Embolization of Inferior Epigastric Artery for Treatment of Rectus Sheath Hematoma Caused by Insulin Injection During Anticoagulation and Antiplatelet Therapy

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Rectus sheath hematoma, caused by rupture of epigastric vessel or muscle tear, is most frequently encountered in association with anticoagulation therapy, trauma, operation, and hematologic disorder. It rarely happens spontaneously. Rectus sheath hematoma related to subcutaneous injection of insulin is very rare. We report a case of percutaneous catheter-based coil embolization for treatment of rectus sheath hematoma caused by subcutaneous injection of insulin on abdomen during anticoagulation and antiplatelet therapy in an 83-year-old thin woman with diabetes.

Key Words: Hematoma, Injections, Insulin, Rectus abdominis, Embolization

INTRODUCTION

Rectus sheath hematoma is uncommon cause of abdominal pain1-3. It is caused by rupture of epigastric vessel or muscle tear. Cases of rectus sheath hematoma are most frequently encountered in association with anticoagulation therapy, trauma, operation, and hematologic disorder. It rarely happens spontaneously1-6. Most patients can be successfully treated with supportive care (intravenous fluids, pain management) with or without blood transfusion. Fewer patients had reversal of anticoagulation, endovascular embolization of suspect vessels, or surgery for rectus sheath hematoma7. In special medical condition such as high risk of continuous bleeding on anticoagulation and antiplatelet therapy, more invasive therapies with embolization of the bleeding vessel or surgery can be first line management. We report a case of percutaneous, catheter-based coil embolization for treatment of rectus sheath hematoma caused by subcutaneous injection of insulin on abdomen during anticoagulation and antiplatelet therapy in an 83-year-old thin woman with diabetes.

CASE REPORT

An 83-year-old woman complained of chest pain with nausea and vomiting for 3 hours prior to her arrival in the Emergency Department. Her body weight and height were 50 kg and 155 cm, respectively. Her body mass index (BMI) was 20.81 kg/m^2. Her past history was long standing diabetes with oral hypoglycemic agent for 10 years. Five days ago, she was hospitalized with behavioral abnormalities and memory impairment at other hospital where a brain magnetic resonance imaging (MRI) was performed. The brain MRI demonstrated acute infarction in the area of left middle cerebral artery. Under the diagnosis of acute cerebral infarction, she was treated with anticoagulation therapy using low molecular weight heparin. After development of cerebral infarction, serum glucose was poorly controlled. Three days
ago, she was switched from oral hypoglycemic agent to injection of subcutaneous insulin to control serum glucose. After initial subcutaneous injection of insulin on the left abdomen, she suffered abdominal pain and swelling at the injection site of insulin. On the course to subside abdominal pain and swelling, she complained of dull nature chest pain. She was referred to the emergency department of our hospital.

In the Emergency Department, her blood pressure was 120/70 mmHg with pulse rate at 70 beats/min and body temperature at 36.9°C. An electrocardiogram showed a ST-segment elevation in leads V2-5. Laboratory tests revealed elevated levels of troponin I (2.99 ng/mL) and creatine kinase-myoglobin (18.8 ng/mL). Echocardiography showed mild decreased left ventricular systolic dysfunction (EF=46% by biplane method) with akinesia in the left anterior descending coronary artery (LAD) territory. Under the diagnosis of ST segment elevation myocardial infarction (STEMI) at anterior wall, she underwent a coronary angiography (CAG) via the right femoral artery. Before the CAG, she took loading dose of aspirin 300 mg and clopidogrel 300 mg administrated on a continuous infusion of heparin after bolus injection of heparin. CAG showed significant stenosis of the mid portion of LAD. We tried to dilate the LAD lesion with balloon and then deployed the drug eluting stent in the LAD lesion. Finally, the LAD had good distal flow.

The next day, she complained of an aggravated abdominal pain and swelling at the injection site of insulin. At that time, her blood pressure was 82/47 mmHg with pulse rate of 96 beats/min and body temperature at 36.8°C. Physical examination demonstrated ecchymosis and tenderness at injection site of insulin. Her hemoglobin dropped from 10.6 to 6.3 g/dL in 35 hours. The initial activated partial thromboplastin time was 48.5 seconds. Post percutaneous coronary intervention activated partial thromboplastin time was 89.2 seconds. To evaluate her abdominal pain, a contrast enhanced abdominal CT revealed a round and heterogeneous density mass in rectus sheath measuring at size of 11.3×6.5 cm with a fluid-fluid level suggesting rectus sheath hematoma (Fig. 1A). The contrast implied active bleeding of left epigastric artery (Fig. 1B). The subcutaneous layer was very thin at 11 mm by CT image (Fig. 1A). Under the diagnosis of rectus sheath hematoma caused by perforation of left epigastric artery, we stopped the infusion of heparin and performed left iliac artery and left inferior epigastric artery angiogram via unremoved right femoral artery sheath. Angiogram revealed no active bleeding focus along left inferior epigastric artery probable due to spontaneous compression by large hematoma. Left epigastric artery embolization was performed to prevent delayed bleeding with gelfoam slurry and one 3/2 mm microcoil (0.018 inch Tomade Platinum Microcoils, Cook Medical Inc., Bloomington, IN, USA) (Fig. 1C, D). There was no arterial flow along distal to embolized left inferior epigastric artery after procedure. After embolization, the abdominal pain and swelling subsided gradually. After five days, nonenhanced abdominal CT revealed similar finding without interval change (Fig. 1E). After two months, follow-up abdominal CT showed that the hematoma decreased in size to 5.3×3.5 cm (Fig. 1F).

**DISCUSSION**

Rectus sheath hematoma is uncommon cause of abdominal pain or abdominal wall mass. It is frequently misdiagnosed with other intra-abdominal diseases. Common features and symptoms of rectus sheath hematoma are abdominal pain, palpable abdominal mass, fever, nausea, vomiting, hypovolemic shock with general weakness, pallor, and diaphoresis. It is caused by rupture of epigastric vessels or direct tear of the rectus muscle caused by external trauma, abdominal surgery, pregnancy, intensive contractions of the rectus muscle such as coughing or straining at the stool, yoga, and abdominal wall injection. The other predisposing factor is anticoagulation therapy with heparin, low molecular weight heparin, warfarin, and antiplatelet agents. Rectus sheath hematoma is reported in many cases under anticoagulation.

In our case, the patient was treated anticoagulation therapy including low molecular weight heparin at other hospital and heparin, aspirin, clopidogrel in our hospital. Generally, insulin is injected to the subcutaneous fat, the fat layer just below the skin. Therefore, making a lifted skin fold by fingers is required to put the needle in at 45° angle to avoid injecting into the muscle. In this case, patient’s BMI was only 20.8 kg/m². Her thickness of subcutaneous layer was very thin at 11 mm by CT image, whereas the length of needle for subcutaneous injection of insulin was 8 mm in length. If the subcutaneous insulin injection technique was not appropriate, due to the minimal difference of thickness between subcutaneous layer and needle length, the left epigastric artery might be perforated by subcutaneous injection of insulin, resulting in persistent bleeding under...
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Fig. 1. (A, B) Contrast enhanced abdominal computed tomography (CT) revealing a round and heterogeneous density mass in rectus sheath measuring at size of 11.3×6.5 cm (white arrow), suggesting rectus sheath hematoma and active bleeding of left epigastric artery (white arrowhead). (C, D) In left iliac artery angiogram, a selective left inferior epigastric arteriogram showed no evidence of active bleeding (black arrow) but successful embolization of left epigastric artery (black arrowhead). (E) After 5 days, abdominal CT revealed the same finding without interval change (white arrow). (F) Follow-up CT performed 2 months later revealed that the hematoma (white arrow) was significantly decreased.

Anticoagulation therapy. Two cases reproof rectus sheath hematoma caused by insulin injection have been previously reported.\textsuperscript{9,10}

Most patients with rectus sheath hematoma can be successfully treated with symptomatic management such as analgesia and blood transfusion.\textsuperscript{1,7,11} If a reversal of anticoagulation was necessary, vitamin K, protamine sulfate, and fresh frozen plasma can be injected. However, few patients (25%) have reversal of anticoagulation.\textsuperscript{1} This management is less attractive in patients with high-risk indications for anticoagulation such as a mechanical valve in the mitral position or recurrent pulmonary embolus. More invasive treatments can be considered for unstable patients who are unresponsive to conservative treatments. Angiography with embolization of epigastric vessel should be attempted in unstable patients.\textsuperscript{4,11-13}

In this case, she was at acute stage of cerebral infarction at one day after percutaneous coronary intervention for STEMI. The reversal of anticoagulation such as the injection of vitamin K, protamine sulfate, and fresh frozen plasma was a method with high risk due to recurrence of cerebral infarction and acute stent thrombosis. Therefore, we decided to perform percutaneous mechanical embolization without reversing anticoagulation. Our patient was successful in angiographic embolization. If angiography with embolization was unsuccessful, surgical treatment was the next choice.\textsuperscript{6,13}

Anticoagulation and antiplatelet therapy always have a risk of bleeding and hematoma. Under anticoagulation, subcutaneous injection of insulin should be performed carefully to thin abdominal subcutaneous tissue. When disease progresses to life-threatening state that it does not respond to supportive management, continuing symptomatic treatment could make the situation worse. Early detection of hematoma progression and early invasive interventional management are necessary, especially for elderly patients who require anticoagulation and antiplatelet therapy.

Conflict of Interest Disclosures: The researchers claim no conflicts of interest.

REFERENCES