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Concealed mesenteric ischemia after total knee arthroplasty: A case report

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Abstract

BACKGROUND

In critical care medicine, mesenteric ischemia (MI) is a life-threatening disease that can be present in both critically ill patients and those undergoing major surgery. For the first time, we report a case of concealed MI with a long course after knee arthroplasty.

CASE SUMMARY

A male patient underwent left total knee arthroplasty for gouty arthritis and developed a persistent fever and persistently high levels of serum infection markers after surgery. He was considered to have a periprosthetic site infection and treated with antibiotics and colchicine, periprosthetic debridement was performed, and the spacer was replaced, but no improvement was seen. At 54 d after arthroplasty, the patient developed gastrointestinal symptoms of nausea and vomiting, abdominal distention, and subsequently, cloudiness of consciousness, and hypotensive shock. Finally, the patient was diagnosed with ascending colonic mesentery ischemia with necrosis after laparotomy, which improved after right hemicolectomy.

CONCLUSION

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Concealed MI without gastrointestinal symptoms after major surgery is rare and easily misdiagnosed. Orthopedic surgeons need to be aware of this complication.

Key Words: Concealed mesenteric ischemia; Total knee arthroplasty; Complication; Case report

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Core Tip: We describe for the first time a case of concealed mesenteric ischemia (MI), a type of MI that lacks gastrointestinal signs and symptoms with fever as the only early symptom, which makes early diagnosis extremely difficult. MI often has a poor prognosis, and orthopedic surgeons must be aware of MI as a possible complication after total knee arthroplasty so that early diagnosis and intervention can be made for such concealed MI.

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INTRODUCTION

Mesenteric ischemia (MI) is not uncommon in clinical practice and can be considered either acute or chronic[1]. Chronic MI, characterized by repeated transient blood flow disturbances in the intestine, is often associated with atherosclerotic disease[2]. Acute MI is usually caused by arterial or venous thromboembolism blocking the blood supply and needs to be considered when signs such as severe abdominal pain, nausea, and vomiting with elevated levels of inflammatory markers occur after major surgery [3]. Acute MI progresses rapidly and is associated with a mortality rate of 50% to 70% [4]. We report a case of concealed MI after total knee replacement with a course different from those of acute and chronic MI; fever was the only early symptom, making early diagnosis and intervention extremely difficult.

CASE PRESENTATION

Chief complaints

A 56-year-old male patient presented to our orthopedic outpatient clinic with swelling and pain in both knees with limited range of motion for more than 6 mo.

History of present illness

Six months ago, the patient presented with swelling and pain in both knees, especially in the left knee. The pain worsened over the past 6 mo, he was unable to stand and walk, and his activities were limited.

History of past illness

The patient had a history of gout for more than 10 years and hypertension for more than 20 years. The patient underwent heart valve replacement 9 years ago and took oral warfarin 1.875 mg once daily after surgery (coagulation was never monitored during treatment with the drug). He had a history of gastrointestinal bleeding. He denied having other major medical illnesses, such as diabetes, coronary heart disease, and kidney disease, and a history of infectious diseases, such as hepatitis and tuberculosis.

Physical examination

The patient had swelling and deformities in both knees, pressure pain around both knees, an elevated skin temperature, limited range of motion in both knees, and

multiple swollen gout stones visible on both hands and both feet.

Laboratory examinations

The patient's blood uric acid level was 503 $\mu\text{mol/L}$. The international normalized ratio was 5.75.

Imaging examinations

The patient's X-ray examination showed gouty arthritis in both knees (Figure 1).

The first knee surgery

After multidisciplinary consultation, the patient underwent left-sided total knee arthroplasty because of relatively severe symptoms to regulate coagulation and renal insufficiency. Postoperative coagulation indicators showed that fibrinogen was 4.81 g/L, activated partial thromboplastin time was 43.7 s, and D-dimer was 4.7 mg/L FEU. The postoperative radiographs (Figure 2) showed good prosthesis alignment and good force lines in the lower extremities, and antibiotics anti-infection and low-molecular-weight heparin anticoagulation treatment were given postoperatively.

On the third day after surgery, the patient developed recurrent hyperthermia with a maximum temperature of 38.6 °C. The dressing on the surgical incision was dry and clean, there was no obvious bleeding or oozing from the incision, and the levels of blood flow and sensation in the left lower limb were normal. The procalcitonin, white blood cell (WBC), and C-reactive protein levels were consistently elevated, and the patient was considered to have a surgical site infection. He received anti-infection treatment for 48 d, during which the antibiotics were escalated several times and the patient was given anti-inflammatory treatment and pain relief, but there was still recurrent fever and elevated levels of inflammatory indexes.

The second knee surgery

The patient was considered to have a periprosthetic infection based on the recurrent elevated temperature and inflammatory indicator levels. We then performed a necrosectomy of the left knee joint, replaced the spacer, and performed vacuum sealing drainage. Intraoperatively, a large amount of white discharge and uric acid crystals were found in the knee joint, but no necrotic tissue or pus was observed. Three days later, the patient had a sudden onset of chest tightness and shortness of breath, nausea, and vomiting, with a temperature of 39 °C. Then the patient began to experience confusion, abdominal distention, and erratic reflux. Later, the patient developed hypotension with shock. The abdominal physical examination showed significant pressure pain in the right upper abdomen but not in the left abdomen.

The first abdominal surgery

Abdominal computed tomography (CT) showed intestinal emphysema with fluid planes and exudative changes (Figure 3A). The patient was considered to have an abdominal infection with possible intestinal necrosis and obstruction, so we immediately performed laparotomy, abdominal flushing and drainage, and terminal ileostomy. During the surgery, we found approximately 200 mL of yellowish turbid exudative ascites in the abdominal cavity, localized thickening and edema in the ascending colon, and obvious distension and dilatation in the transverse sigmoid colon. The patient was transferred to the intensive care unit (ICU) after surgery, and after fluid resuscitation, anti-infection treatment, and other symptomatic treatments, his condition improved, and his vital signs stabilized.

Twenty-eight days later, the patient developed persistent right-sided abdominal pain, fever, and bloody exudate from the stoma, followed by bloody stools. The CT examination of the patient's abdomen showed thickening of the wall of the ascending colon with multiple exudative changes around it and possible local hematoma (Figure 3B). He was transferred to the ICU again and was treated with anti-infection treatment, fluid resuscitation, and coagulation correction. The symptoms did not improve, the fever and abdominal pain were recurrent, and the inflammatory indexes did not decrease, so after his family provided permission, laparotomy was performed again due to aggravated infection.

The second abdominal surgery

Forty-two days after the first abdominal surgery, we performed laparotomy, intestinal adhesion release, and right hemicolectomy. Intraoperatively, we found congested and edematous thickening of the ascending colon, hemorrhagic exudation of the prerenal fascia, inflammatory changes in the intestinal wall mucosa, and significant local



Figure 1 Preoperative X-ray images. A and B: Left knee front and lateral radiographs; C and D: Right knee front and lateral radiographs.

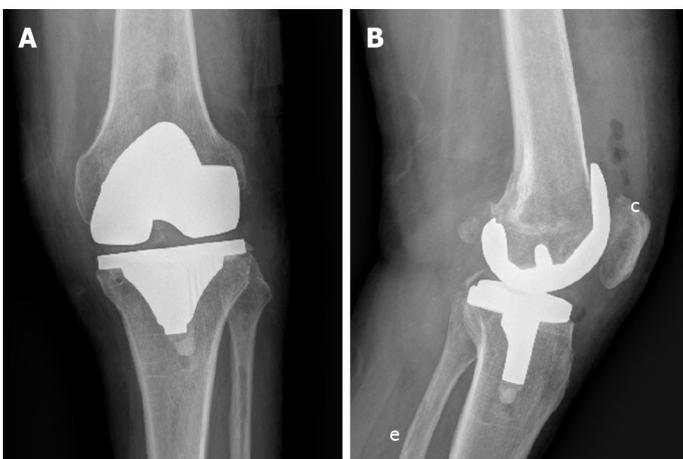


Figure 2 Postoperative front and lateral X-ray images of the left knee. A: Front X-ray image of the left knee; B: Lateral X-ray image of the left knee.

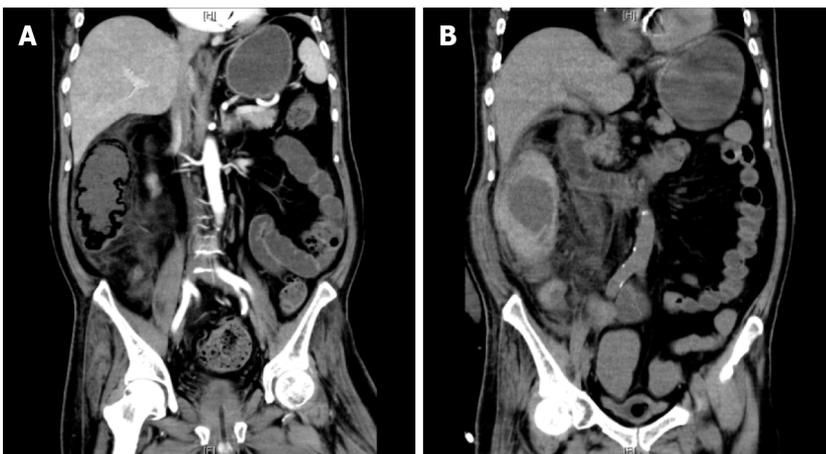


Figure 3 Abdominal computed tomography. A: The initial abdominal computed tomography (CT) showed ascending colon emphysema with fluid planes and exudative changes; B: The second abdominal CT showed thickening of the wall of the ascending colon with multiple exudative changes around it and possible local hematoma.

intestinal adhesions; right hemicolectomy was performed, and a pathological examination was performed. The patient was diagnosed with ascending colon mesenteric ischemic necrosis with infection, and the pathological findings were consistent with colonic mesenteric ischemic changes (Figure 4).

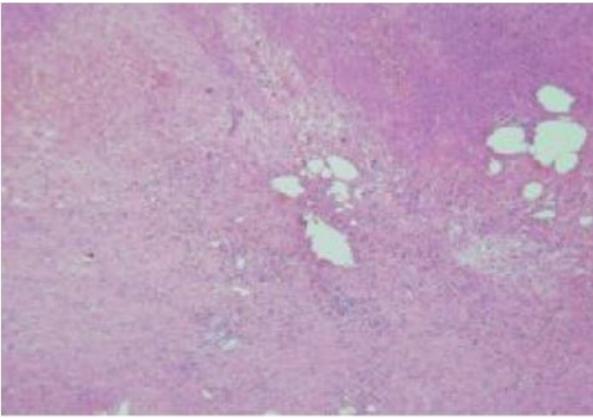


Figure 4 The pathology of the right hemicolectomy specimen showed mucosal surface erosion, inflammatory exudation, and necrosis of the intestinal canal, and the surrounding intestinal wall and mesentery were vasodilated and congested, consistent with ischemic changes of the colon.

FINAL DIAGNOSIS

The patient was diagnosed with MI after total knee arthroplasty.

TREATMENT

After total knee arthroplasty for gouty arthritis, the patient underwent knee debridement again with replacement spacers and drainage because prosthesis infection was suspected. The patient underwent laparotomy two times after developing gastrointestinal symptoms and underwent a right hemicolectomy during the final laparotomy.

OUTCOME AND FOLLOW-UP

After the second abdominal surgery with symptomatic treatment, such as anti-infection and rehydration treatment, the patient's mesenteric ischemic symptoms disappeared, the gastrointestinal function returned to normal, and the patient was eventually discharged from the hospital. The patient returned to the hospital 3 mo after discharge for ileostomy closure.

DISCUSSION

Since early intervention is crucial for the prognosis of MI, MI needs to be diagnosed early, which can be challenging[5]. When MI is suspected to exist, it can usually be diagnosed on the basis of gastrointestinal signs and symptoms combined with ischemic changes such as exudate and thickening of the intestinal wall on abdominal and bowel CT scans or direct vascular computed tomography angiography (CTA) scans in response to vascular blood flow[6,7]. It is also important to note that other diseases such as appendicitis, gastroduodenal perforation, and acute pancreatitis still need to be ruled out when MI is complicated by acute abdominal conditions such as vomiting of coffee-like contents, bloody stools, or signs of peritoneal irritation. However, in MI cases without gastrointestinal symptoms after major orthopedic surgery, such as that described in this study after total knee replacement, it is difficult to diagnose MI on the basis of only signs of fever and elevated levels of infection markers; these signs are often attributed to prosthetic infection, which is often of utmost concern to orthopedic surgeons postoperatively. When anti-infective treatment is administered for a long period and considered ineffective, it is clear that the period for early intervention has been missed, leading to the development of terminal bowel necrosis. The prognosis after intestinal necrosis is extremely poor, with a high mortality rate[8], but fortunately, with timely surgery and aggressive anti-infective

and fluid resuscitation treatment, the patient avoided a worse outcome.

We also did not perform angiography or vascular CTA, and the mechanism of MI in this patient is not clear. We speculate that postoperative thrombosis formed but probably did not involve the macrovascular and major arteries, such as the superior mesenteric artery, because thrombosis in these locations causes ischemic symptoms that are often acute and severe, such as intense spasmodic abdominal pain[3]. Although venous MI is associated with a lower mortality rate than arterial MI, more than one-third of patients require interventions other than anticoagulation[9]. Although it was difficult to make a clear diagnosis in the early stage, the inflammatory response caused by intestinal dysfunction, intestinal infection, and intestinal bacterial translocation still existed, leading to the elevation of infection index levels. We used antibiotics, anticoagulation, and symptomatic support treatment to treat the disease in the early stage, which perhaps suppressed the infection and delayed the development of the disease to a certain extent. At a later stage, gastrointestinal symptoms developed rapidly in the postoperative period, probably due to further aggravation of MI by the hypercoagulable state and possible thrombosis caused by the second knee surgery.

This rare type of concealed MI progresses slowly with an early symptom of fever only, unlike acute mesenteric ischemia and chronic mesenteric ischemia, where abdominal pain is the initial symptom[10], and it is worth thinking about how to make an early diagnosis. In this case, the patient's only early sign was fever. Considering that the patient had a history of heart valve replacement and abnormal coagulation function, there was a possibility of thromboembolism, and previous studies have shown that an elevated WBC count is a risk factor for MI progression[11,12]. After excluding blood flow disorders in the lower extremities and heart, MI is one of the complications after major surgery that needs to be considered. When patients with coagulation abnormalities present with postoperative fever, abdominal CT should also be performed routinely in the postoperative investigation.

CONCLUSION

In general, MI progresses rapidly and has a poor prognosis. When elevated levels of inflammatory markers such as WBC are present after major orthopedic surgery without obvious signs of infection around the surgical area, this complication needs to be considered promptly, even in the absence of obvious gastrointestinal symptoms so that early intervention can be performed.

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