내시경 검사의 합병증

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Major Complications

- Cardiopulmonary complication
- Complications related to sedation
- Bleeding
- Perforation
- Infectious complication

Cardiovascular complication

- Most common
- 40-46% of patients
- Minor changes in vital sign to shock
- Factors leading to oxygen desaturation
  - Age and cardiovascular/pulmonary disease
  - Vasovagal reflex
- Management
  - Resuscitation medication,
  - Reverse agents and equipment

Routine Use of Supplemental Oxygen

- Elderly Patients
  - Relatively decreased baseline arterial oxygen saturation
  - Blunted cardiovascular response to hypercarbia and hypoxia
  - Exaggerated response to opioid-induced respiratory depression
- Abnormal baseline oxygen saturation
- Severe cardiovascular disease
- Desaturation during the examination

Bleeding – Upper endoscopy

Diagnostic endoscopy: 0.15%

Trauma from passing the endoscope

Risk factors:

- Thrombocytopenia: platelet<20,000 and coagulopathy
- Previous gastric surgery

Mallory-Weiss tears: <0.1%

Important postprocedural hemorrhage

- Transfusion
- Hospitalization
- Reintervention

Bleeding – Colonoscopy

Diagnostic colonoscopy: 0-0.07%

Biopsy: 0.3%

Polypectomy: 1.5-2%

Immediate postpolypectomy: 1.5%

Delayed postpolypectomy: 1.9%

1-29 days later

Bleeding – Treatment

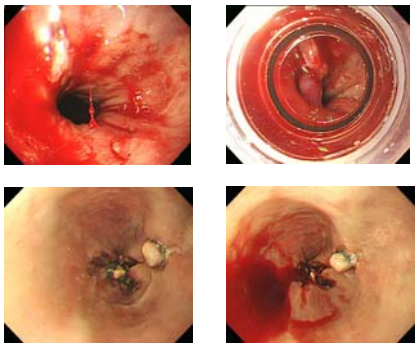
Indication:

- Active bleeding (spurt and oozing) or exposed vessel

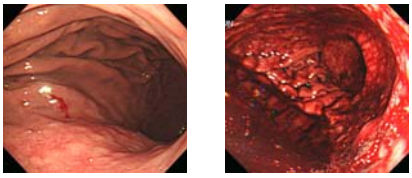
Management:

- Hemodynamically stable and normal hematocrit
  - Close monitoring and observation
- Endoscopic treatment
  - Injection
  - Thermocoagulation
  - Hemoclip
- Angiography
- Surgery

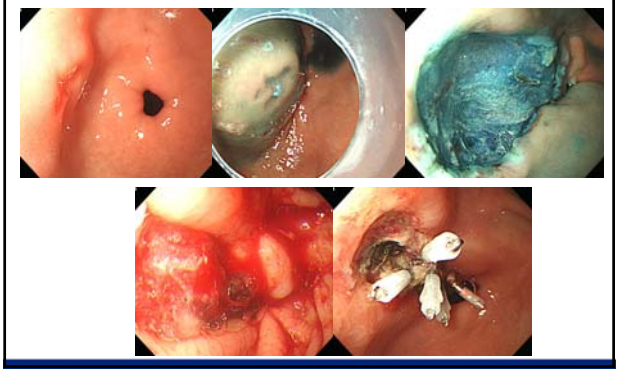
Mallory-Weiss syndrome



Bleeding by Biopsy



Hematemesis 4 Hours after EMR



Bleeding risk of endoscopic procedures

Procedure	Risk of bleeding
Low risk of bleeding (< 1%)	
Diagnostic endoscopy with or without biopsy	
EGD	0.01–0.13% (22)
Double balloon enteroscopy	0.1% (23)
Colonoscopy	0–0.02% (24,25)
Biliary/pancreatic stent without sphincterotomy	0.26% (26)
Endosonography without FNA	—[a]
Wireless capsule endoscopy	—[a]

Kwok et al, AMJ 2009; 104:3085-3097

Bleeding risk of endoscopic procedures

High risk of bleeding (≥1%)	
Polypectomy	
Gastric	7.2% (27)
Duodenal/ampullary	
1–3 cm	4.5% (28)
>3 cm	10.3% (28)
Colonic	0.7–3.3% (24,29,30)
Endoscopic mucosal resection	22%[b] (31)
Biliary sphincterotomy	2.0–3.2% (32,33)
Pneumatic/balloon dilation in achalasia	1.7%[c] (34)
Esophageal stenting	0.5–5.3% (36–38)
PEG placement	2.5% (39)
Endosonography with FNA	1.3–6%[d] (40–42)
Laser ablation and coagulation	1.1% (43)
Variceal sclerotherapy	4–25.4% (44,45)
Variceal band ligation	2.4–5.7%[e] (45,46)
Thermal ablation and coagulation	5% (47)

Kwok et al, AMJ 2009; 104:3085-3097

Conditions associated with a high risk of thromboembolic events

Atrial fibrillation	Previous stroke/transient ischemic attack
	$CHADS_2 \geq 3$ (see **Table 4**)
	Associated valvular heart disease
Prosthetic valve	Discontinuing antiplatelet/anticoagulant in bioprosthetic valve <3 months
	Mechanical valve in mitral position
	Mechanical valve with previous thromboembolic event
Coronary disease and stents	Recent acute coronary event <4–6 weeks
	Discontinuing dual antiplatelet therapy in:
	Drug-eluting stent <1 year
	Bare metal stent <1 month
DVT/PE	Discontinuing anticoagulation in event <3 months
	Recurrent DVT/PE
	Severe hypercoagulable states: active cancer, paroxysmal nocturnal hemoglobinuria, myeloproliferative syndromes

Kwok et al, AMJ 2009; 104:3085-3097

Recommandations of ASGE

Outlines in procedure risks

- High (Bleeding risk 1-6%)
- Low (Bleeding risk<1%)

Condition risks

- High
- Low → Risk when anticoag. is interrupted 4-7 days estimated at 1 to 2 per 1000 patients (DVT, AF, Biovalves and mech.AVR)

Guideline on the management of anticoagulation and antiplatelet therapy for endoscopic procedures

Gastrointestinal Endoscopy 2002;55:775-9.

Condition risk for thromboembolism

Procedure risk	High	Low
High	Discontinue warfarin 3-5 days before procedure. Consider heparin while INR is below therapeutic level	Discontinue warfarin 3-5 days before procedure. Reinstitute warfarin after procedure
Low	No change in anticoagulation. Elective procedures should be delayed while INR is in supratherapeutic range.	

Procedure risk

High-risk procedures	Low-risk procedures
• Polypectomy • Biliary sphincterotomy • Pneumatic or bougie dilation • PEG placement • Endosonographic guided fine needle aspiration • Laser ablation and coagulation • Treatment of varices	• Diagnostic EGD ± biopsy Flex sig ± biopsy Colonoscopy ± biopsy • ERCP without sphincterotomy • Biliary/pancreatic stent without endoscopic sphincterotomy • Endosonography without fine needle aspiration • Enteroscopy

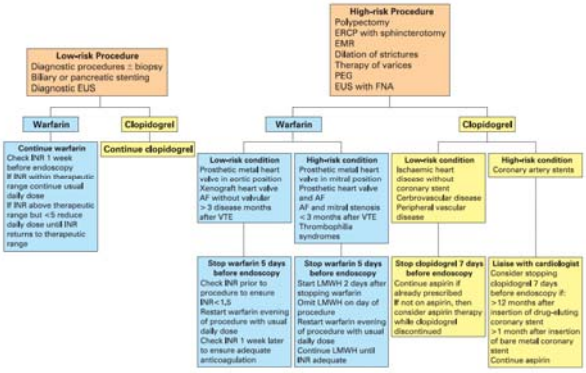
Condition risk

High-risk conditions	Low-risk conditions
• Atrial fibrillation associated with valvular heart disease • Mechanical valve in the mitral position • Mechanical valve and prior thromboembolic event	• Deep vein thrombosis • Uncomplicated or paroxysmal nonvalvular arterial fibrillation • Bioprosthetic valve • Mechanical valve in the aortic position

Aspirin and other NSAID use

In the absence of a pre-existing bleeding disorder, endoscopic procedures may be performed in patients taking aspirin or other NSAIDs.

Guidelines for the management of patients on warfarin or clopidogrel undergoing endoscopic procedure



Gut 2008;57:1322-1329

Timing of reinstitution of anticoagulant/antiplatelet therapy after GI endoscopy

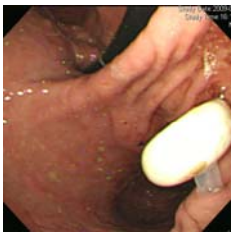
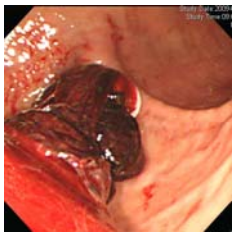
Drug	Timing of reinstituion	Grade of recommendation (90)	Special considerations
Warfarin	Same night (1,90)	Grade 1C	Consider recommencing ≥3 days in the case of sphincterotomy (32), gastric/duodenal polypectomy, large colonic polypectomy, EMR
Heparin	2–6 h after procedure (1)	N/A	
LMWH	24 h after procedure (90)	Grade 1C	Higher risk procedure—48–72 h after and lower dose (Grade 1C)
	Individualize (2)		
Aspirin/ NSAIDs	Next day (90)	Grade 2C	
Clopidogrel	Next day (2,90)	Grade 2C	Consider delayed reinstitution if higher risk procedure performed

EMR, endoscopic mucosal resection; LMWH, low-molecular-weight heparin, NSAID, nonsteroidal anti-inflammatory drug.

Endoscopy and Anticoagulation

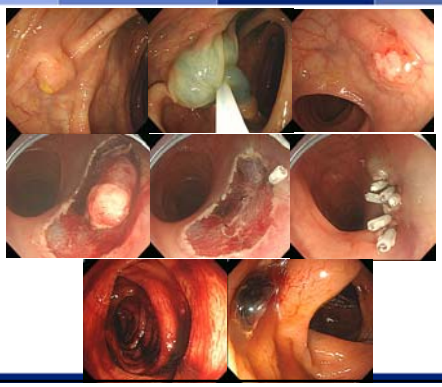
- 내시경 검사 및 치료를 위하여 warfarin이나 anti-platelet을 중단할 때에는 risk-benefit를 고려해야 한다.
- Antiplatelet를 사용하고 있는 환자에서는 조직검사를 위한 약물중단은 권유되지 않는다.
- 고위험 환자에서 warfarin을 중단할 때에는 heparin을 사용하는 것이 고려되어야 한다.
- 서구에서는 warfarin 사용환자에서, 필요하면 약물중단 없이 내시경 조직검사를 하도록 권하고 있으나, 국내에서는 이에 대한 검토가 필요하다.

PEG on Clopidogrel

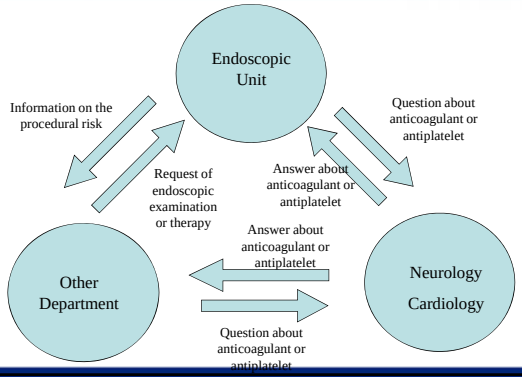



PEG 당일 PEG 다음날

Bleeding after CPP during Aspirin Medication



Communication



Communication

Perforation - Upper endoscopy

Diagnostic endoscopy: 0.02-0.2%

Perforation site:

- Distal third of esophagus
- Cervical esophagus: pyriform sinus, Zenker's diverticulum, cricopharyngeal muscle

Predisposing factors

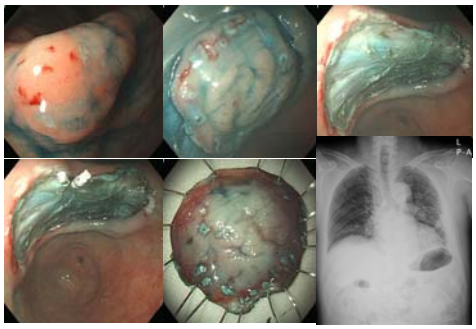
- Presence of anterior cervical osteophytes
- Zenker's diverticulum
- Esophageal stricture
- Malignancy

Perforation - Upper endoscopy

Therapeutic upper endoscopy

- Dilation of benign esophageal stricture
  - Bougie: 0.3-0.4%
  - Caustic strictures: 17%
- Achalasia: 4-6.7%
- Malignant esophageal strictures: -10%
- Gastric outlet obstruction: 0-6.7%

Primary Closure of Perforation during ESD



Perforation - Colonoscopy

Diagnostic colonoscopy: 0.2%

- Rectosigmoid area: 64%
- Cecum: 13%

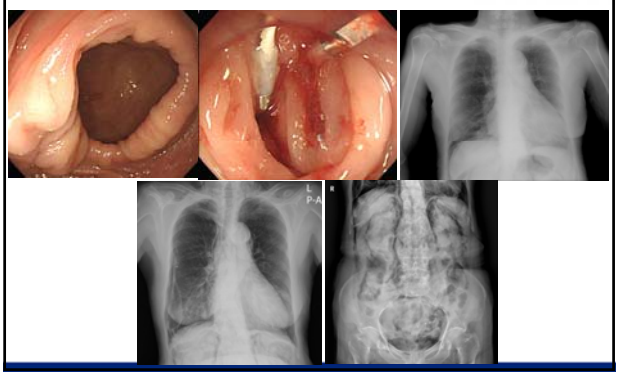
Therapeutic colonoscopy: 0.3-0.4%

- Larger(>1cm) and sessile polyp
- Electrical current

Postpolypectomy syndrome

- Full-thickness electrical burn during polypectomy
- 1 to 5 days after procedure
- Localized peritoneal sign
- Conservative management

Retroperitoneal Perforation during Diagnostic Colonoscopy



Incidence of Bacteremia

Not associated with any infectious complications

Gastroscopy with or without biopsy: 0-8% (4.4%)

Flexible sigmoidoscopy: 0-1%

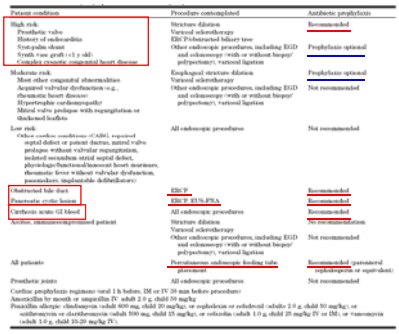
Colonoscopy: 0-25% (4.4%)

Esophageal dilation of stricture: -45%

Endoscopic variceal sclerotherapy: 31-50%

Endoscopic variceal ligation: 1-25% (8.8%)

Antibiotic Prophylaxis : ASGE Guidelines



Gastrointest Endosc 2003:58: 475-482

Other Complications during EGD : Aspiration

- Common status
  - Advanced age, massive upper GI bleeding (1-4%)
  - Altered mental status, absent gag reflex
  - Unstable cardiopulmonary status
- Prevention
  - Avoidance of topical anesthetics
  - Prevention of oversedation
  - Maintaining the head of the bed at a 30-40^{O} angle
  - Minimizing air insufflation

Other Complications

- 복부 팽만
- 이하선 또는 악하선의 종대
- 측두하악관절(temporomandibular joint)의 탈골
- 하부식도나 식도 열공 헤르니아에 내시경이 감돈(impaction)되는 경우
- 급성 위점막 병변
- 결막하 출혈
- 폐암환자에서의 상대정맥 폐쇄

Conclusion

- Team approach
- Medical recording
- Ability of problem solving
- Enough explanation before procedure
- Good relationship with patients