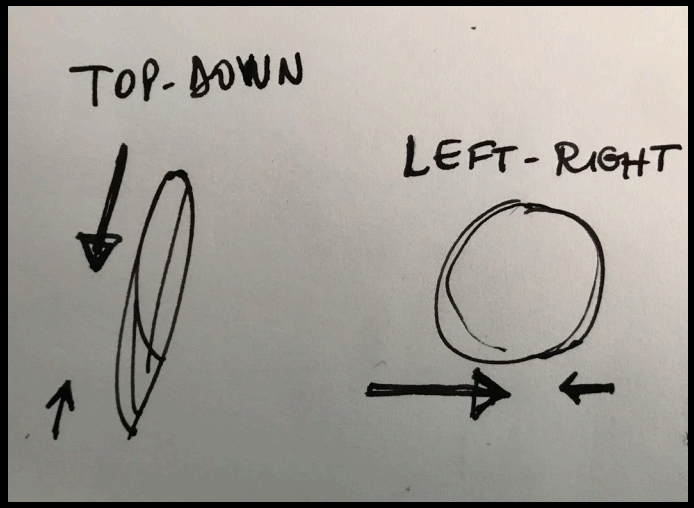
First author, year	Type	n	Pathologies	Technique	Success rate	Others
Binmoeller, 1993 [98]	Case report	1	Leiomyoma	TTS clipping	100%	–
Albuquerque, 2004 [99]	Case report	1	Adenoma	TTS clipping	100%	–
Katsinelos, 2004 [100]	Case report	1	Adenoma (HGD)	TTS clipping	100%	–
De Caro, 2009 [101]	Case report	1	Adenocarcinoma in situ	TTS clipping	100%	–
Kim, 2000 [102]	Case report	1	Adenocarcinoma in situ	TTS clipping	100%	–
Tsunada, 2003 [76]	Retrospective, case series	7	Early gastric cancer	TTS clipping (6) Omental patch (1)	100%	1 large defect
Fujishiro, 2006 [18]	Retrospective, case series	11	Early gastric cancer	TTS clipping	100%	Mean discharge time 12.1 days
Minami, 2006 [63]	Retrospective	121	Early gastric cancer	– < 1 cm: TTS clipping – > 1 cm: omental patch	98.3%	2 surgeries
Total	–	144		–	> 99%	For defects < 10 mm

& OTS clip

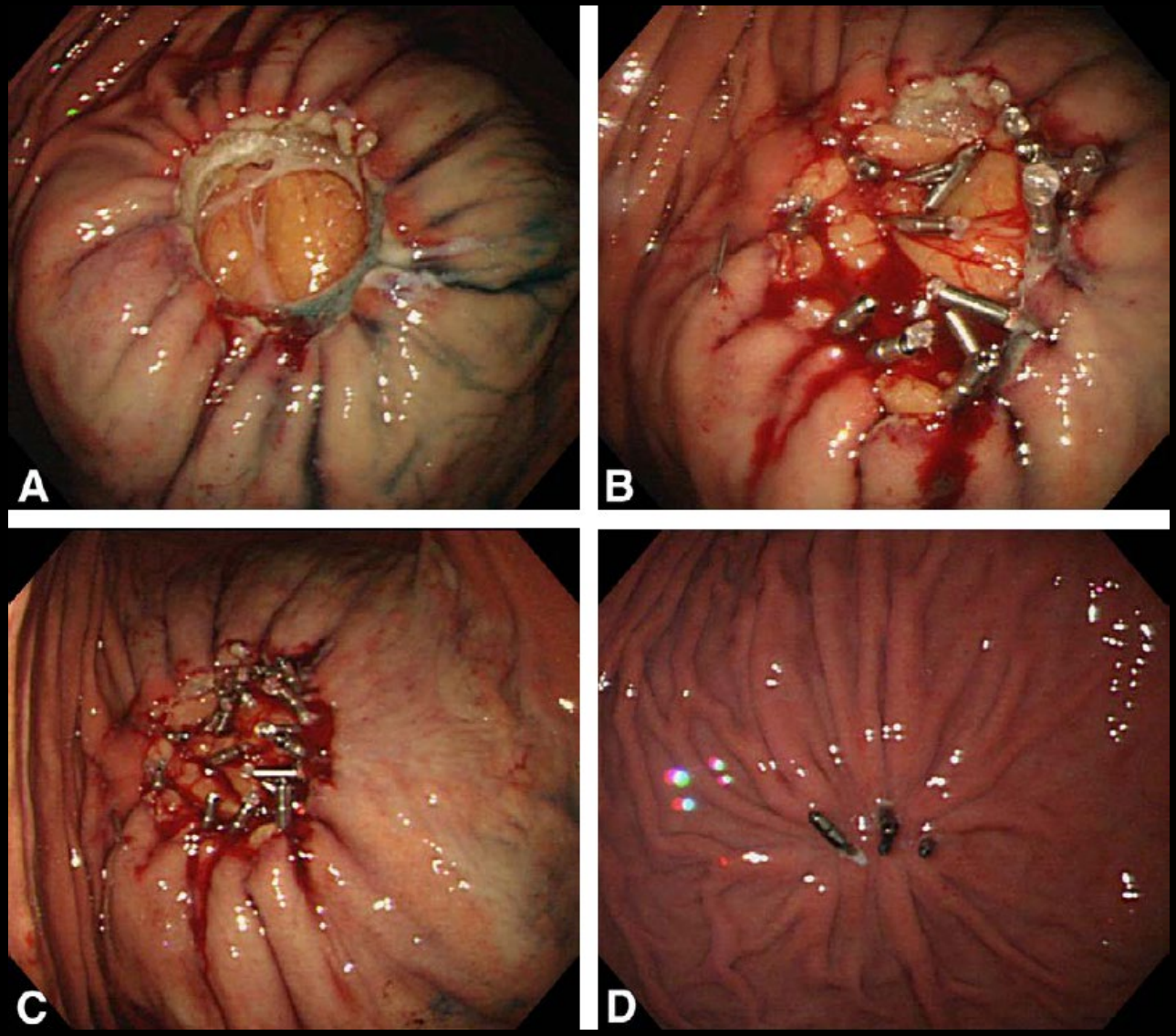
First author, year	Type	n	Perforation cause	OTSCs, n	Success rate	Size
Baron, 2012 [71]	Retrospective	2	Iatrogenic	2	100%	–
Kirschniak, 2011 [70]	Retrospective	7	Iatrogenic (1 ESD)	7	100%	–
Voermans, 2012 [2]	Prospective	6	Iatrogenic: ESD, EMR, EUS	6	100%	< 30 mm
Nishiyama, 2013 [72]	Retrospective	7	Iatrogenic: ESD, scope/ulcer	13	86% (6/7)	Mean diameter 30 mm 1 failure, 50 mm
Total		22	Iatrogenic	28	95%	For 10-mm to 30-mm defects

TTS clip
standard technique

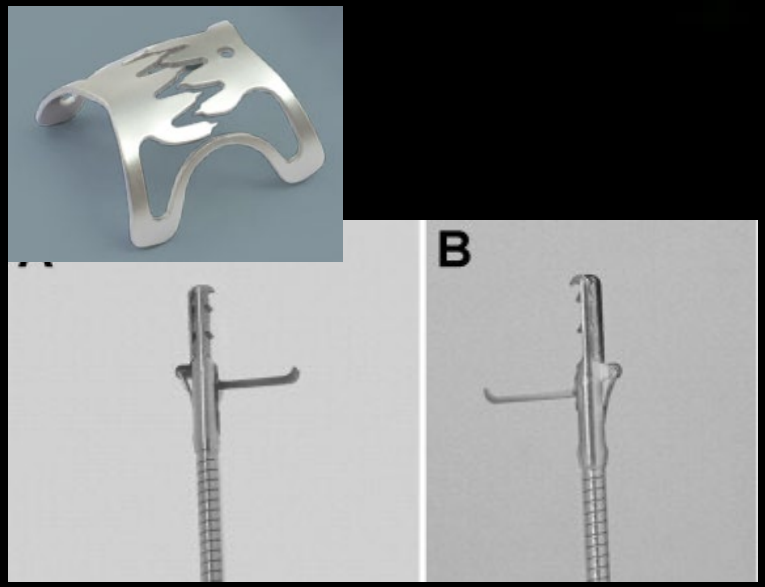




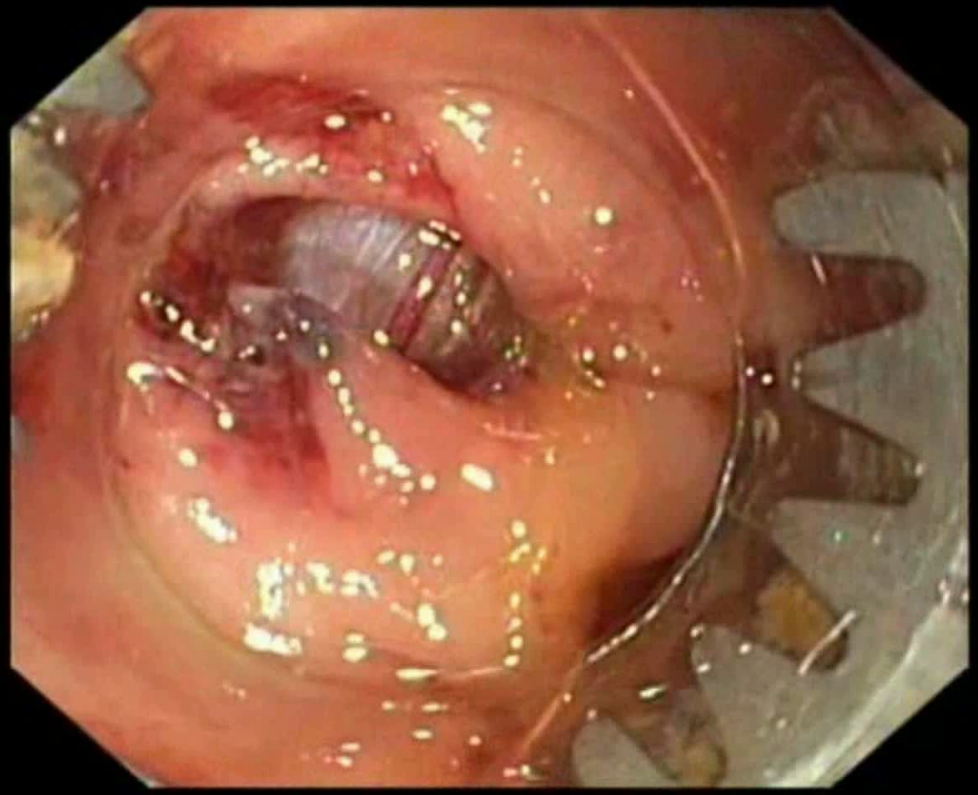
TTS clip
Omental-patch closure



OTS clip



Location	n.	Successful closure (%)
Esophagus	5	5 (100)
Stomach	6	6 (100)
Duodenum	12	9 (75)
Colon	13	12 (92)



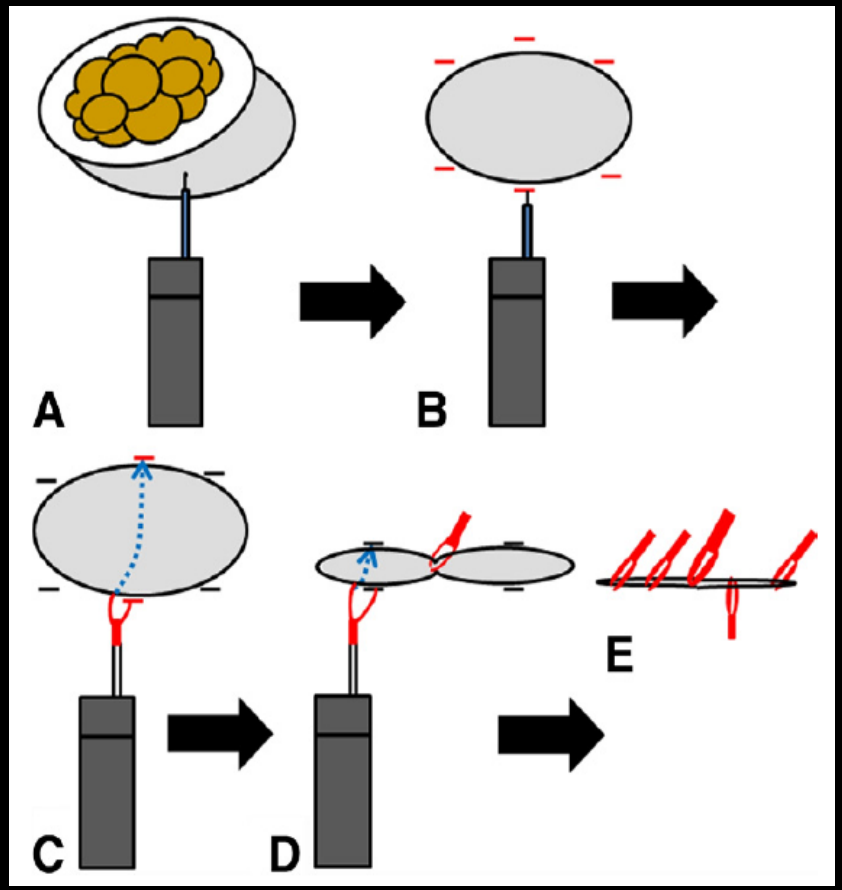
Voermans RP, et al. CGH 2012

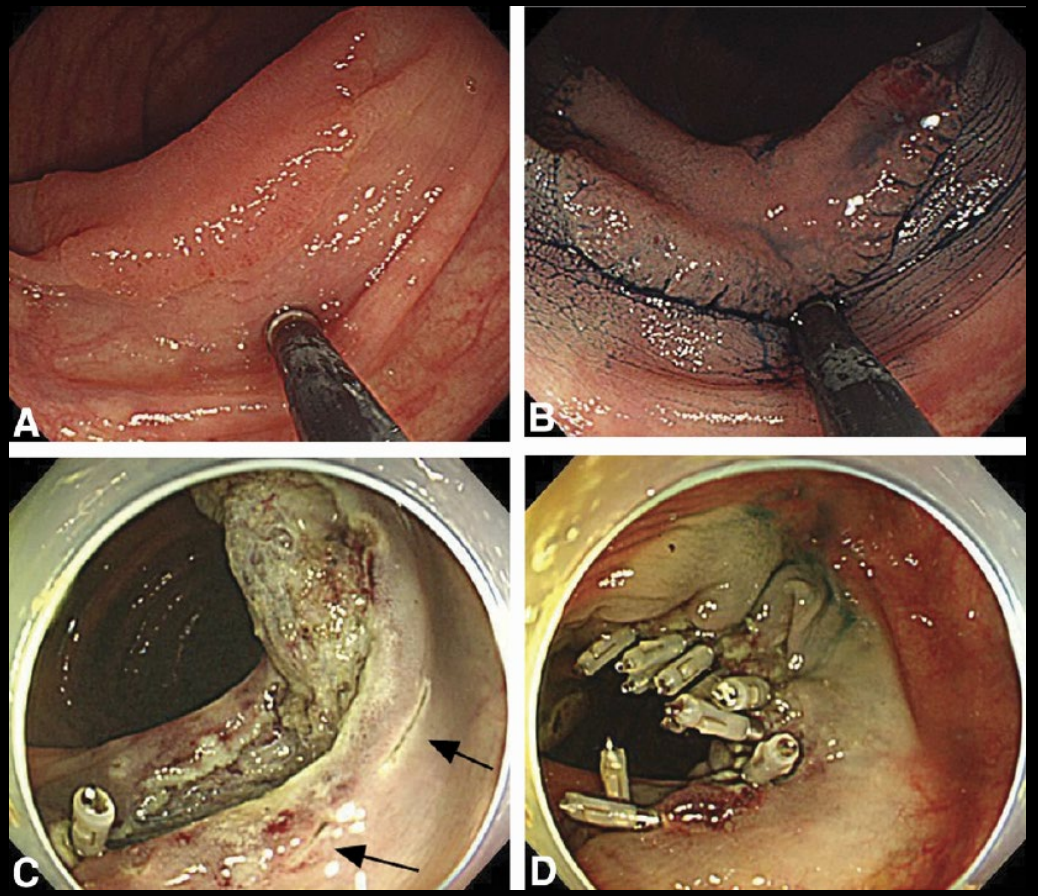
perforations
large >20 mm

possibilities

- **clips + *assistance***
- **stents**
- **suturing devices**

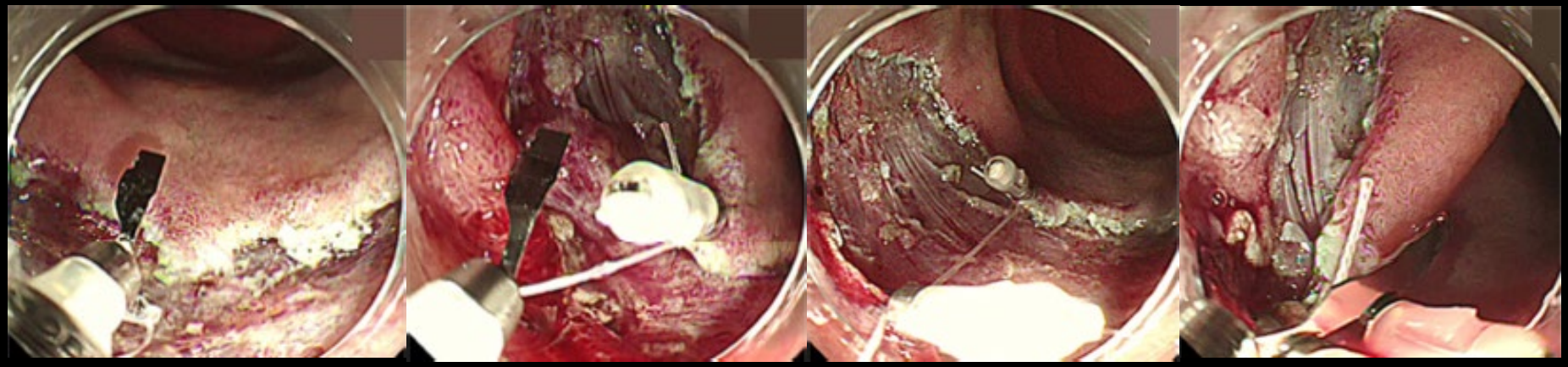
Artificial ulcer closure
m incisions for a better & stable clip grip

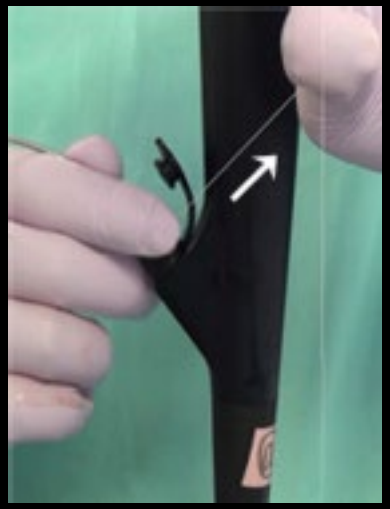




Otake Y, et al. GIE 2012

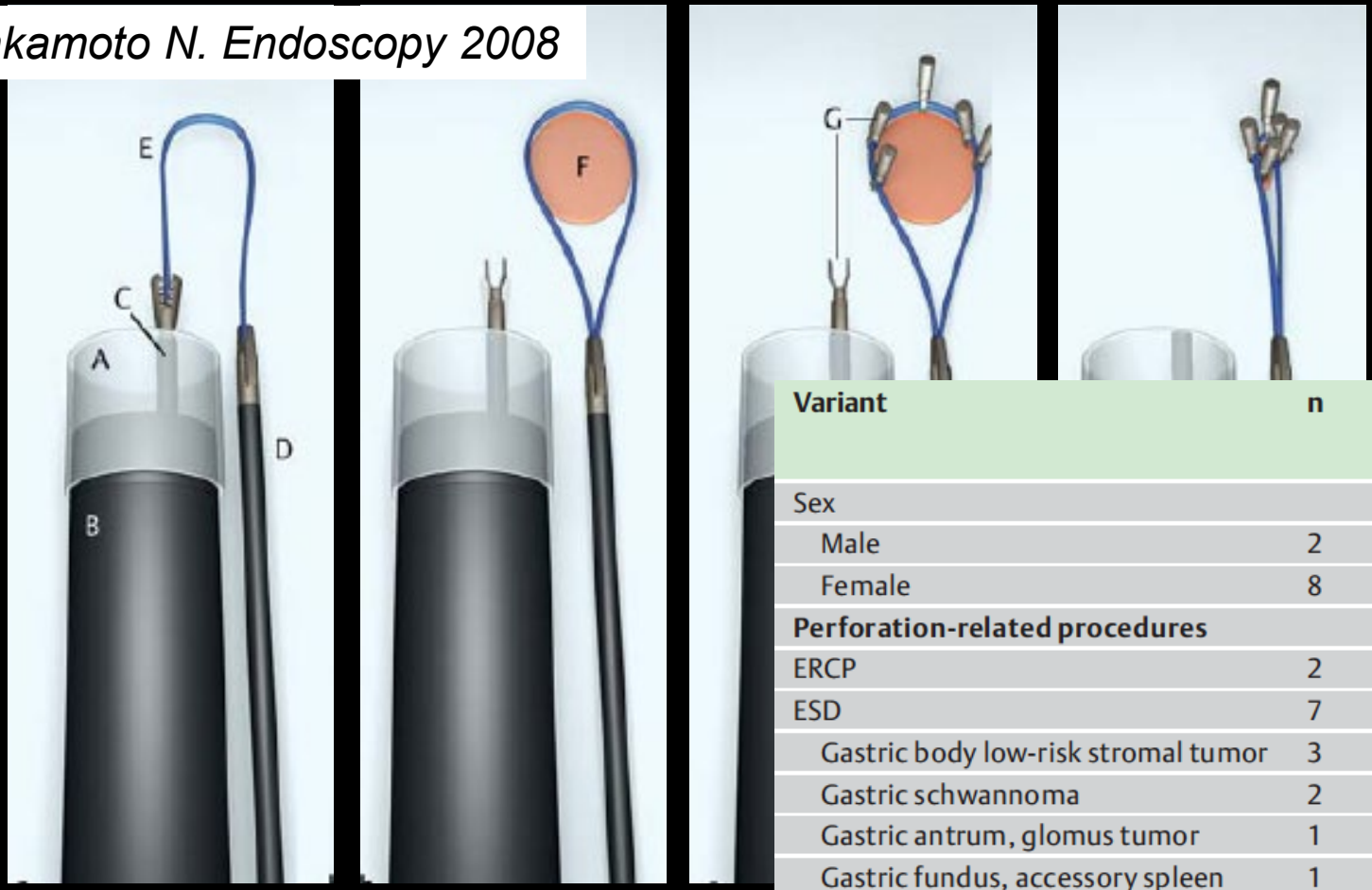
clip&string closure





loop&clips closure with a 1-channel endoscope

Sakamoto N. Endoscopy 2008



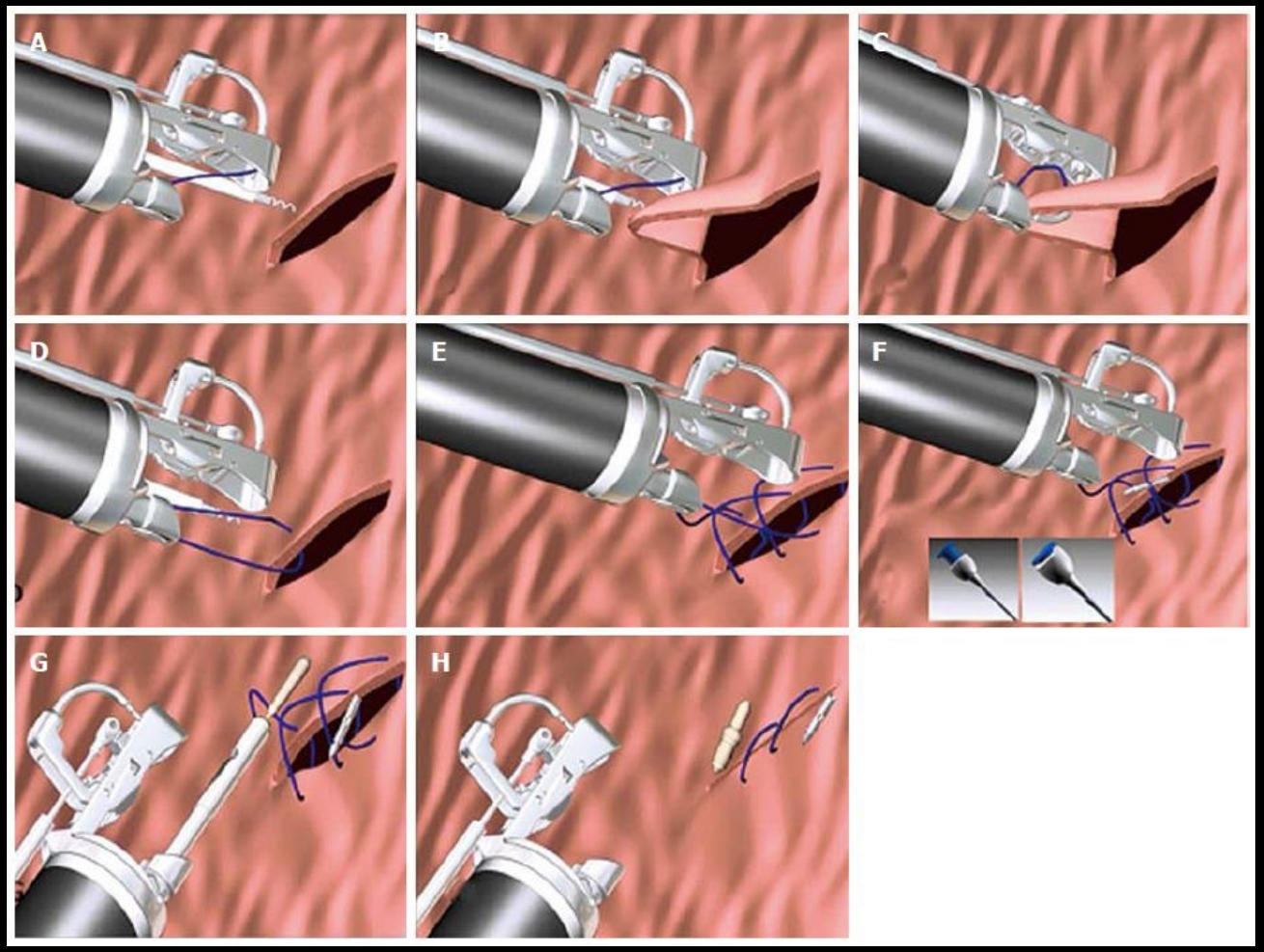
Variant	n	Diameter of perforations, cm
Sex		
Male	2	
Female	8	
Perforation-related procedures		
ERCP	2	2.5, 3.0
ESD	7	
Gastric body low-risk stromal tumor	3	2.5, 3.0, 2.5
Gastric schwannoma	2	2.5, 4.0
Gastric antrum, glomus tumor	1	3.0
Gastric fundus, accessory spleen	1	2.5
Anesthesia colonoscopy	1	2.5

Zeng CY. Endoscopy 2015

Stent e-perforations

First author, year	Study design	Type of treatment	Patients, n	Technical success, %	Clinical success, %	Complications, %	Mortality, %
Eroglu, 2009 [78]	Retrospective	SEMS	4	100	n.a.	0	0
Freeman, 2009 [79]	Prospective	SEPS	19	100	89	24	0
Salminen, 2009 [80]	Retrospective	SEMS	8	100	75	25	37.5
Amrani, 2009 [81]	Prospective	SEMS	2	100	100	0	0
Leers, 2009 [82]	Prospective	SEMS	9	100	n.a.	n.a.	<6
Kiernan, 2010 [83]	Retrospective	SEMS	8	100	75	n.a.	12
Vallböhmer, 2010 [59]	Retrospective	SEMS	12	100	n.a.	8	0
Van Heel, 2010 [55]	Prospective	SEMS/SEPS	31	100	97	33	21
Schimdt, 2010 [84]	Retrospective	SEMS + endoclip	21 + 1	100	n.a.	n.a.	<13.3
Swinnen, 2011 [85]	Retrospective	SEMS	23	100	n.a.	n.a.	n.a.
Làzàr, 2011 [86]	Retrospective	Endoclip	1	100	100	0	0
Dai, 2011 [87]	Prospective	SEPS	5	n.a.	83	n.a.	n.a.
D'Cunha, 2011 [88]	Retrospective	SEMS/SEPS	15	95	60	13	6.7
Baron, 2012 [71]	Retrospective	Novel OTSC	1	100	100	0	0
Lin, 2014 [89]	Retrospective	Mesh-covered stents	9	100	n.a.	4	55.6
Biancari, 2013 [90]	Retrospective	Unspecified stents + endoclips	11 + 1	100	n.a.	25	46
Wilson, 2013 [91]	Retrospective	SEMS	7	100	n.a.	n.a.	n.a.
Wahed, 2013 [92]	Retrospective	Unspecified stent	2	100	0	n.a.	100
Voermans, 2012 [2]	Prospective, multicenter	OTSC	5	100	100	0	0
Schweigert, 2013 [93]	Retrospective	SEMS/SEPS	13	100	15	85	15
Sato, 2013 [94]	Retrospective	Endoclip	1	100	100	0	0
Heits, 2014 [95]	Prospective	Vacuum therapy	10	100	90	20	10
Hadj, 2012 [96]	Retrospective	OTSC + SEMS	1	100	100	0	0
Biancari, 2014 [97]	Retrospective	SEMS/endoclips	67	100	15	34	19.4

suture
Overstitch, Apollo



endoscopic approach to perforation

be Prepared to Close
or
Refer to Avoid

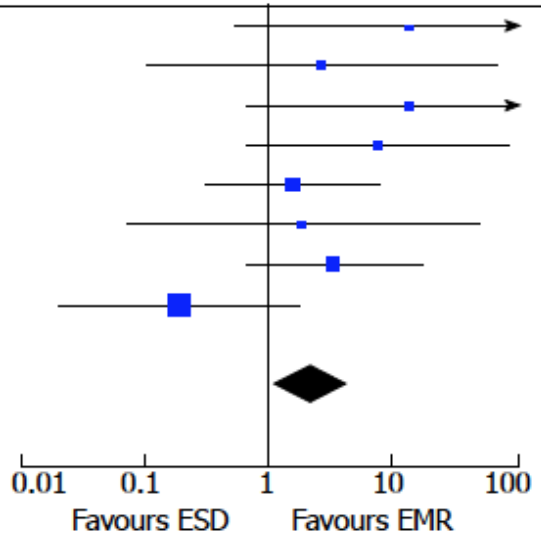
- risk factor: procedure related
- experience: operator / center related

e-perf: EMR vs. ESD

Study or subgroup	ESD Events	ESD Total	EMR Events	EMR Total	Weight	Odds ratio M-H, fixed, 95%CI
Ishihara 2008	1	31	0	140	1.7%	13.82 [0.55, 347.43]
Jung 2008	1	37	0	32	4.9%	2.67 [0.11, 67.89]
Konishi 2012	3	56	0	105	3.1%	13.80 [0.70, 272.14]
Kubota 2010	2	36	1	131	3.9%	7.65 [0.67, 86.86]
Takahashi 2010	3	116	3	184	21.6%	1.60 [0.32, 8.07]
Teoh 2010	1	22	0	13	5.5%	1.88 [0.07, 49.67]
Urabe 2011	6	79	2	83	17.2%	3.33 [0.65, 17.01]
Yamashita 2011	1	71	4	56	42.1%	0.19 [0.02, 1.71]
Total (95%CI)		448		744	100.0%	2.19 [1.08, 4.47]
Total events	18		10			

Heterogeneity: $\chi^2 = 8.90$, $df = 7$ ($P = 0.26$); $I^2 = 21\%$

Test for overall effect: $Z = 2.16$ ($P = 0.03$)



1-8% 0-6%

e-perf: resection risk factors

SCC by ESD in japan

156 neo in 147 pts

perforation in 9 (6%)

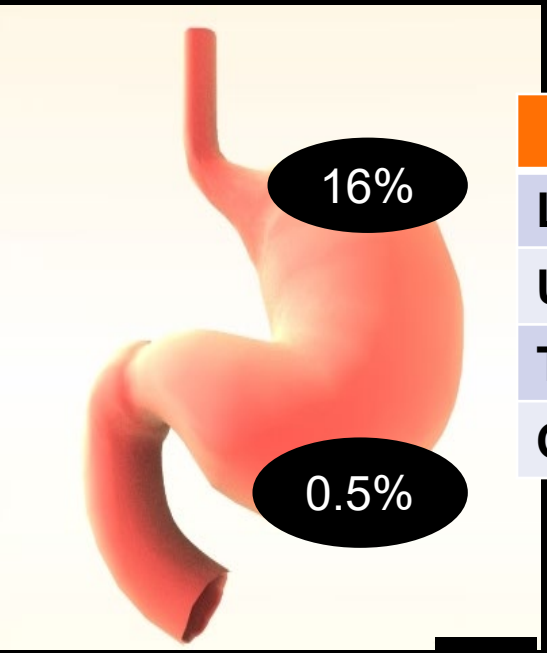
- 6 closed by clips
- 2 drainage of pleural effusions
- surgery 0

- size >75% circumf — OR =7.37; *P* = 0.016
- Early treatment periods — OR=4.04; P<0.01
- low volume institutions — OR=3.03; P =0.045

Tsujii. Endoscopy 2015

Perforation at endoscopic resection of gastric neoplasms

EMR (Kojima T. GIE 1998)	0.5%
ESD (Minami S. GIE 2006)	5%



	adj-OR	P	OR	P
	retrospective single center n. ESDs 1795 **Perforation 3%**		retrospective single center n. ESDs 823 **Perforation 10%**	
Location: upper area	2.4	.006	7.1	.005
Ulcer / fibrosis	1.1	.86	2.6	.023
Tumor > 20 mm	1.9	.04	n.s.	
Op.-time >2 hrs	n.a.		4.0	.020
	Ohta T, et al. GIE 2012		Yoo JH, et al. Surg Endosc 2012	

ESD for trainees

Hirasawa K, et al. Dig Endosc 2012

Predicted non-curability rates

	Non-ulcerative tumor			Ulcerative tumor		
Tumor location / Tumor size	Lower location	Middle location	Upper location	Lower location	Middle location	Upper location
≤ 20 mm	4.7	7.0	11.7	11.4	16.4	25.7
20 – 30mm	9.9	14.3	22.8	22.3	30.3	43.4
> 30 mm	23.0	31.1	44.5	43.7 *	54.1 *	67.7 *

EMR difficulty
SMSA levels

	SMSA 2+3 (score 6-12) %	SMSA 4 (score >12) %	p
complete initial resection	92* - 98	**83* - 87**	**0.009**
residual/recurrence at 1st FU	98	**79**	**0.001**
perforation & bleeding	0 - 4.5*	**9 - 10***	**0.007**
post polypectomy syndrome	2.5	2.9	n.s.
cancer	11	9	n.s

Longcroft-Wheaton G. DCR 2013 – *lesions: n. ; size >20 mm*

* Sansone S. DLD 2017 – *lesions: n. ...; size*

RECOMMENDATION

ESGE recommends careful lesion assessment prior to EMR to identify features suggestive of poor outcome. Features associated with incomplete resection or recurrence include lesion size >40 mm, ileocecal valve location, prior failed attempts at resection, and size, morphology, site, and access (SMSA) level 4. (Moderate quality evidence; strong recommendation.)

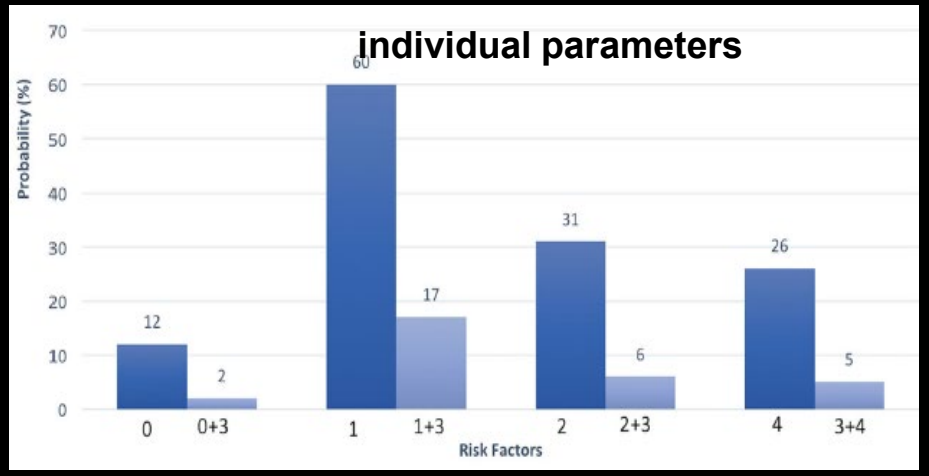
Ferlitsch M. ESGE Guidelines Endoscopy 2017

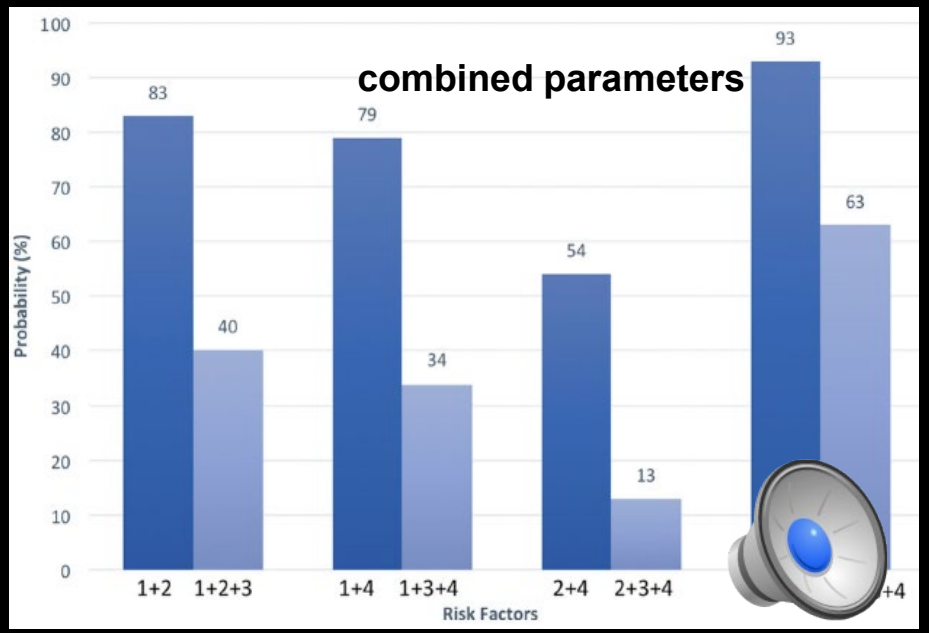
EMR difficulty / Incomplete R % "experience" impact

retrospective, 10 year period
neoplasms: n. 269; size >10 mm

Expert definition:
- who receive tertiary referrals for difficult cases,
- >20 cases >10 mm within the study period

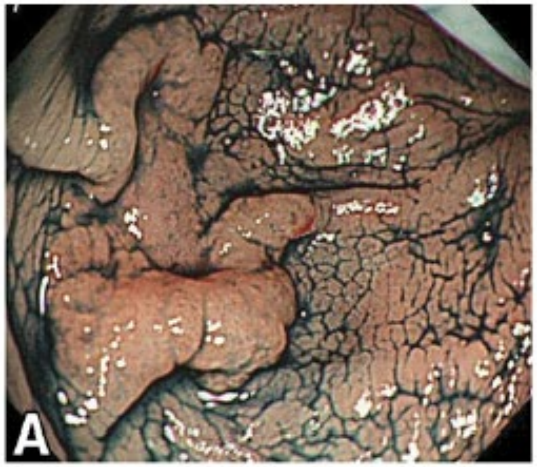
Parameters	OR (95% CI)
1. difficult lifting	11.0 (2.7-45.3)
2. size ≥40 mm	3.3 (1.4-7.9)
3. expert endoscopist	0.1 (0.04-0.42)
4. flat/LST morphology	2.6 (1.2-5.5)

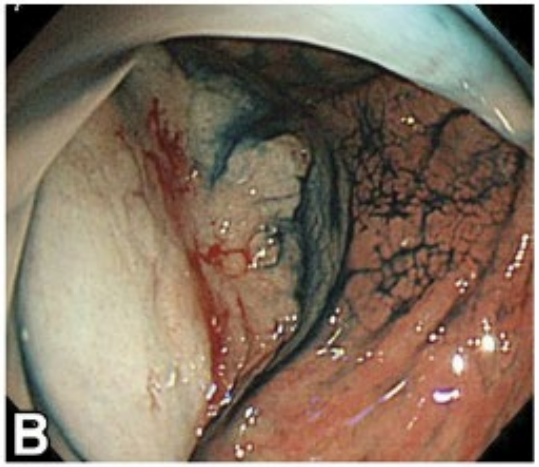




Tavakkoli A. DDS 2017

perforation is predictable





Colorectal endoscopic submucosal dissection: predictors and neoplasm-related gradients of difficulty

Endosc Int Open 2017

Federico Iacopini[1], Yutaka Saito[2], Antonino Bella[3], Takuji Gotoda[4], Patrizia Rigato[5], Walter Elisei[1], Fabrizio Montagnese[1], Giampaolo Iacopini[6], Guido Costamagna[7]

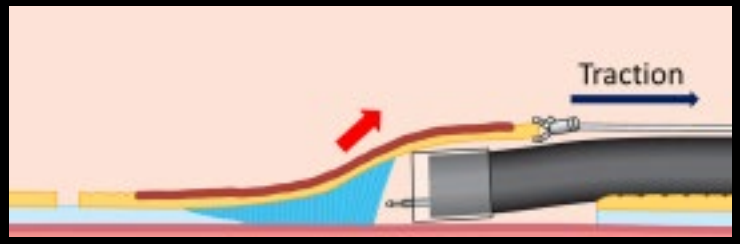
Difficulty Assessment Chart
probabilities of difficult **colon ESD**

Morphology / Experience	Scar negative			Scar positive		
	LST-G	Sessile	LST-NG	LST-G	Sessile	LST-NG
≤90	<0.7	<2.3	<19.7*	<7.8	<22.8*	<47.0*
91-120	<0.2	<0.6	<1.9	<2.3	<7.5	<19.6*
>120	<0.1	<0.4	<1.3	<1.6	<5.3	<14.3

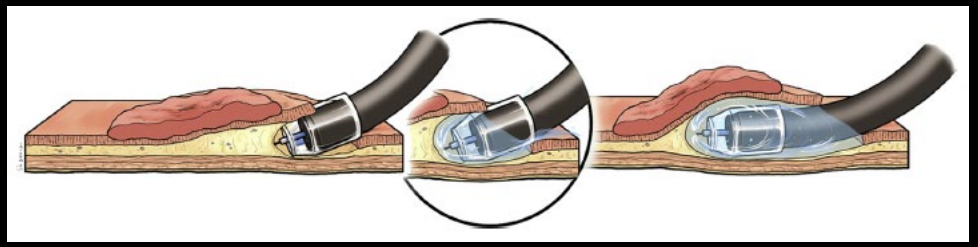
**, variable with size*

traction-assisted ESD

dental floss & clip: *esoph & stomach*



pocket creation method: *colon*

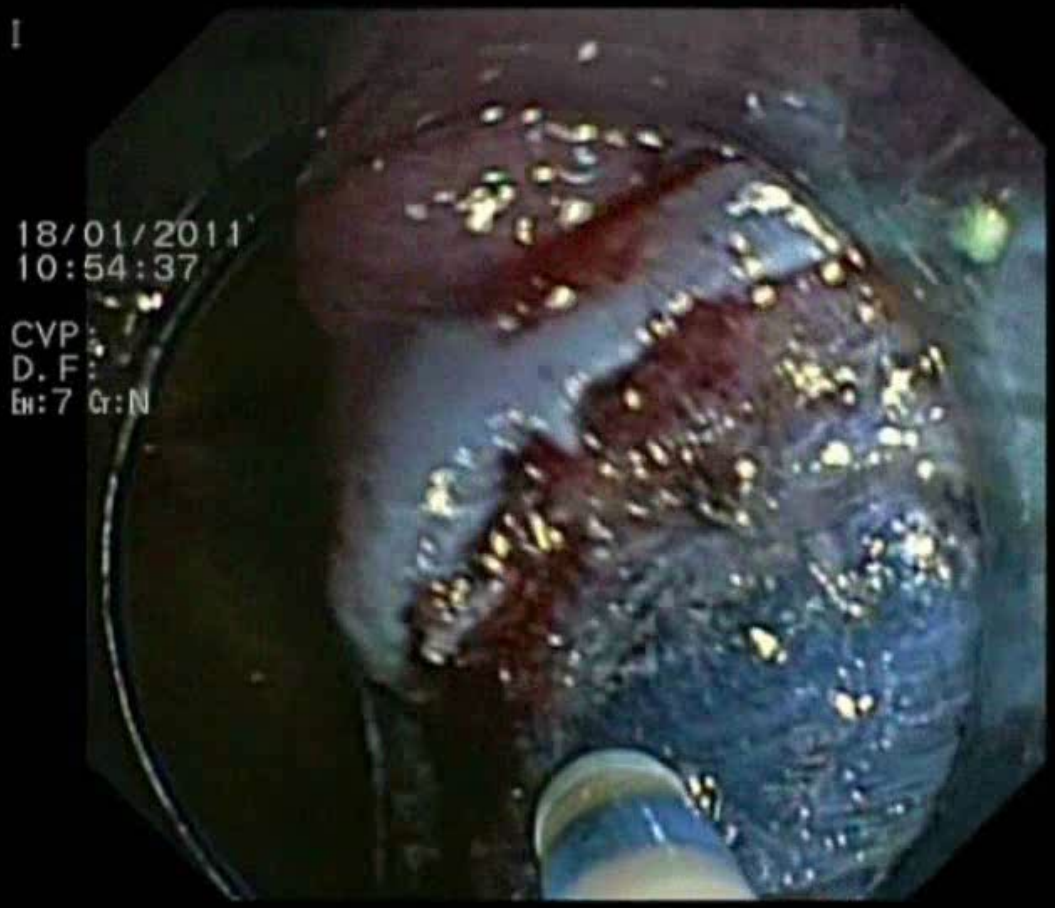


faster easier **safer** (also for trainees)

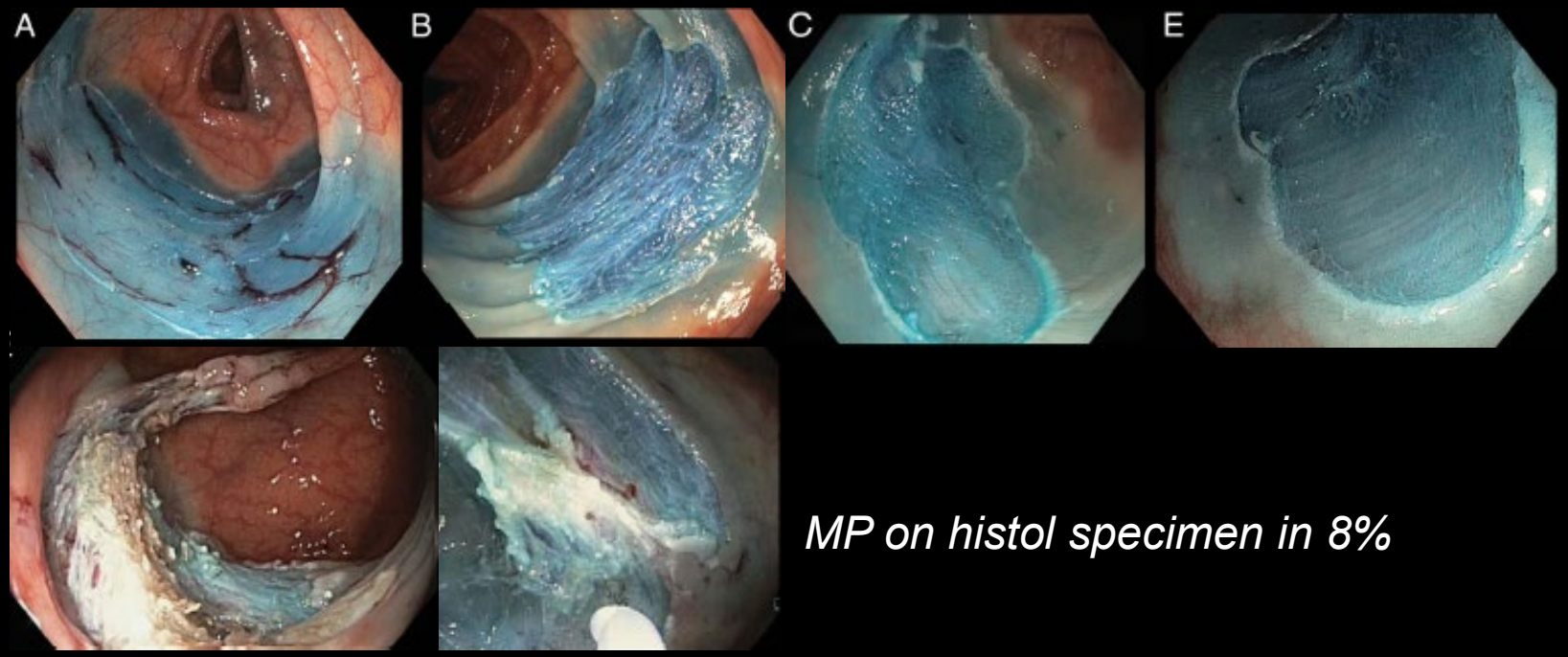
RCT

- gastric (310 pts/group): CONNECT-G study. Yoshida M. GIE 2018
- esoph (117 pts /group): CONNECT-E study. Yoshida M. GIE 2019
- colon (42 pts /group) Yamasaki Y. Dig Endosc 2018
- colon (PCM) (45 pts/group): Harada H. GIE 2019

be prepared
Recognize anatomic bowel wall structure



Resection Site *chromoscopy*

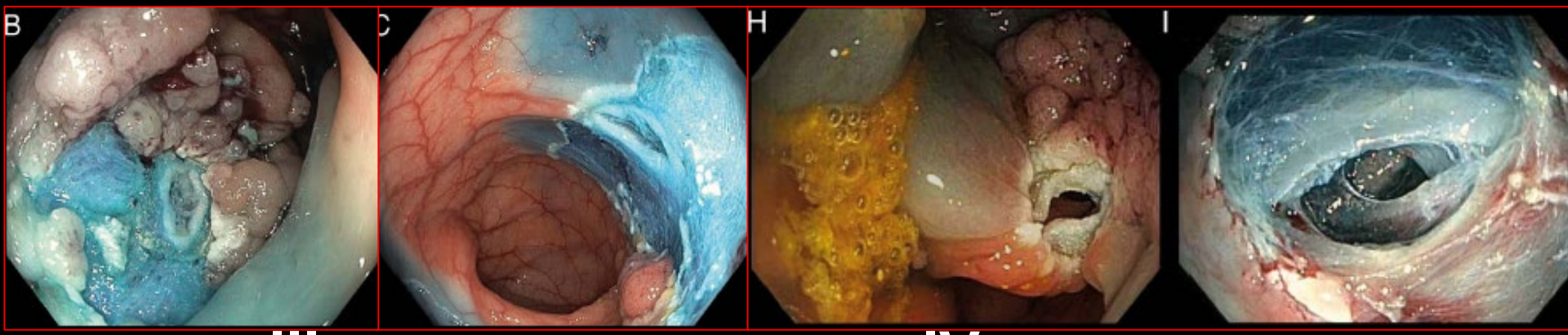


0

I

II

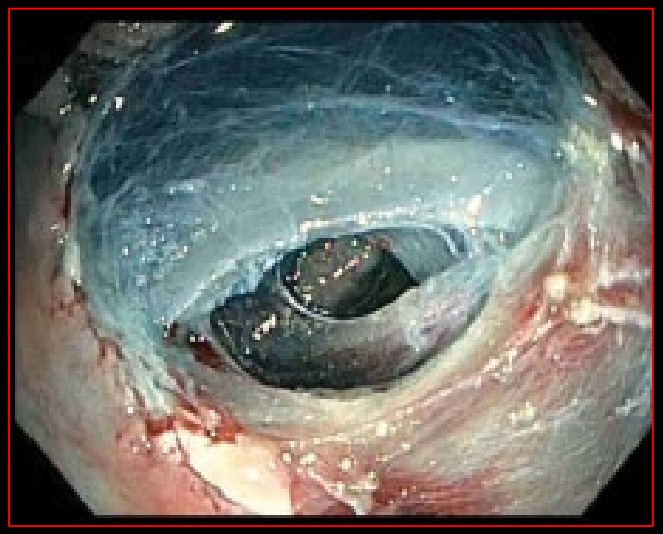
MP on histol specimen in 8%



III

IV *(V with fluid leak)*

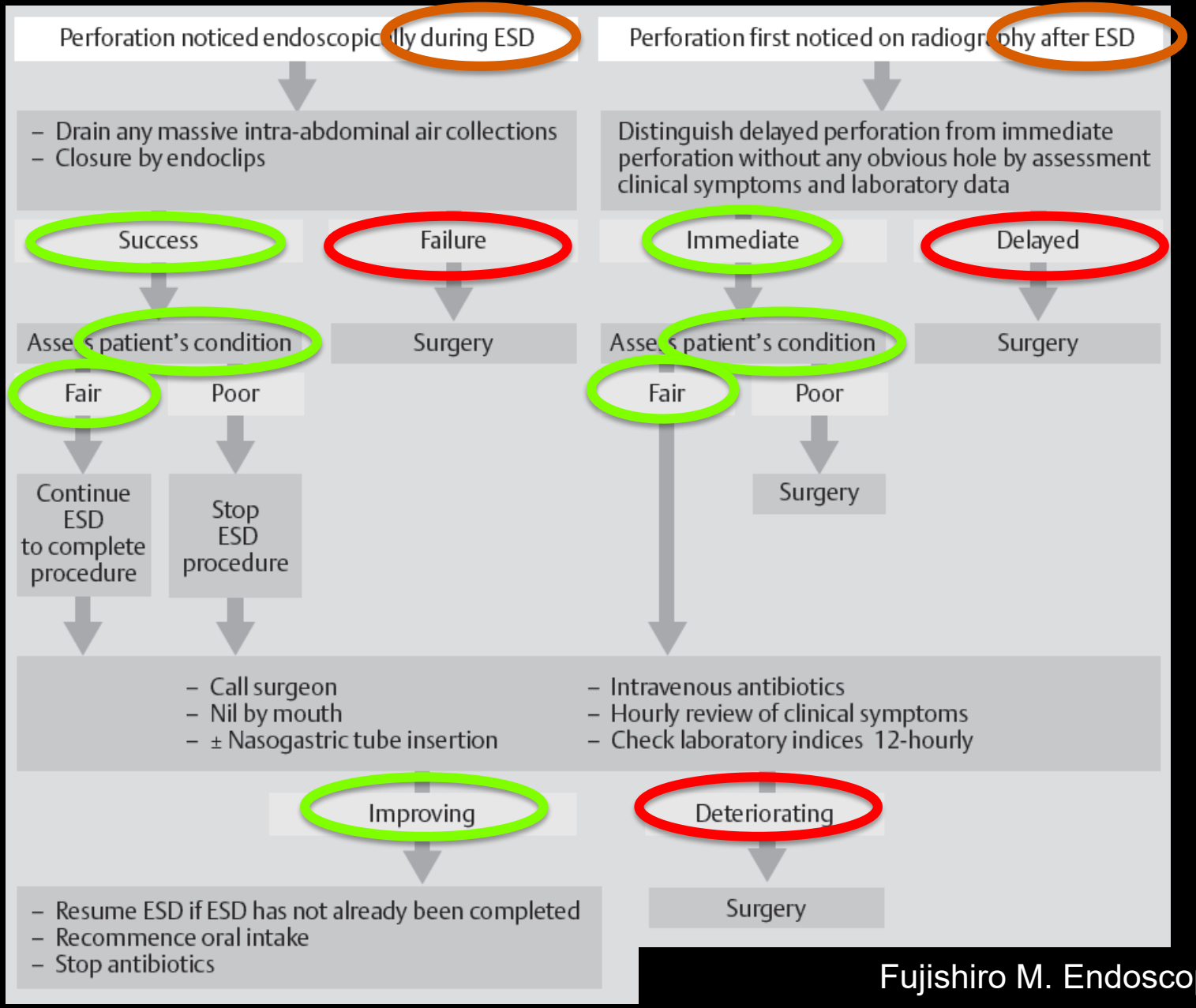
risk factors for deep muscular injury



	target III-IV-V adj OR
prox colon	1
transverse	3.55 (1.2-11.0)
distal	2.03 (0.8-5.5)
HGD / T1	3.0 (1.3-7.1)
en bloc if >25 mm	3.8 (1.5-9.8)

Burgess NG. Gut 2016

Perforation: procede up to completition

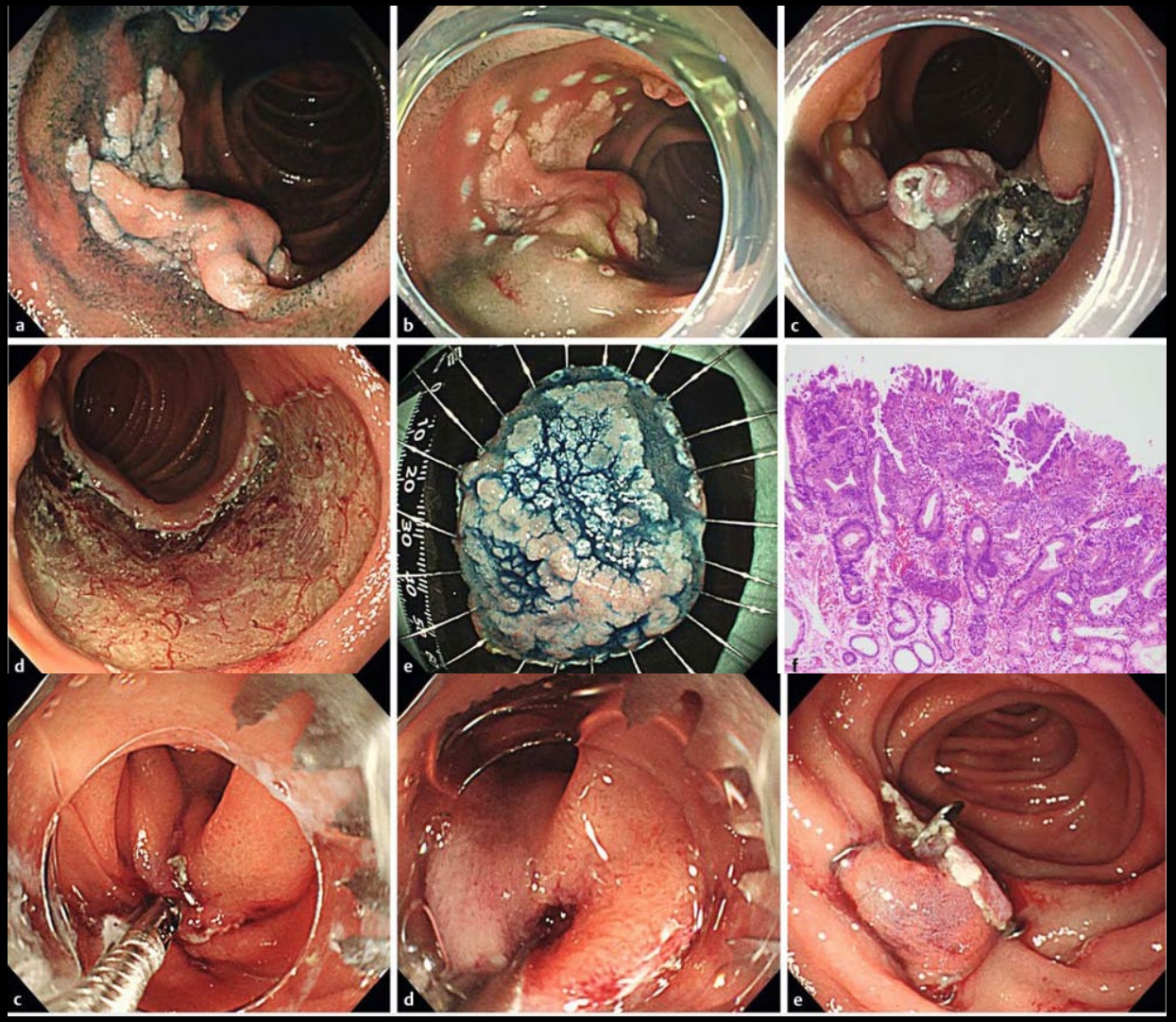


Fujishiro M. Endoscopy 2006

c-ESD Perforation multidisciplinary management

	Lee EJ. Surg Endosc 2013 Single center Seoul, Korea	Saito Y. Gut Liver 2013 Single center NCCH, Tokyo	Iacopini F Fismad 2014 Single center Albano L, Roma
Endoscopist	Expert	Expert	Intermediate
n. ESD	1000	806	129
Incidence	53 (5%)	23 (3%)	7 (5%)
Intra/early			7 (100%)
Conservative ther by clip closure	50 (94%)	21 (91%)	4 (57%)
Surgery	3 (6%)	2 (9%)	3 (43%)

closure to prevent AEs



Tashima T. Endoscopy 2018

resection site closure
AEs prevention

prospective
50 superficial nonampullary duodenal neoplasms
size 25 mm +/- 9 mm

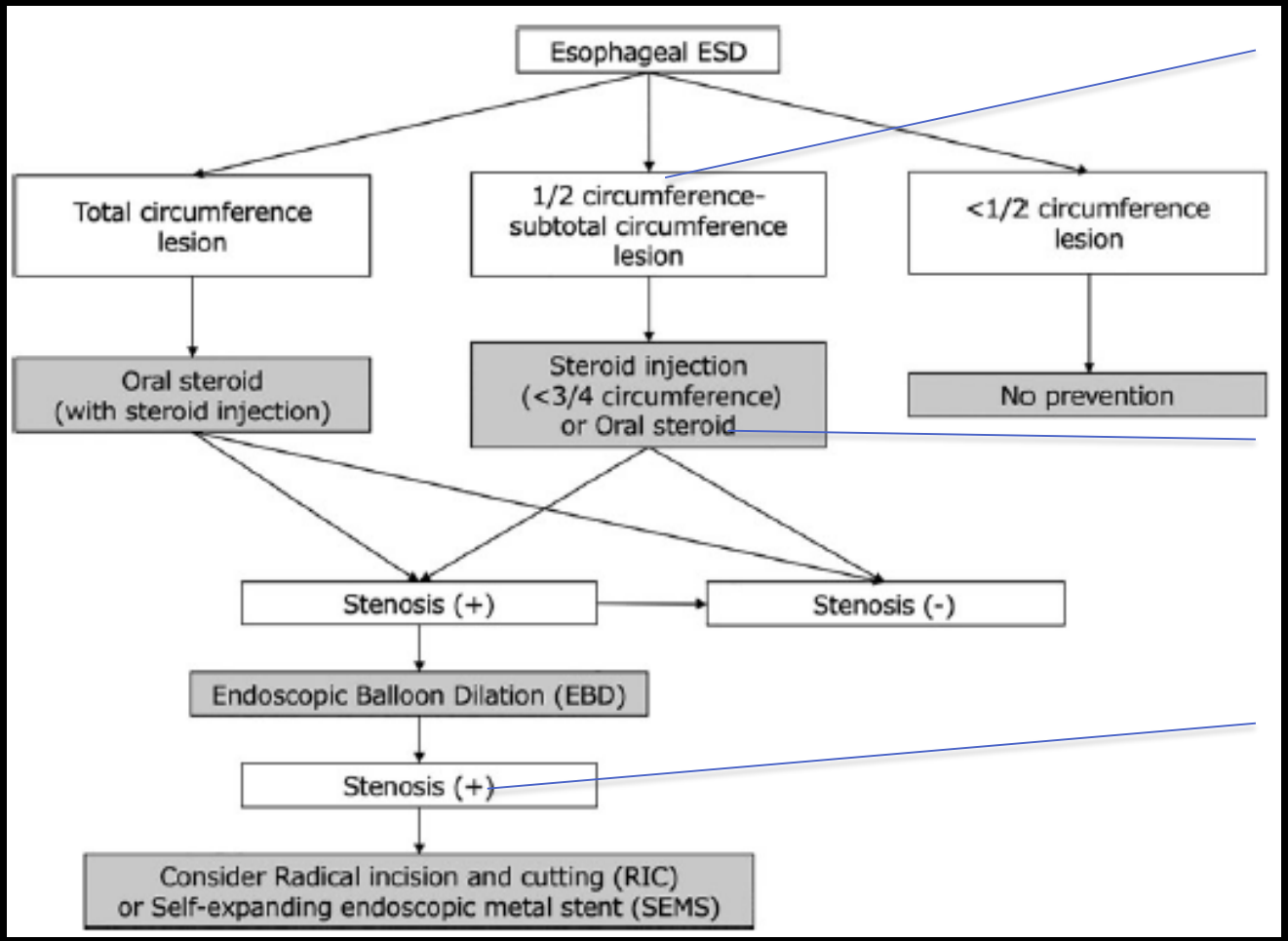
R0 88%

Procedure time, mean ± SD (range), minutes	67.3 ± 58.8 (7–300)
Closure time using OTSC, mean ± SD (range), minutes	9.8 ± 7.2 (3–30)
Complete closure rate, n (%)	47/50 (94.0%)
Cases using a Twin Grasper, n (%)	11/50 (22.0)
Number of OTSC deployments, mean ± SD (range)	1.4 ± 0.5 (1–3)
Lesions requiring use of an endoloop snare, n (%)	3/50 (6.0)
Emergency surgery performed, n (%)	2/50 (4.0)
Submucosal fibrosis, n (%)	12/50 (24.0)
Intraoperative perforation, n (%)	4/50 (8.0)
Intraoperative uncontrollable bleeding, n (%)	1/50 (2.0)
Delayed perforation, n (%)[2]	1/48 (2.1)
Delayed bleeding, n (%)[2]	3/48 (6.3)
Hospital stay after procedure, days, mean ± SD (range)	5.5 ± 7.2 (3–52)

OTSC misplacement

Tashima T. Endoscopy 2018

Strictures *as complications* post esophageal ESD



size	risk
<1/2	no
50mm; <2/3	33%
>3/4	>90%

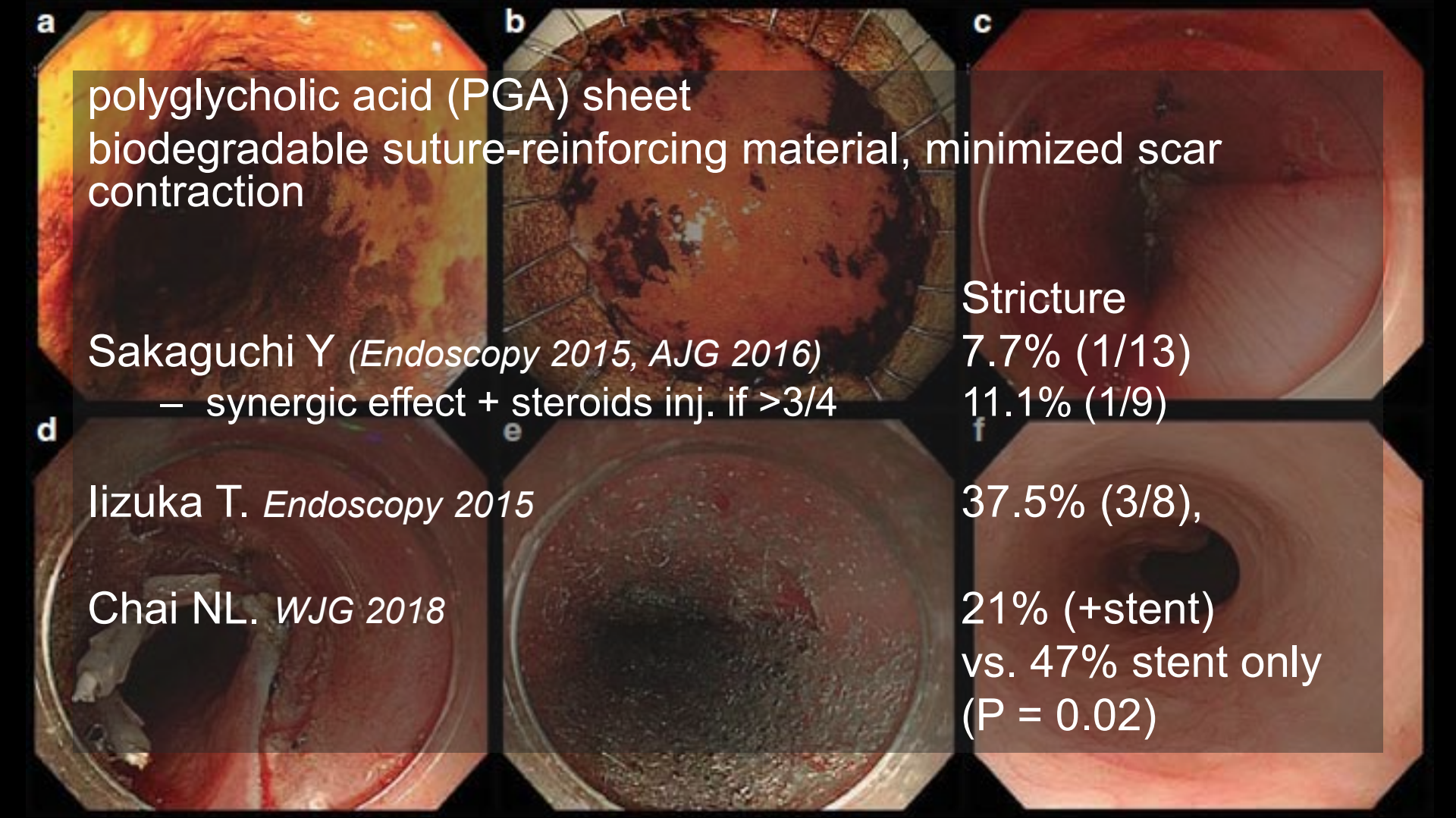
size	risk
>3/4	from 90 to 60%

increased perforation risk of EBD

Refractory stricture
>3/4 - >5/6
additional oral steroids to reduce n. EBD

Guidelines. Yamamoto Y. Dig Endosc 2019

post resection e-stricture protective method



polyglycholic acid (PGA) sheet
biodegradable suture-reinforcing material, minimized scar contraction

	Stricture
Sakaguchi Y *(Endoscopy 2015, AJG 2016)*	7.7% (1/13)
– synergic effect + steroids inj. if >3/4	11.1% (1/9)
Iizuka T. *Endoscopy 2015*	37.5% (3/8),
Chai NL. *WJG 2018*	21% (+stent) vs. 47% stent only (P = 0.02)

e-perforation dilation outcomes

after EMR/ESD

648 stricture dilations in 76 pts (78 neo)
single center
retrospective

- median 5 dilations over 3 months
- Initial dilation after 14 days
- **Perforations in 7 (1%)**

RISK FACTORS
- **multiple dilations (OR 1.2; P=0.012),**
- **lower third (OR 12.8; P=0.043).**

Takahashi H. Endoscopy 2011

EoE

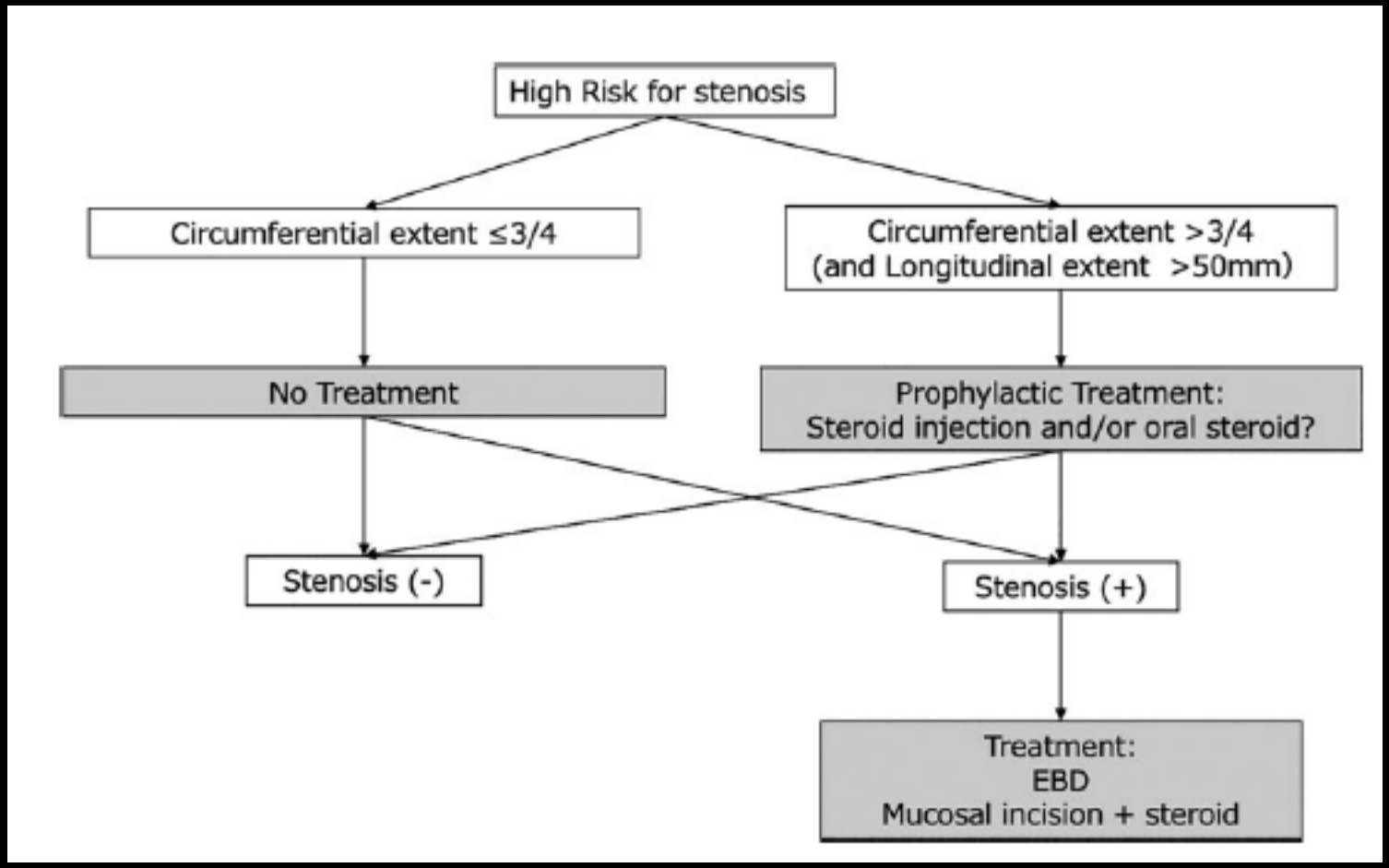
293 dilations in 161 pts

- **deep mucosal tear in 10% (n. 30),**
- conservative therapy in all

RISK FACTORS severe complications
- upper third OR, 5.62; (P < .001)
- middle third OR, 4.93 (P < .005)
- stricture unable to be traversed (OR, 2.48 (P = .037),
- Savary dilator (OR, 2.63 (P = .018)

Jung KW. GIE 2011

post resection stricture
g-ESD



Guidelines. Yamamoto Y. Dig Endosc 2019

post resection stricture cr-ESD

		Hayashi T. GIE 2017	*Abe S GIE 2016*
		822 pts, 912 lesions	363 pts, 370 lesions
site		CR	Rectum
size			80 mm (47-150)
stricture %		**0.5% (4/912)**	**0.02% (1/370)**
circumf defect	**90%-<100%**	**11% (2/18)**	**-**
	100%	**50% (2/4)**	**-**

Conclusions...

RISK MANAGEMENT

RISK MANAGEMENT IS the discipline of identifying, monitoring and limiting risk. Strategies include transferring the risk to another party, avoiding the risk, reducing the negative effect of the risk, and accepting some or all of the consequences of a particular risk. In order to manage risk, one has to identify the risk factors.

1. Procedure related (complexity of procedure).
2. Patient related (comorbidity and clinical status).
3. Operator related (individual expertise).

ASGE lexicon GIE 2011