A Case of Rectus Sheath Hematoma with Spontaneous Inferior Epigastric Artery Injury Treated Successfully by Angioembolization

Dong Eun Lee, M.D., Jae Yun Ahn, M.D.*, Sungbae Moon, M.D.

Department of Emergency Medicine, Kyungpook National University School of Medicine, Daegu, Korea

Rectus sheath hematoma with spontaneous inferior epigastric artery injury (IEAI) is rarely found and can often be mistaken for something else causing abdominal pain. We present the case of rectus sheath hematoma with spontaneous IEAI caused by coughing in a 61-year-old woman. She presented to our emergency department with a chief complaint of right-lower quadrant pain after severe coughing. An abdominal computed tomography scan with contrast enhancement demonstrated rectus sheath hematoma with active hemorrhage; angiography with selective embolization of the right inferior epigastric artery was performed successfully without complication. Even if a patient with nontraumatic abdominal pain had no anticoagulant therapy or coagulopathy, an abdominal contrast-enhanced computed tomography scan is essential for early diagnosis of spontaneous IEAI. Arteriography with selective embolization of the injured arteries is useful and highly effective in the control of ongoing hemorrhage owing to IEAI.

Key Words: Abdominal pain, Angiography, Epigastric arteries, Embolization, therapeutic, Rupture, Spontaneous

Introduction

Rupture or injury of the inferior epigastric artery (IEA) is not only rare but also a potentially life-threatening condition. Most cases of injured IEA have occurred after blunt abdominal trauma or iatrogenic intervention such as paracentesis, percutaneous peritoneal dialysis catheter insertion, surgical drainage, and trocar placement for laparoscopy. Although a few studies have reported that inferior epigastric artery injury (IEAI) could occur spontaneously in patients with anticoagulation therapy or coagulopathy, spontaneous IEAI in patients without anticoagulant or coagulopathy has been rarely reported previously. We report a rare case of spontaneous rupture of IEA following frequent coughing in a 61-year-old woman who was successfully treated by transcatheter arterial embolization.

Case Report

A previously healthy 61-year-old woman presented to our emergency department with a complaint of right lower quadrant abdominal pain, and fever for 2 days. She had developed a cough 2 weeks before admission, but was observed without medications. She felt the sudden onset of right lower quadrant abdominal pain after severe coughing, which occurred 2 days before admission. She visited a local clinic where a transabdominal ultrasonography was performed, and the result showed a mass-like lesion in the abdominal muscle. She was then referred to our emergency department.

On admission, her blood pressure was 165/101 mmHg, heart rate was 93 beats/min, and body temperature was 37.7°C. She denied any history of trauma or acupuncture in the right lower quadrant area. Her past medical history included gastric polypectomy in the previous year. She took no medications, including anticoagulants, and had...
no allergies. Physical examination revealed irreducible, palpable swelling in the right lower quadrant, with tenderness over the area of the swelling. There was no rebound tenderness, guarding, or ecchymosis. The other physical examination results were normal.

Initial laboratory data provided the following results: white cell count, $13.62 \times 10^3/\text{mm}^3$ with 77.6% neutrophils; hemoglobin, 12.5 g/dL; hematocrit, 33.6%; platelet count, $297 \times 10^3/\mu\text{L}$; erythrocyte sedimentation rate, 6 mm/h; C-reactive protein, <0.29 mg/dL. The results of other blood tests were within normal ranges: prothrombin time, 11.1 s; activated partial thromboplastin time, 33.9 s; international normalized ratio, 1.02.

As the patient had persistent symptoms and her body temperature of 37.7°C, we administered systemic hemostatic agents (vitamin K1 10 mg and botropase 2 mL) considering the possibility of hematoma, and empirical intravenous antibiotics (2 g cefotaxime sodium and 500 mg metronidazole) considering the possibility of infection. Plain abdominal radiography was unremarkable. An abdominal computed tomography (CT) scan with contrast enhancement revealed a heterogeneous hematoma $80 \times 43 \times 42$ mm in size, with high density and active contrast extravasation in the right lower rectus abdominis muscle (Fig. 1). Although her hemoglobin level was 11.6 g/dL after 12 hours of admission and vital signs were stable, the patient’s pain was persistent and CT findings suggested that active bleeding was continuing. We consulted the interventional radiology team, who performed a selective right IEA angiogram (Fig. 2). The result revealed right IEA1, and right IEA embolization was successfully performed with a gelfoam pledget and three 3-mm tornado coils (Fig. 2). No complications occurred during the procedure. Her symptoms gradually improved and hemoglobin levels stopped decreasing. The patient was discharged 7 days after admission. After one month, she visited the outpatient department of vascular surgery for follow-up. The palpable mass in the right lower quadrant of the abdomen discovered during her physical examination on admission had disappeared without any further complications.

### Discussion

IEA originates from the external iliac artery and extend across the inguinal ring up to the umbilicus. Within the abdominal muscle, inferior epigastric arteries extend through the transversalis fascia and linea semicircularis, ultimately arriving between the rectus abdominis muscle and posterior lamella. Since the inferior epigastric arteries are located in a relatively superficial layer of the abdominal muscle, they are prone to injury by iatrogenic procedures of the abdomen, such as suture, paracentesis, and surgical drainage. Predisposing factors for spontaneous rectus sheath hematoma include the following factors: (1) over contraction or overstretching of the

---

Fig. 1. Abdominal computed tomography images. Axial (A) and coronal (B) plane abdominal computed tomography scans demonstrate a rectus sheath hematoma with extravasation of intravenous contrast (white arrow).
muscle as a result of coughing, sneezing, straining, twisting, or vomiting; (2) weakness of the vessel wall or decrease in muscular resistance as a result of hypertension, arteriosclerosis, old age, obesity, pregnancy, previous surgery, trauma, or inflammatory disease; and (3) diseases characterized by a tendency to bleed or that require the use of anticoagulants\textsuperscript{6,7}). In our case, we can conclude that the IEA was ruptured as a result of over-contraction of the muscle during coughing.

The acute abdominal pain associated with the rectus sheath hematoma caused by IEAI can mimic other causes such as peritonitis, incarcerated hernia, ovarian pathology, ruptured abdominal aneurysm, appendicitis, diverticulitis, pancreatitis, periappendicular abscess, ectopic pregnancy, and Spigelian hernia\textsuperscript{8}). The typical symptom is an abrupt onset of severe, usually unilateral, abdominal pain that increases with movement. Physical examination frequently shows a palpable tender mass that may be helpful in its diagnosis\textsuperscript{9}). The Fothergill and Carnett signs can help to differentiate rectus sheath hematoma from other causes. For the Fothergill sign, if a mass is produced by hematoma, it remains fixed and doesn’t cross the mid line when the patient lifts their head or leg in supine position\textsuperscript{8,9,10}). For the Carnett sign, the pain and tenderness increase with palpation or remain unchanged when raising head or shoulders in supine position\textsuperscript{9,11}). Other late findings include Cullen sign (periumbilical ecchymosis) and Grey Turner sign (flank ecchymosis)\textsuperscript{9}). It is very important to question the patient about underlying diseases or conditions and any precipitating event or procedures and to perform an abdominal examination. The diagnosis should be suspected by patient history and physical examination.

Rectus sheath hematoma caused by IEAI is detected using abdominal ultrasonography, contrast-enhanced abdominal CT, and CT angiography. Although ultrasonography may rapidly provide information about the mass size, location, and physical characteristics, it is an operator-dependent modality which is difficult in confirming the diagnosis or evaluating the exact extent of the hematoma\textsuperscript{12}). A contrast-enhanced abdominal CT scan is a commonly used diagnostic modality and mostly diagnosed accurately. CT provides additional information about the extent of the hematoma and possible presence of

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image}
\caption{Angiographic images. (A) Angiogram of selective inferior epigastric artery shows a blush of contrast (arrow). (B) Embolization of the right inferior epigastric artery with a tornado coil was successfully done.}
\end{figure}
active bleeding, and helps physicians determine the plan of treatment\textsuperscript{13,14}. The sensitivity and specificity of contrast-enhanced CT for demonstrating active arterial bleeding are 70\% and 100\%, respectively. Due to its relatively less sensitivity, if ongoing bleeding is clinically suspected, CT angiography may be additionally required\textsuperscript{13,13}).

Most cases of rectus sheath hematoma have a favorable outcome with conservative management\textsuperscript{15}. The overall mortality rate has been estimated about 4\% and mortality rate rise up to 25\% in patients with anticoagulation treatment\textsuperscript{16,17}. Nevertheless, one retrospective review of IEAI revealed 20 cases over a 12-year period, with a 30-day mortality rate of 30\%.\textsuperscript{18} Arteriography with selective embolization of the epigastric arteries has been demonstrated to be useful and highly effective in the control of abdominal wall hemorrhage owing to IEAI\textsuperscript{18}. Surgery can be considered when bleeding cannot be controlled by interventional radiology, concomitant abdominal compartment syndrome even when there is no active bleeding, or if there is evidence of an infection of the hematoma\textsuperscript{11}.

Emergency physicians and clinicians frequently face a patient complaining of abdominal pain. Spontaneous IEAI is a rare cause of abdominal pain in adults, which can be fatal and often be mistaken for other acute intra-abdominal pathologies. A sufficient level of suspicion and appropriate investigations are important for avoiding a misdiagnosis and unnecessary surgery. In this case, we illustrated the importance of a thorough evaluation and proper intervention in a patient with spontaneous rupture of the IEA following frequent coughing episodes. We highlight the diagnostic value of performing contrast-enhanced CT in the arterial phase and performing an arteriography with selective embolization for patients with signs of instability or ongoing bleeding.

References