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Case Report

Cerebral Infarction and Congestive Heart Failure after a Colonoscopic Polypectomy in High-risk Patients: Lessons from a Case Report

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Abstract

There is a risk of post-polypectomy bleeding (PPB) in patients undergoing a colonoscopic polypectomy, especially in those taking warfarin. Undoubtedly, the use of warfarin can raise the risk of bleeding, but its withdrawal increases the risk of thrombosis. Therefore, the management of warfarin during a colonoscopic polypectomy is particularly important to balance the risk of thrombosis and bleeding. Herein, we reported a case taking warfarin due to mitral and aortic valve replacement who developed cerebral infarction and congestive heart failure (CHF) after a colonoscopic polypectomy. Knowledge regarding management of warfarin and heparin bridging was reviewed to guide clinical interventions about how to avoid thrombotic and bleeding events.

Introduction

Colorectal polyps are neoplasms caused by the excessive growth of colorectal mucosal epithelial cells and protrude into the intestinal lumen, which carries a risk of developing cancer.[1] Early removal of colorectal polyps can reduce the morbidity and mortality of colorectal cancer.[2] Furthermore, post-polypectomy bleeding (PPB) is one of the most common complications of a colorectal polypectomy.[3] Nowadays, a growing number of patients who need to undergo a colonoscopic polypectomy are taking anticoagulants for the treatment of deep vein thrombosis, pulmonary embolism, and/or ischemic stroke, and the prophylaxis of arterial thromboembolism from atrial fibrillation and flutter and cardiac valvular disorders.[4] Warfarin is one of the most widely used anticoagulants, but also one of the important risk factors for PPB.[5] Before a colonoscopic polypectomy, the risk of thrombosis from discontinuing warfarin could be weighed against that of bleeding secondary to the use of these agents.[4] Herein, we reported a case with a history of mitral and aortic valve replacement who developed cerebral infarction and congestive heart failure (CHF) after a colonoscopic polypectomy due to the discontinuation of warfarin and discussed the timing of discontinuing and resuming warfarin and heparin bridging.

Keywords: Colonoscopic polypectomy; Post-polypectomy bleeding; Warfarin; Heparin bridging.

Abbreviations: CHF, congestive heart failure; CRP, C-reactive protein; hs-TnT, high-sensitivity troponin T; INR, international normalized ratio; LMWH, low molecular weight heparin; NT-pro BNP, N-terminal prohormone of brain natriuretic peptide; PPB, post-polypectomy bleeding; VKA, vitamin K antagonists.

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Case presentation

On November 4, 2021, a 61-year-old male was admitted to the Department of Gastroenterology of the General Hospital of Northern Theater Command due to irregular stools for five months. He underwent a colonoscopy showing multiple polypoid lesions in June 2021, which were not treated because he was receiving oral warfarin at that time. He had had a history of atrial fibrillation, CHF, and aortic and mitral valve replacement for more than 10 years, as well as a history of lacunar infarction for nine months. Laboratory examinations on admission showed that hemoglobin was 125 g/L (reference range: 130–175 g/L), red blood cells were 4.11×10^{12}/L (reference range: 4.3–5.8×10^{12}/L), white blood cells

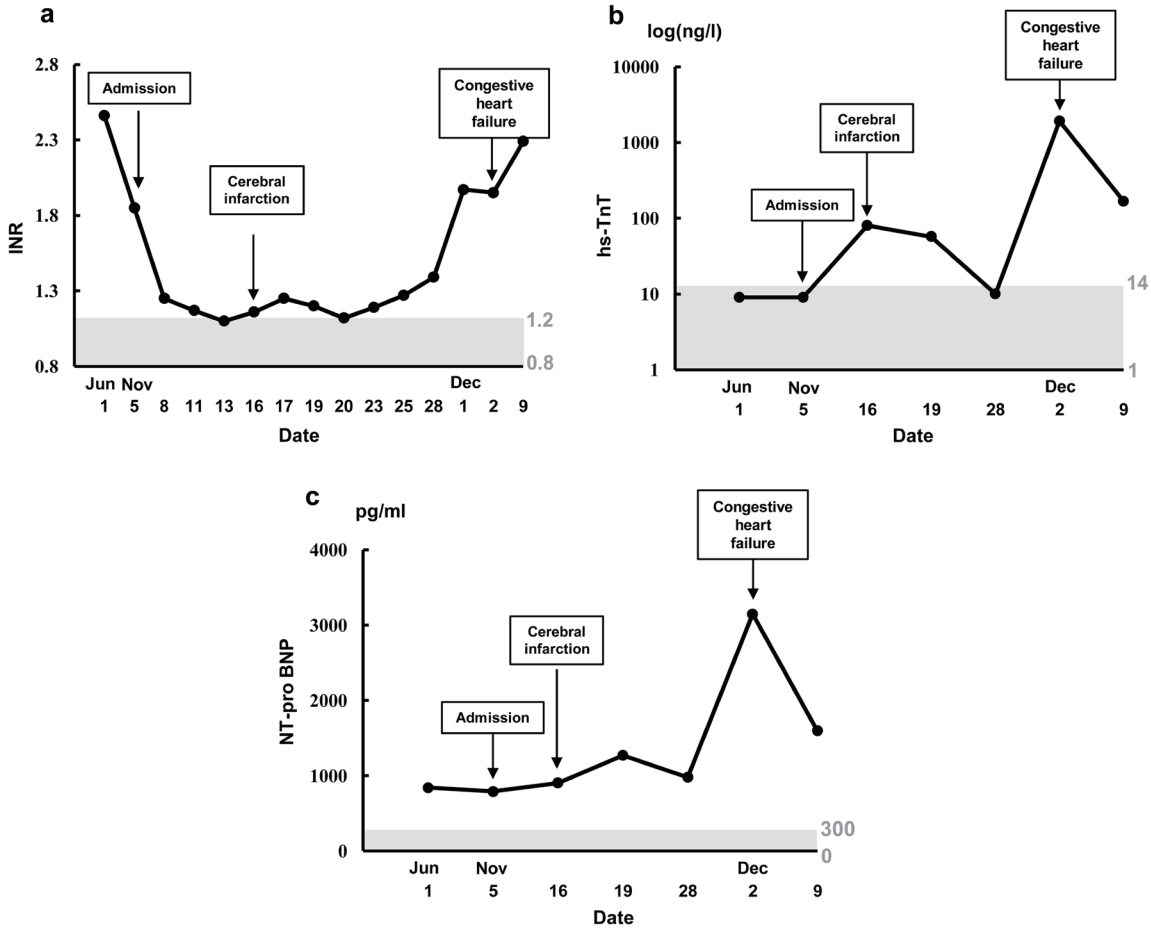

Fig. 1. Line graphs of INR (a), hs-TnT (b), and NT-pro BNP (c) during the patient's disease course. Notes: Grey area refers to the reference range of INR, hs-TnT, and NT-pro BNP. Abbreviations: hs-TnT, high-sensitivity troponin T; INR, International normalized ratio; NT-pro BNP, N-terminal prohormone of brain natriuretic peptide.

were 3.2×10^9/L (reference range: 3.5–9.5×10^9/L), C-reactive protein (CRP) was 1.55 mg/L (reference range: <10 mg/L), prothrombin time was 21.7 s (reference range: 11.0–14.3 s), activated partial thromboplastin time was 61.0 s (reference range: 31.5–43.5 s), international normalized ratio (INR) was 1.85 (reference range: 0.8–1.2), fibrinogen was 2.72 g/L (reference range: 2.00–4.00 g/L), D-dimer was 0.11 μg/mL (reference range: 0.00–0.50 μg/mL), N-terminal prohormone of brain natriuretic peptide (NT-pro BNP) was 790.9 pg/mL (reference range: <300 pg/mL), and high-sensitivity troponin T (hs-TnT) was 9 ng/L (reference range: <14 ng/L) (Fig. 1). Oral warfarin was discontinued on the day of admission and changed to a subcutaneous injection of low molecular weight heparin (LMWH) at a dosage of 5000 IU once a day.

On November 8, the INR decreased to 1.25, and LMWH was stopped. On November 10, six polyps with a size of 2–12 mm were removed by endoscopic mucosal resection, and a total of six hemoclips were placed (Fig. 2). The colonoscopic procedure lasted for 47 minutes. On November 11, LMWH was reinitiated. On November 12, hematochezia developed. On November 13, LMWH was stopped after a consultation with the patient and his relatives because hematochezia persisted. After that, no hematochezia developed.

On the morning of November 16, the patient developed sudden binocular free gaze, right hemiplegia, and aphasia. He was transferred to the Department of Neurology of the General Hospital of Northern Theater Command and cerebral computed tomography scans showed massive cerebral infarction. Emergency cerebral angiography and stent retriever thrombectomy at the end of the left internal carotid artery were performed (Fig. 3). The patient received subcutaneous dalteparin at a daily dosage of 5000 IU on the same day. His symptoms gradually improved. The INR was kept stable at 1.25 after the colonoscopic polypectomy, but the NT-pro BNP level increased to 904.6 pg/mL. On November 17, a lung cerebral computed tomography showed a bilateral pleural effusion and thickening in the pericardium.

On November 19, LMWH was discontinued, and warfarin was resumed at a dosage of 2 mg and then adjusted to 2.5 mg/day.

On November 28, the patient experienced dyspnea, sweating, and general weakness after straining during defecation. After conservative therapy, his symptoms gradually improved and the dosage of warfarin was increased to 4.375 mg/day. On December 2, laboratory tests revealed significantly elevated levels of NT-pro BNP at 3147 pg/mL, hs-TnT at 1920 ng/L, and CRP at 70.84 mg/L. Then, he was transferred to the Department of Congenital Cardiology of the General Hospital of Northern Theater Command and diagnosed with CHF. His blood culture was negative. On Decem-

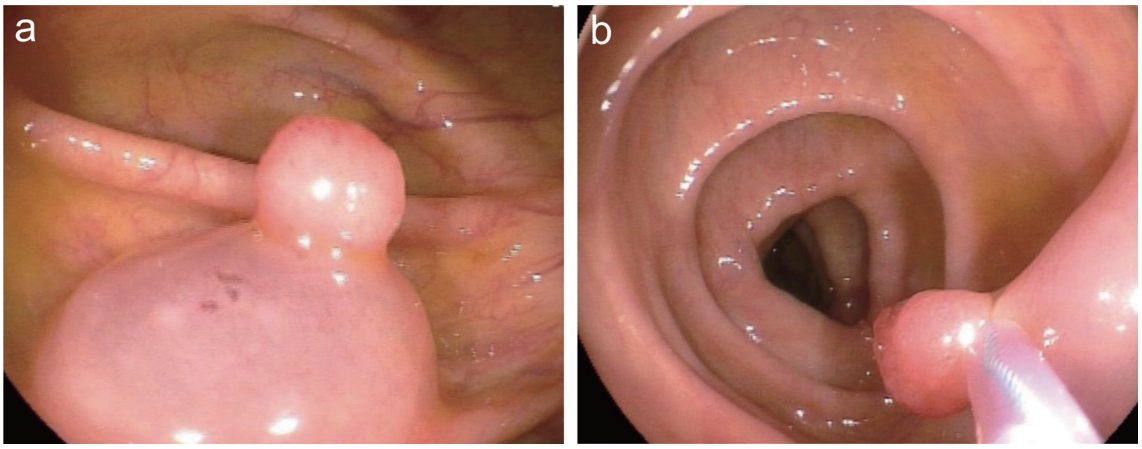

Fig. 2. Colonoscopic removal of polyps by endoscopic mucosal resection in the ascending colon and transverse colon. (a) Hypertonic saline was injected underneath the lesion in the ascending colon. (b) A snare was placed on the polyp in the transverse colon.

ber 9, CRP decreased to 4.07 mg/L after symptomatic therapy. Moreover, the NT-pro BNP and hs-TnT levels had significantly decreased to 1598 pg/mL and 167 ng/L, respectively. The patient was discharged without any recurrence of gastrointestinal bleeding after a six-month follow-up period.

Discussion

Anticoagulation has been used for various thrombotic diseases,[6] such as atrial fibrillation and lacunar infarction, which are concomitant in our patient, but periprocedural anticoagulation could increase the risk of PPB.[7] Therefore, it is of importance for patients undergoing a colonoscopic polypectomy to minimize the risk of PPB secondary to the use of warfarin and the risk of thrombosis as a consequence of warfarin withdrawal. If warfarin must be stopped, the risk of thrombosis should be assessed to determine whether heparin bridging would be required.[8] Our patient received warfarin adjustment due to the high risk of PPB and then heparin bridging for prevention of thrombosis progression; unfortunately, he developed cerebral infarction during the discontinuation of anticoagulation. No published cases of CHF and cerebral infarction in patients who had undergone a colonoscopy were found in our literature search.

The discontinuation and resumption of warfarin are essential in patients undergoing a colonoscopic polypectomy. A large retrospective study of 1657 patients who underwent a polypectomy showed that the use of warfarin during a polypectomy was associated with a significant increase in PPB.[9] A case-control study by Sawhney *et al*. showed that the resumption of warfarin or heparin within one week of a polypectomy significantly increased the risk of delayed PPB.[10] Collectively, warfarin should be discontinued during a polypectomy. Furthermore, the optimal timing of discontinuing and resuming of warfarin remains very controversial.[11] In addition, the Asian Pacific Association of Gastroenterology and Asian Pacific Society for Digestive Endoscopy practice guidelines have recommended the resumption of warfarin after adequate haemostasis.[12] In contrast, the American College of Gastroenterology and Canadian Association of Gastroenterology Clinical Practice Guideline could not reach a rec-

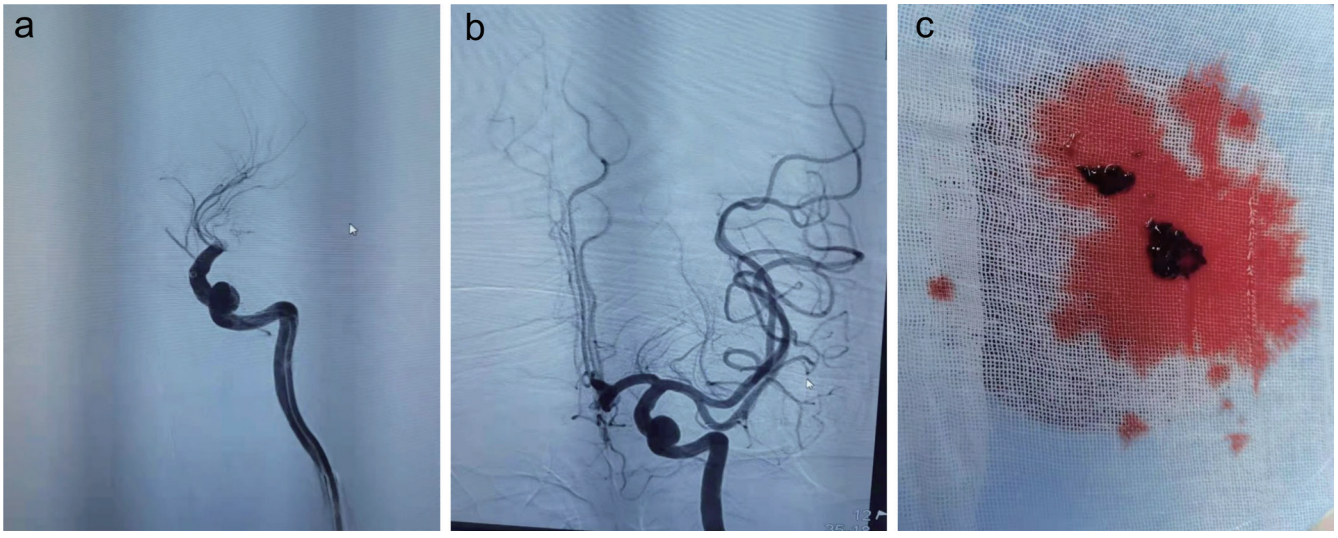

Fig. 3. Emergency cerebral angiography and stent retriever thrombectomy at the end of the left internal carotid artery. (a) Cerebral angiography before thrombectomy. (b) Cerebral angiography after thrombectomy. (c) Fresh thrombus aspirated after thrombectomy.

ommendation on whether warfarin should be resumed on the same day of a polypectomy or 1–7 days post-polypectomy.[13] The British Society of Gastroenterology and European Society of Gastrointestinal Endoscopy guidelines and Chinese guidelines on the prevention and treatment of cardiogenic stroke (2019) also recommend that warfarin should be discontinued for five days, and the INR should be less than 1.5 before a colonoscopic polypectomy is conducted in patients with a low thrombotic risk.[14,15] The former suggests that it should be resumed at a usual daily dosage on the night of the procedure, but the latter suggests that it should be resumed within 48–72 hours after a colonoscopic polypectomy in patients with a high risk of PPB. In our patient, warfarin was discontinued for six days and the INR was less than 1.5 before the polypectomy and resumed after adequate hemostasis.

LMWH, which has a shorter half-life than warfarin, can be given while warfarin is temporarily discontinued in patients with a high thrombotic risk who have had a history of a mechanical valve, rheumatic valvular disease, venous thromboembolism, or cerebrovascular accident/transient ischemic attack within the last three months.[16] However, there are several opinions on the application of LMWH for patients with a polypectomy. The American College of Chest Physicians clinical practice guidelines recommend that heparin bridging is not required for an elective polypectomy during the period of vitamin K antagonists (VKA) interruption.[17] A meta-analysis of 2601 patients undergoing a polypectomy showed that the use of heparin bridging was associated with a greater incidence of PPB compared with no heparin bridging.[18] In contrast, the most recent British Society of Gastroenterology and European Society of Gastrointestinal Endoscopy guidelines recommend that patients with a high thrombotic risk who undergo a polypectomy should commence a daily therapeutic dosage of LMWH two days after stopping warfarin,[14] take the last dosage of LMWH at least 24 hours prior to the procedure, and restart the same dosage of LMWH on the day of the procedure until a satisfactory INR is achieved. Similarly, the Chinese guidelines recommend that patients with a high thrombotic risk and bleeding risk should stop subcutaneous injection of LMWH 24 hours before a colonoscopic polypectomy and restart LMWH within 48–72 hours after the colonoscopic polypectomy until a normal INR is achieved.[15] To sum up, warfarin may be substituted temporarily by LMWH in patients with a high thrombotic risk who require to undergo high-risk endoscopic procedures. Our patient received heparin bridging due to mitral and aortic valve replacement with atrial fibrillation, thus representing a high thrombotic risk. He commenced a daily prophylactic dosage of LMWH on the day of stopping warfarin, stopped LMWH for 48 hours before the procedure, and resumed the daily prophylactic dosage of LMWH the next day after the polypectomy. More notably, in our patient, minor gastrointestinal bleeding persisted for two days during the period of heparin bridging, and thus anticoagulants were stopped again after a consultation with the patient and his relatives, which should also be a potential cause of cerebral infarction.

Anticoagulant reversal may be required in patients taking warfarin who develop massive hemorrhage, but this is associated with thromboembolism, especially in patients with a high thrombotic risk.[14] For patients receiving VKA with an INR > 2.5, 4-factor prothrombin complex concentrate is superior to fresh frozen plasma due to its greater efficacy and safety in the reversal of VKA-associated gastrointestinal bleeding.[19]

Clinical perspectives

This case aimed to comprehensively review the management of warfarin and heparin bridging after a colonoscopic polypectomy and guide clinical practice about how to avoid thrombotic and bleeding events.

Conclusions

Management of warfarin during a colonoscopic polypectomy is critical to minimize the risk of PPB. Heparin bridging may also be required in patients with a high thrombotic risk. Individualized anticoagulation strategy should be emphasized in patients with a high thrombotic risk considering that the current guidance statements are limited.

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Conflict of interest

XSQ has been an editorial board member of *Exploratory Research and Hypothesis in Medicine* since January 2020. All authors have completed the ICMJE uniform disclosure form and have no other conflict of interests to declare.

Author contributions

Study designed (XSQ), draft preparation (XTS, RW, YYZ, and XSQ), treated and followed the case (XTS, RW, WL, JQ, LL, ZCW, YL, and XSQ), and manuscript revision and approval (XTS, RW, WL, JQ, LL, ZCW, YL, and XSQ).

Ethical statement

This study was performed in accordance with the Declaration of Helsinki and approved by the Ethics Committee of General Hospital of Northern Theater Command. The patient and his relatives' written informed consents were obtained for performing all procedures.

Informed consent

The authors have obtained the patient's informed consent for publication of his clinical details.

Data availability

Not applicable.

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