ORIGINAL ARTICLE

Management of patient with concomitant upper gastrointestinal bleeding and myocardial infarction: Two case reports and literature review

Huynh, Nam Huu[1]

Affiliations:
1 Gastroenterology Department, Da Nang general Hospital, Viet Nam

Correspondence

Huynh, Nam Huu[1]
Gastroenterology Department, Da Nang general Hospital, Viet Nam

Telephone: +84903595436
Email: bsnambvdanang2010@gmail.com

Abstract

Background : Patients with simultaneous upper gastrointestinal bleeding (UGIB) and acute myocardial infarction (AMI) have higher mortality than whom with either GIB or AMI. No offical guideline about this challenging situation has been published. The prior choice either gastrointestinal endoscopy (GIE) or coronary artery revascularization (CAR) remains controversial.

Case presentation: First case, a 55-years-old female patient with concomitant severe upper gastrointestinal bleeding and non ST elevation myocardial infarction. The priority endoscopy strategy was done and patient was successfully treated with 18 months follow-up. Second case, 45-years-old male patient with ST elevation myocardial infarction and concomitant upper gastrointestinal bleeding. The priority coronary artery revascularization strategy was done and patient was successfully treated with 32 months follow-up.

Conclusion: Working in team of cardiologists, gastroenterologists, anesthesiologists and individualized treatment are optimal. Risks and benefits must be carefully considered base on the optimal time for each strategy and type of acute myocardial infarction. The priority gastrointestinal endoscopy is safe and prefer in case of immediate coronary revascularization is not mandatory. Nevertheless, this approach needs further studies to obtain optimal strategy for management of this instance.

Background

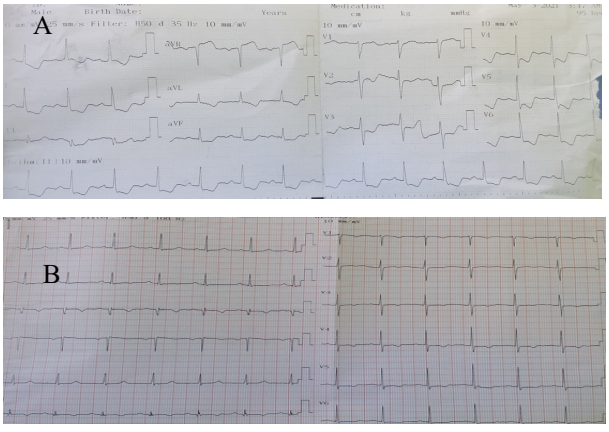
Upper gastrointestinal bleeding (UGIB) and acute myocardial infarction (AMI) are serious medical emergencies that cause synergistic sequelae [1]. Findings from studies showed that patients with simultaneous UGIB and AMI had significantly greater mortality than either GIB or AMI. According to Lingjie He et al [1], in-hospital mortality rate of concomitant AMI and UGIB patient was 24.7%. Meanwhile, Yavorski et al. [2] found that the overall mortality was 7% in patient with UGIB. Furthermore, in patients with ST elevation myocardial infarction (STEMI) treated with primary percutaneous coronary intervention (PCI), mortality rate was 3.4% in first 7 days and 3.9% from 7 days to 1 year [3]. Additionally, mortality rate of non ST elevation myocardial infartion (NSTEMI) is probably lower than STEMI. Bouisset F et al [4] found that mortality rate of NSTEMI and STEMI were 4.7% and 6.7% respectively.

In case of simultaneous upper gastrointestinal bleeding and myocardial infarction, treatment of the one can badly affect to another. We have well known that initiating antithrombic therapy with loading dose as soon as possible is fundamental in management of AMI [5],[6]. Nevertheless, these antithrombic agents worsen UGIB. If AMI patient hasn't received antithrombic therapy, coronary artery revascularization with stenting can't be done because of high risk of early thrombosis in stent. On the other hand, it is quite risky if doing gastrointestinal endoscopy (GIE) in patient with AMI, especially patient with hemodynamic instability, arrhythmias. Alastair Dorreen et al[7] found that postprocedural complications of GIE after acute coronary syndrome (ACS) was 9.1%. Hypotension, arrhythmias and repeat ACS were the most frequent adverse events. Moreover, in preoperative risk stratification, ischemic heart disease is one of the 6 independent predictors of perioperative cardiac complications. As a result, gastroenterologists and anesthesiologists may be hesitant at times to perform endoscopy in AMI patients [17]. According to the guideline of European Society of Gastrointestinal Endoscopy 2015[8], immediate assessment of hemodynamic status in patients who present with UGIB and prompt intravascular volume replacement initially using crystalloid fluids if hemodynamic instability exists. However, in AMI patient with reduce left ventricular function, fluid therapy must be cautious. From those reciprocal effects, making decision on treatment is difficult and must be individualized. Nevertheless, no guidelines currently report the treatment principles in concomitant UGIB with AMI. We represent 2 cases of concomitant UGIB with AMI which successfully treated at our hospital and our strategy in treatment of these patients.

Case presentation

First case, a 55-year-old female patient had past medical history of hypertension, no smoking history, hospitalized due to melena for 3 days and chest pain for a few hours. In emergency room, patient was fully logical contact, notable conjunctival pallor, angina, dyspnea, epigastric pain, tarry stool. Heart rate 120/min, blood pressure P 90/60 mmHg, saturation 95%, regular rhythm with normal S1 and S2, without murmurs, rubs, or gallops, no pulmonary rale, no jugular venous dilatation, rectal examination noted tarry stool, no signs of hepatocellular insufficiency or portal hypertension. Echocardiography revealed preserved left ventricular ejection fraction (55%), no inferior vena cava dilatation. Electrocardiogram: regular sinus rhythm, ST depresion and T inversion in V3 – V6, D1, aVL, D2, D3, aVF (Fig 1A). Blood test showed red blood cell 2.06x1012/l, hemoglobin: 55 g/dl; troponin Ths 0,15 ng/ml. In consultation of gastroenterologist and cardiologist, patient was diagnosed severe upper gastrointestinal bleeding and concomitant non ST elevation myocardial infarction. Following treatment were fluid replacement, blood transfusion, esomeprazol 80mg bolus and followed by 8mg/hours. After transfusing 2 packed red blood cell units, symptoms were improved with less chest pain, no dyspnea, HR 100/min, BP 110/70 mmHg. Blood test revealed RBC 3,2 x 1012/l, Hb 9,1 g/gl. ECG after transfution showed no

ST depression in those leads, only negative T vawe in V3-V6 and D3, aVF (Fig 1B). Patient was transferred to GI endoscopy room, assisted with resuscitation team and anesthesiologist. Gastroscopy was performed which showed: normal esophagus and stomach, Forrest IIa ulcer in duodenum. Endoscopy hemostasis was applied by two hemoclips at ulcer to eleminate the visible vessel (Fig C,D). After that, patient was treated with dual antiplatelet therapy, statin, enoxaparin, continuous PPI infusion for 3 days. One day later, patient was transferred to cardiac cath lab to do angiography. This showed severe stenosis of left descending artery at mid portion and moderate stenosis of right coronary artery at third segment. Angioplasty was done successfully with drug eluting stent (Fig. 1 E, F). Seven days later, patient was stable with no cardiac ischemic symptoms, stable hemoglobin concentration and be discharged. Following treatment were clopidogrel 75mg/day, aspirin 81mg/day, rosuvastatin 20mg/day, rabeprazol 20mg/day, lisinopril 5mg/day. Monthly follow up to 18 months, patient was re-examined and no symptom of cardiac ischemia and gastric discomfort recognized.



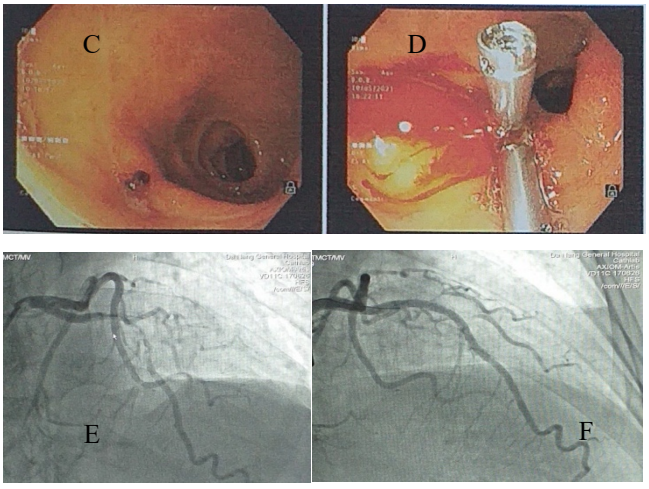
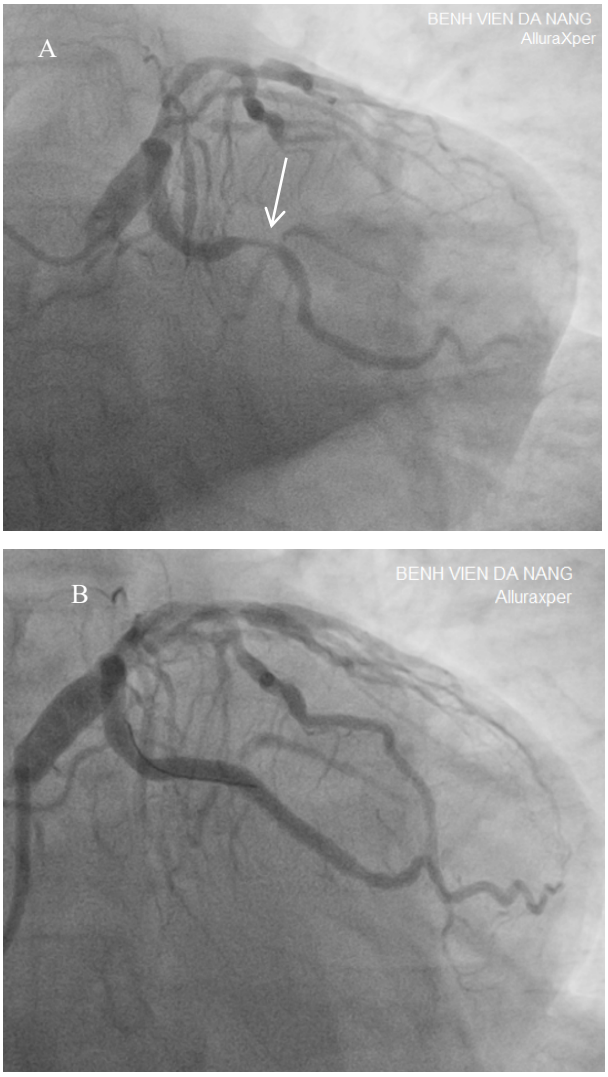
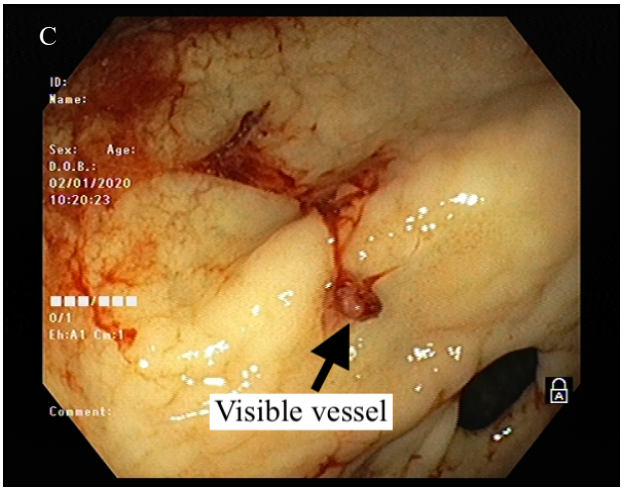


Figure 1. *A: ECG on admission; B. ECG after transfusion; C: Endoscopy showes Forrest IIa bleeding ulcer in duodenum; D: Endoscopy hemostasis was applied by two hemoclips at ulcer to stop bleeding. E: Severe stenosis of left descending artery at mid portion; F: Successful revascularization with drug eluting stent.*

Second case, 65-year-old male patient, neither history of gastroenterological diseases nor cardiovascular risk factor. Before admitting hospital, patient has presented for 3 hours of acute chest pain and 2 hours of hematemesis. On examination at emergency room, patient was fully logical contact, severe chest pain, sweating, dyspnea, epigastric pain, HR 55/min, BP 90/60 mmHg, saturation 90%, no pulmonary rale, jugular venous dilatation, ECG: first degree AV block and bradycardia sinus rhythm, ST elevation on lead V5, V6, D1 and aVL. Echocardiography revealed preserverd LVEF 55% with hypokinetic lateral wall motion, IVC dilatation 22 mm. Blood test: RBC: 3.2 x1012/l, Hb: 95 g/dl; troponin Ths 0,09 ng/ml. In consultation of gastroenterologist and cardiologist, patient was diagnosed concomitant ST elevation myocardial infarction and UGIB. Following treatment were pantoprazol 80mg bolus and followed by 8mg/hours for 3 days, enoxaparin, clopidogrel 300mg, asprin 325mg, rosuvastatin 20mg and transferred to cardiac cathlab. Angiogram showed severe circumflex artery stenosis. Revascularization was done successfully by drug eluting stent within 30 minutes (Fig 2A,B). During intervention, patient had hypotension and hemaetemesis once. Saline infusion and one unit of packed red blood cell transfusion were initiated during coronary artery intervention. After coronary artery revascularization, patient was transferred directly to GI

endoscopy room. Gastroscopy was performed which showed: normal esophagus and duodenum, Forrest IIa ulcer in stomach. Endoscopy hemostasis was applied by two hemoclips (Fig 2 C,D). After that, patient was treatment with aspirin 81mg/day, clopidogrel 75mg/day, rosuvastatin 20mg/day, continuous infusion of pantoprazol 8mg/hour for 3 days and following 40mg/day orally. Five days later, patient was stable and be discharged. Following treatment were: clopidogrel 75mg/day, aspirin 81mg/day, rosuvastatin 20mg/day, pantoprazol 40mg/day, lisinopril 5mg/day. Monthly follow up to 32 months, patient was re-examined and no symptom of cardiac ischemia and gastric discomfort recognized.





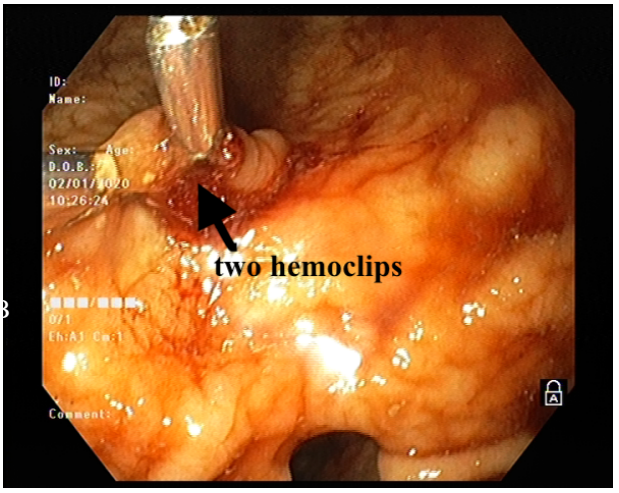


Figure 2. **A.** Severe circumflex artery stenosis at proximal segment (arrow); B: Successful revascularization by drug eluting stent; C. Forrest IIa ulcer in antrum; D. Hemostasis of ulcer was done by two hemoclips.

Discussion and literature review

Prior choice of gastrics endoscopy or coronary artery revascularization

Because of having no consensus for this situation, to make a decision whether gastric endoscopy or coronary artery revascularization first, cardiologist and gastroenterologist consultation is mandatory. Patient should be evaluated for following aspects:

Firstly, clarifying optimal time for each strategy is paramount key. In the respect of UGIB, definitions regarding the timing of upper GI endoscopy in acute overt UGIB relative to patient presentation: very early <12 hours, early ≤ 24 hours, and delayed >24 hours. For very early (< 12 hours) upper GI endoscopy may be considered in patients with high risk clinical features, namely: hemodynamic instability (tachycardia, hypotension) that persists despite ongoing attempts at volume resuscitation; in-hospital bloody emesis/nasogastric aspirate; or

contraindication to the interruption of anticoagulation[8]. In case of concomitant UGIB and AMI, antithrombic therapy is nessessary. Therefore, it is considered as patient have a situation of contraindication to the interruption of anticoagulation. Therefrom, all of patients with concomitant UGIB and AMI need to have upper GI endoscopy within <12 hours. In the other hand, optimal time for revascularization was also recommended. In the situation of NSTEMI, all patients need early revascularization within < 24 hours. Especially, immediate revascularization need to be done in case of haemodynamic instability, recurrent/refractory chest pain despite medical treatment, life-threatening arrhythmias, mechanical complications of AMI, acute heart failure clearly related to AMI, ST segment depression >1 mm/6 leads plus ST segment elevation aVR and/or V1[5]. In case of STEMI, immediate revascularization is indicated for all patients with symptoms of ischemia of ≤12 hours duration and persistent ST-segment elevation. In patients with time from symptom onset >12 h, a primary PCI strategy is indicated in the presence of ongoing symptoms suggestive of ischemia, hemodynamic instability, or life-threatening arrhythmias[6]. From viewpoint of authors, weighing between benefit and risk is essential. If we try do GIE, patient will loss gold time for myocardium rescue from revascularization in case of immediate coronary artery revascularization is mandatory to rescue patient. Therefrom, the priority coronary revascularization strategy is prefered and antithrombotic therapy is initiated. Antithrombic therapy that connotes a higher risk of further bleeding in the patient with GIB, and these can generally be managed with transfusion and supportive measures such as high dose proton pump inhibitor therapy, fluid. Our strategies in this situation are: (1) Working in team of cardiologists, gastroenterologists, anesthesiologists is mandatory; (2) Fluid, packed red blood cell product should be well prepared immediately; (3) High dose proton pump inhibitor should be initiated as early as possible; (4) loading dose of antithrombotic agents are unfractionated heparin (70UI/kg), aspirin 150mg and clopidogrel 600mg; (5) Immediate revascularization is indicated and GIE should be done immediately after finishing coronary revascularization. On the other hand, if we evaluate that patient doesn't need to have immediate revascularization, GI endoscopy is prior. Currently, some studies showed that endoscopy is safe and should be performed when clinically indicated despite recent cardiac ischemia [9],[10],[11]. In clinical practice, identifying cause of hemodynamic instability in patient with concomitant UGIB and AMI is essential as affecting to management strategy. Blood loss is the cause of instability in patient with UGIB. In patient with AMI, haemodynamic instability is caused by cardiac compromise. It is extremely essential for differentiating cardiogenic shock from hemorrhagic shock. From the viewpoint of authors, if patient has hemodynamic instability due to blood loss, the aggressive strategy for haemostatis should be done as soon as possible. Therefore, the priority endoscopy is prefer. On the other hand, priority coronary artery revascularization is prefer if acute cardiac compromise due to AMI. In clinical practice, some following signs and symptoms help to differentiate two these settings (table 1).

Table1. Differentiation of cardiogenic shock and hemorrhagic shock [12],[13]

Signs and symptoms	**Cardiogenic shock**	**Hemorrhagic shock**
Respiratory crepitations	+++	-
S3, S4 gallop rhythm	+++	-
Echocardiography	Disminished contractility and ejection fraction	Ventricular chamber obliteration
	IVC dilatation	IVC collapse
	Valvular disease , cardiac tamponade	No
Chest X-ray	Large heart, pulmonary edema	No

Secondly, types of AMI also contribute to make a decision for each strategy. Type 2 AMI is frequent in patients with UGIB [16]. In patients with stable known or presumed CAD, an acute stressor such as an acute GIB with a precipitous drop in hemoglobin with clinical manifestations of myocardial ischemia, may result in myocardial injury and a type 2 MI. For patients with type 2 AMI, treatment of the primary cause of supply/demand mismatch is paramount [16]. Therefore, priority GI endoscopy strategy is prefered. Because the significant overlap of manifestations and no gold standard that discriminates type 2 from type 1 AMI, type 2 AMI diagnosis in patient with UGIB is challenging. Following several diagnostic modalities are commonly used to assist with diagnosis. Although similar manifestations were seen in observational studies [16], but in UGIB, type 2 AMI occurs due to profound drop in hemoglobin. Therefore, type 2 of AMI should be suggested when ischemic symptoms such as chest pain, dyspnea, T wave inversion, ST changes improve after blood transfusion and better hemoglobin concentration achieved. ECG is also not reliable to discriminate these 2 types. Several studies observed that ST-segment depression occurs more frequently in type 2 AMI than among patients with type 1 AMI. Although significant differences in the distribution of baseline or peak cTn levels are seen in several studies and peak cTn values were higher in type 1 versus type 2 MI, both the absolute cTn level and the change over time provided poor discrimination for type 1 from type 2 MI. Coronary angiography is considered the gold standard for defining coronary anatomy and is used widely to identify patients with evidence of plaque rupture and coronary thrombosis among patients with suspected type 1 MI. It is more reliable when implementing intravascular ultasound or optical coherence tomography to visualize the unstable atheroma which occur in type 1 AMI. Computed tomography coronary angiography (CTA) may be detect plaque ruptures however, sensitivity is modest in comparison with intravascular ultrasound. CTA is a good modality to diagnose type 2 AMI in case of absence of coronary atherosclerotic disease seen in CTA because atherosclerotic disease is a requisite for type 1 MI [16].

Initiation of antithrombotic therapy

Nowadays, we have all consented that among patients with high cardiothrombotic risk receiving antiplatelet agents, these agents should be resumed as soon as haemostasis can be established [14],[15]. Despite of insufficient evidence to recommend a specific timeline for re-administration of antithrombotic drugs to patients with UGIB, it is advised that aspirin should be resumed immediately if endoscopic hemostasis is successful. In case of dual antiplatelet therapy is mandatory after coronary stenting, thienopyridine agents can be delay for several days. Study of Eisenberg et al showed that among patients with stent thrombosis, obstruction occurred in a median of 7 days in patients who stopped both aspirin and thienopyridine, whereas obstruction occurred in a median of 112 days in patients who maintained aspirin. Thus, even if thienopyridine is discontinued because of gastrointestinal bleeding, maintaining aspirin may lower the risk of stent thrombosis [15]. On our daily practice, aspirin is initiated immediately after successful haemostatis. Thienopyridine initation time depends on the successful possability of haemostatis on endoscopy. If gastroentorologist is highly sure for success of haemostatis, it should be started with aspirin simultaneously. If not, haemorrhagic signs such as tarry stool, hematemesis, RBC and Hb concentration should be carefully monitored for several days until they are considerably stable and thienopyridine agent is initiated.

Conclusion

The prior choice either gastrointestinal endoscopy or coronary artery intervention for patient with concomitant AMI and UGIB depends on type of hemodynamic compromise, clarifying optimal time of each strategy and type of AMI. Working in team of cardiologists, gastroenterologists, anesthesiologists and individualized treatment is optimal. Risks and benefits must be carefully considered on a case by case basis. The priority

gastrointestinal endoscopy is generally safe and prefer in case of immediate coronary revascularization is not mandatory. Nevertheless, this approach needs better studies in the future to obtain optimal strategy for management of this instance.

References

1. Lingjie He, Jianwei Zhang, and Shutian Zhang, Risk factors of in-hospital mortality among patients with upper gastrointestinal bleeding and acute myocardial infarction, Saudi J Gastroenterol. 2018 May-Jun; 24(3): 177–182. doi: 10.4103/sjg.SJG_492_17.
2. Yavorski RT, Wong RK, Maydonovitch C, Battin LS, Furnia A,Amundson DE. Analysis of 3,294 cases of upper gastrointestinal bleeding in military medical facilities. Am J Gastroenterol 1995;90:568-73.
3. Doost Hosseiny A, Moloi S, Chandrasekhar J, et al. Mortality pattern and cause of death in a long-term follow-up of patients with STEMI treated with primary PCI, Open Heart 2016;3:e000405. doi:10.1136/openhrt-2016-000405.
4. Frédéric Bouisset, Jean-Bernard Ruidavets, Jean Dallongeville et al, Comparison of Short- and Long-Term Prognosis between ST-Elevation and Non-ST-Elevation Myocardial Infarction, J. Clin. Med. 2021, 10, 180. https://doi.org/10.3390/jcm10020180.
5. Jean-Philippe Collet, Holger Thiele, Emanuele Barbato, Olivier Barthélémy, Johann Bauersachs, Deepak L. Bhatt et al. 2020 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation, European Heart Journal (2020) 00,1-79, doi:10.1093/eurheartj/ehaa575.
6. Borja Ibanez, Stefan James, Stefan Agewall, Manuel J. Antunes, Chiara Bucciarelli-Ducci, Héctor Bueno et al. 2017 ESC Guidelines for the management of
acute myocardial infarction in patients presenting with ST-segment elevation, European Heart Journal (2018) 39, 119–177, doi:10.1093/eurheartj/ehx393.
7. Alastair Dorreen, Sarvee Moosavi, Myriam Martel, Alan N. Barkun. Safety of Digestive Endoscopy following Acute Coronary Syndrome: A Systematic Review, Canadian Journal of Gastroenterology and Hepatology, Volume 2016, Article ID 9564529, http://dx.doi.org/10.1155/2016/9564529.
8. Ian M. Gralnek, Jean-Marc Dumonceau, Ernst J. Kuipers, Angel Lanas, David S. Sanders et al. Diagnosis and management of nonvariceal upper gastrointestinal hemorrhage: European Society of Gastrointestinal Endoscopy (ESGE) Guideline, Endoscopy 2015; 47: a1–a46, http://dx.doi.org/10.1055/s-0034-1393172.
9. Gila R. Hoffman, Daniel J. Stein, Matthew B. Moore, Joseph D. Feuerstein. Safety of Endoscopy for Hospitalized Patients With Acute Myocardial Infarction: A National Analysis, Am J Gastroenterol 2020;115:376–380. https://doi.org/10.14309/ajg.0000000000000528
10. Roxanne Lim, William Cobell, Shoba Theivanayagam, Todd Kilgore, Michelle Matteson, Srinivas Puli, et al. Upper GI Bleeding with Myocardial Infarction: Evaluation of Safety for Endoscopy, The American Journal of gastroenterology 2012, 1890
11. Jakub Nozewski, Grzegorz Grzesk, Maria Klopocka, Michal Wicinski, Klara Nicpon-Nozewska, Jakub Konieczny et al. Management of Patient with Simultaneous Overt Gastrointestinal Bleeding and Myocardial Infarction with ST-Segment Elevation – Priority Endoscopy, Vascular Health and Risk Management 2021:17 123–133.
12. Marin H. Kollef, Introduction to Shock, the Washington manual of critica care, 3rd edition.
13. Ka Leung Mok, Make it SIMPLE: enhanced shock management by focused cardiac ultrasound, Journal of Intensive Care (2016) 4:51 DOI 10.1186/s40560-016-0176-x.
14. Joseph JY Sung, Philip CY Chiu, Francis K L Chan, James YW Lau, Khean-lee Goh, Lawrence HY Ho, et al. Asia-Pacific working group consensus on non-variceal upper gastrointestinal bleeding: an update 2018, Gut 2018; 0:1–12. doi:10.1136/gutjnl-20 18-316276.
15. Joon Sung Kim, Byung-Wook Kim, Do Hoon Kim, Chan Hyuk Park, Hyuk Lee, Moon Kyung Joo, Da Hyun Jung, et al. Guidelines for Nonvariceal Upper Gastrointestinal Bleeding, Gut and Liver, Vol. 14, No. 5, September 2020, pp. 560-570.
16. Andrew P. DeFilippis, Andrew R. Chapman, Nicholas L. Mills, James A. de Lemos, Armin Arbab-Zadeh,L. Kristin Newby, et al. Assessment and Treatment of Patients With Type 2 Myocardial Infarction and Acute Nonischemic Myocardial Injury, Circulation. 2019;140:1661–1678. DOI: 10.1161/ CIRCULATIONAHA. 119.040631.
17. Lee TH, Marcantonio ER, Mangione CM, et al. Derivation and prospective validation of a simple index for prediction of cardiac risk of major noncardiac surgery. Circulation 1999;100:1043–9.