

Antithrombotic Strategies and Complication Management in Paroxysmal Atrial Fibrillation Complicated by Mesenteric Artery Embolism: A Case Report and Literature Review of an Elderly Patient

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Abstract: *Objective:* To explore antithrombotic strategy selection and bleeding complication management in patients with paroxysmal atrial fibrillation (AF) complicated by acute mesenteric artery embolism (AME). *Methods:* The diagnosis and treatment process of an 84-year-old patient with AF complicated by AME was reviewed, and the balancing strategy between antithrombotic therapy and reperfusion injury was analyzed in conjunction with the literature. *Results:* The patient developed intestinal bleeding and abdominal wall hematoma after interventional thrombectomy, and the risks of thrombosis and bleeding were ultimately controlled through a dual antithrombotic regimen of rivaroxaban combined with clopidogrel. *Conclusion:* For AF complicated by AME, individualized weighing of thromboembolic and bleeding risks is necessary, and multidisciplinary collaboration and dynamic monitoring are crucial for optimizing treatment.

Keywords: Paroxysmal atrial fibrillation; Mesenteric artery embolism; Anticoagulant therapy; Reperfusion injury; Bleeding risk management

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1. Introduction

Acute mesenteric artery embolism can lead to acute intestinal ischemic necrosis and even life-threatening conditions. Patients often present with sudden abdominal pain, nausea, vomiting, diarrhea, and gastrointestinal bleeding. However, the abdomen may feel soft, even without tenderness, making diagnosis challenging and resulting in a high clinical mortality rate. When acute mesenteric artery embolism is combined with paroxysmal atrial fibrillation, the condition can be further exacerbated. It is crucial to provide timely and accurate diagnosis,

select an appropriate antithrombotic strategy, and implement scientifically sound complication management. This article analyzes the clinical diagnosis and treatment of an elderly patient with paroxysmal atrial fibrillation complicated by mesenteric artery embolism. The report is as follows.

2. Case information and diagnosis/treatment course

The patient, an 84-year-old female, was admitted at 15:55 on October 26, 2022, due to “sudden abdominal pain for 3 hours.” On the day of admission, the patient had consumed leftover food at noon and developed persistent colicky pain in the epigastric region around 13:00 without obvious inducement. The pain did not radiate to other areas and was accompanied by profuse sweating and palpitations. Subsequently, she had two episodes of diarrhea, characterized by yellow watery stools. There was no nausea, vomiting, fever, chest pain, chest tightness, or bloody stools. She was admitted to the hospital with a preliminary diagnosis of “abdominal pain under investigation.”

2.1. Past medical history

The patient had a history of coronary heart disease, paroxysmal atrial fibrillation, incomplete right bundle branch block, type 2 diabetes mellitus, hyperthyroidism, chronic kidney disease, hyperuricemia, hyperlipidemia, severe osteoporosis, lumbar vertebral compression fracture, thrombocytosis, and left lower extremity venous thrombosis. In July 2021, she underwent “percutaneous vertebroplasty for L2 vertebral compression fracture.” She had no history of drug allergies.

2.2. Physical examination on admission

Vital signs were stable: temperature 36.0 °C, pulse 72 beats/min, respiratory rate 19 breaths/min, blood pressure 180/71 mmHg. No significant abnormalities were found on cardiopulmonary examination. The abdomen was flat and soft, with mild tenderness in the upper abdomen but no rebound tenderness. Bowel sounds were slightly hyperactive, approximately 7 times/min.

2.3. Auxiliary examinations

A 12-lead electrocardiogram showed atrial fibrillation (**Figure 1**). D-dimer was significantly elevated (5515.29 ng/mL). Myocardial enzyme profile indicated lactate dehydrogenase 503 U/L and α -hydroxybutyrate dehydrogenase 357 U/L. Renal function tests showed urea nitrogen 11.42 mmol/L, creatinine 110 μ mol/L, and uric acid 522 μ mol/L.

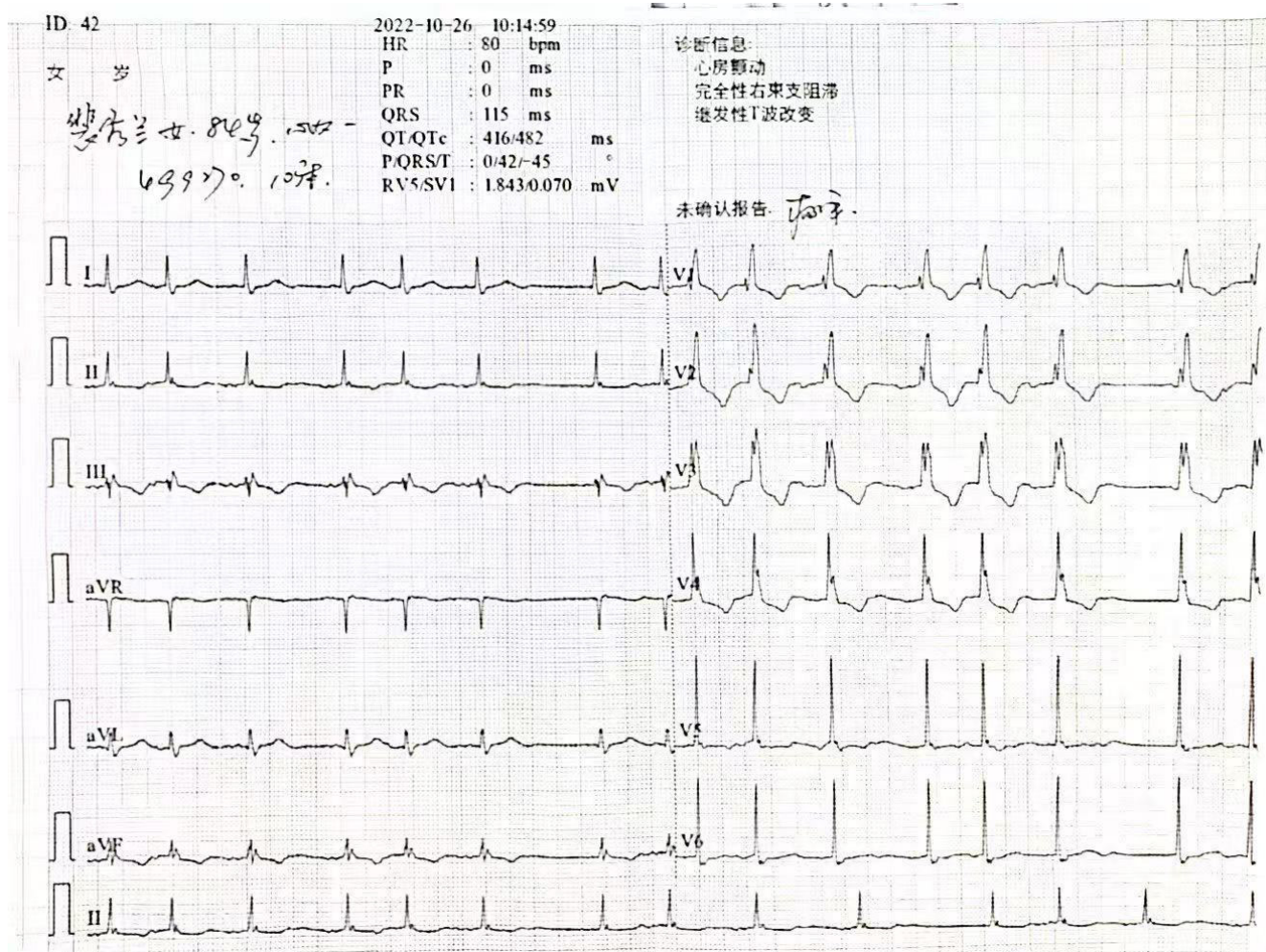


Figure 1. Twelve-lead electrocardiogram at admission.

2.4. Preliminary diagnosis

Abdominal pain under investigation: acute gastroenteritis? Ischemic bowel disease? Intestinal spasm? Empirical treatment was initiated, including anti-infection therapy, antispasmodics, acid suppression and gastric protection, as well as fluid replacement. The patient's abdominal pain symptoms were temporarily alleviated.

Around 18:00 on October 27, the patient experienced recurrent abdominal pain accompanied by abdominal distension. Physical examination revealed absent bowel sounds. Emergency computed tomography angiography (CTA) of the abdominal aorta indicated: (1) Thrombosis in the superior mesenteric artery, involving the jejunal and ileal arteries, ileal artery, and ileocolic artery; (2) Significant dilation of the small intestine with air-fluid levels, suggesting intestinal paralysis; (3) Atherosclerosis of the abdominal aorta with mild stenosis in the proximal segment of the right renal artery and calcified plaque with severe stenosis at the opening of the right internal iliac artery.

After emergency consultations with the general surgery and interventional radiology departments, it was determined that emergency surgery was indicated. Following communication with the family, interventional therapy was selected.

That same night, under local anesthesia, the patient underwent superior mesenteric artery angiography via

femoral access, thrombus aspiration (**Figure 2**), and thrombolytic drug infusion. During the procedure, a large amount of thrombus was aspirated from the mid-segment of the superior mesenteric artery. After confirming vascular recanalization via angiography, 20 mg of prourokinase was slowly injected. Postoperatively, the patient received intensive anti-infection therapy, dual antiplatelet therapy (aspirin 100 mg/day + clopidogrel 75 mg/day), and anticoagulation therapy (low molecular weight heparin calcium 0.4 mL q12h).



Figure 2. Filamentous thrombus aspirated during surgery.

The patient's condition fluctuated postoperatively: On day 3 after surgery (October 30), she developed periumbilical pain, abdominal distension, intermittent passage of dark red bloody stools, and vomiting. Abdominal CT showed dilation of the small intestine and intestinal wall edema. Considering reperfusion injury accompanied by bleeding, the antithrombotic regimen was adjusted to indobufen 0.1 g/day combined with low molecular weight heparin calcium. Supportive treatments, including fasting, water restriction, gastrointestinal decompression, and blood transfusion (4 units of suspended red blood cells), were initiated.

On November 4, the patient experienced severe pain in the left mid-abdomen. Imaging revealed a massive hematoma in the left abdominal wall (approximately 151 mm × 81 mm × 73 mm), considered spontaneous bleeding due to anticoagulation therapy (**Figure 3**). All anticoagulant and antiplatelet medications were immediately discontinued. Freeze-dried thrombin powder was administered orally for hemostasis. Multiple ultrasound-guided hematoma punctures and aspirations were performed (approximately 350 ml of non-clotting blood was aspirated in total), accompanied by local compression bandaging and blood transfusion for supportive care.

With active management, the bleeding was controlled. Starting from November 6, the antithrombotic regimen was gradually adjusted: rivaroxaban 15 mg/day was initiated for anticoagulation, followed by the addition of clopidogrel 75 mg/day for antiplatelet therapy. The patient's abdominal pain and distension symptoms gradually alleviated, bowel sounds returned, and she progressively resumed oral intake. Follow-up CTA of the entire

aorta showed that the original thrombus in the superior mesenteric artery had been removed, with good vascular recanalization.

Based on CHA₂DS₂-VASc score (6 points) and HAS-BLED score (4 points), the patient was deemed to have both high thrombotic risk and high bleeding risk. Upon discharge, she continued on rivaroxaban 15 mg/day combined with clopidogrel 75 mg/day for antithrombotic therapy. Regular outpatient follow-ups were scheduled, and the patient reported no symptoms such as abdominal pain or bloody stools.



Figure 3. Hematocrit fluid aspirated from the abdominal wall hematoma via puncture.

3. Discussion

3.1. Selection of antithrombotic regimens for AF complicated with AME: A dynamic trade-off between thrombotic and hemorrhagic risks

This patient had a CHA₂DS₂-VASc score of 6 (advanced age, female, coronary artery disease, diabetes, chronic kidney disease), indicating a very high risk of thromboembolism and necessitating long-term anticoagulation therapy. However, after interventional thrombectomy during the acute phase of AME, reperfusion injury in the intestine significantly increased the risk of bleeding, creating a “thrombosis-bleeding” paradox. According to the 2020 ESC Guidelines for the Management of Atrial Fibrillation ^[1], anticoagulation should be resumed within 24–48 hours after arterial embolism if there is no active bleeding. In this case, low-molecular-weight heparin calcium bridging combined with dual antiplatelet therapy (aspirin + clopidogrel) was initially used postoperatively. However, due to intestinal bleeding, the regimen was adjusted to indobufen combined with low-molecular-weight heparin calcium, eventually transitioning to rivaroxaban (15 mg/d) combined with clopidogrel. This adjustment strategy reflects the following considerations:

(1) Evidence and Limitations of NOACs: Although NOACs have demonstrated clear efficacy in non-valvular AF ^[2], evidence for their use in AME remains limited to small-sample studies. Becattini *et al.* ^[3] noted that the

combination of NOACs with antiplatelet drugs increases the risk of gastrointestinal bleeding by 2.3-fold. In this case, the selection of rivaroxaban 15 mg/d was based on the patient's creatinine clearance rate (calculated as 34 mL/min using the Cockcroft-Gault formula), which met the criteria for dose adjustment ^[3]. However, its safety in mesenteric ischemia requires further validation through prospective studies.

(2) Postoperative fluctuations in D-dimer levels suggested residual thrombotic risk, but immediate anticoagulation could exacerbate reperfusion injury. Acosta *et al.* ^[4] proposed that for patients at high risk of bleeding, anticoagulation could be delayed until 48 hours postoperatively, using low-dose low-molecular-weight heparin (e.g., 0.3 mL q12h). In this case, early combination with dual antiplatelet therapy may have excessively suppressed platelet function. The subsequent adjustment to indobufen (a selective COX-1 inhibitor with weaker inhibition of gastrointestinal prostaglandins) ^[5] reduced the risk of gastrointestinal bleeding. However, the development of an abdominal wall hematoma suggested the need for more precise monitoring of coagulation function (e.g., using thromboelastography to guide individualized medication).

3.2. Pathological mechanisms and intervention strategies for reperfusion injury and hemorrhagic complications

The occurrence of postoperative dark red hematochezia and abdominal wall hematoma in this case was associated with the following mechanisms: (1) the burst of oxygen free radicals following mesenteric vessel recanalization, leading to microvascular endothelial cell damage and disruption of the mucosal barrier ^[6]; (2) the widespread inhibition of the coagulation cascade by anticoagulant drugs, exacerbating tissue bleeding. In response to this contradiction, a stepwise management approach was adopted in this case:

(1) Evidence-based rationale for medication adjustment: Indobufen was selected after discontinuing aspirin due to its milder gastrointestinal mucosal injury effect (OR 0.52 vs. aspirin) ^[7]. However, it should be noted that its antiplatelet efficacy is only one-third that of clopidogrel, potentially increasing the risk of thrombotic recurrence. Recent studies suggest that anticoagulation can be temporarily discontinued for a short period (< 72 hours) in such patients, combined with proton pump inhibitors (e.g., pantoprazole) and gastrointestinal mucosal protectants (e.g., rebamipide) to reduce bleeding risk.

(2) Active intervention for hemorrhagic complications: When the abdominal wall hematoma expanded to 151 mm × 81 mm × 73 mm, simple puncture decompression had limited efficacy. According to the 2021 ACC Expert Consensus Decision Pathway: Management of Bleeding in Patients on Oral Anticoagulants ^[8], a combination of local thrombin injection (e.g., fibrin glue occlusion) and continuous compression with an elastic bandage is recommended to reduce transfusion requirements. In this case, ultrasound-guided hematoma puncture combined with compression bandaging was subsequently employed, with hemoglobin stabilizing at 103 g/L, confirming the effectiveness of this strategy.

3.3. Multidisciplinary collaboration and optimization of treatment processes

Early involvement of a multidisciplinary team (MDT): Patients with acute mesenteric ischemia (AME) often present with concurrent intestinal paralysis, infection, and nutritional metabolic disorders. The consensus of the Interventional Physicians Branch of the Chinese Medical Doctor Association emphasizes that MDTs should be initiated within 24 hours of diagnosis, involving vascular intervention, gastrointestinal surgery, nutrition, and critical care medicine departments ^[9]. For example, early initiation of enteral nutrition (e.g., short-peptide formulations) after surgery can reduce intestinal flora translocation and lower systemic inflammatory responses (in

this case, the CRP peak reached 108.35 mg/L).

Refined decision-making on the timing of anticoagulation: Based on the “Guidelines for the Diagnosis and Treatment of Acute Mesenteric Ischemic Diseases”^[10], it is recommended to implement stratified management according to the ischemic time window: (1) For patients with ischemia lasting less than 6 hours, anticoagulation should be initiated 12 hours postoperatively; (2) For patients with ischemia lasting 6–24 hours, anticoagulation should be delayed until 24–48 hours postoperatively, with monitoring for signs of intestinal wall CT enhancement. In this case, the ischemic duration was approximately 8 hours. Delaying anticoagulation until 24 hours postoperatively might have reduced the risk of early bleeding.

4. Conclusion

In summary, this case study, which details the diagnosis and treatment process of an elderly patient with paroxysmal atrial fibrillation complicated by acute mesenteric artery embolism, highlights the complexity and challenges of selecting antithrombotic strategies when both thromboembolic and bleeding risks are present. The patient developed reperfusion injury-related bleeding and abdominal wall hematoma after interventional thrombectomy. Through multidisciplinary collaboration and stepwise medication adjustments, a balance between thrombotic and bleeding risks was ultimately achieved using rivaroxaban in combination with clopidogrel. This case suggests that for elderly patients with concurrent high thrombotic and bleeding risks, individualized assessment of CHA₂DS₂-VASc and HAS-BLED scores should be conducted, with dynamic adjustments made to the intensity and timing of antithrombotic therapy. Active collaboration with imaging and coagulation function monitoring is also recommended. Furthermore, early involvement of a multidisciplinary team, anticipation of reperfusion injury, and proactive management of bleeding complications are crucial for improving prognosis. More prospective studies are still needed to optimize antithrombotic strategies for such complex cases in the future.

Disclosure statement

The authors declare no conflict of interest.

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