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CASE REPORT

미세코일 색전술로 치료된 대량 복수 천자 후 발생한 가성동맥류에 의한 심한 복강내 출혈

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Severe Intraperitoneal Hemorrhage from Pseudoaneurysm after a Large-volume Paracentesis, Successfully Treated with Microcoil Embolization

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Large-volume paracentesis-induced intraperitoneal hemorrhage due to pseudoaneurysm formation is rarely reported. Here, we present a 56-year-old man with alcoholic liver cirrhosis admitted for massive ascites. Large-volume paracentesis was performed. Three days later, he became pale and complained of dyspnea and abdominal distention with hypotension. Percutaneous iliac angiography revealed contrast media leakage from a branch of the left circumflex iliac artery with pseudoaneurysm. He was successfully treated with microcoil embolization. Several days later, ascitic fluid increased and large-volume paracentesis was performed again. Two days later, his hemoglobin level suddenly decreased. An abdominal computed tomography scan showed new active bleeding at the left lower lateral peritoneal cavity, just anterior to the metalic coils. Percutaneous iliac angiography revealed contrast media extravasation from a branch of the left inferior epigastric artery with formation of collateral vessel. Percutaneous embolization was successfully performed again. After coil embolization, there were no further bleeding episodes. **(Korean J Gastroenterol 2018;71:162-167)**

Key Words: Paracentesis; Pseudoaneurysm; Hemorrhage; Liver cirrhosis; Angiography

INTRODUCTION

Ascites is a common complication of liver cirrhosis with portal hypertension. It has been known that a large-volume paracentesis is an effective and safe procedure for managing massive and refractory ascites.[1] The reported incidence of hemorrhagic complication of paracentesis is about 1%, and severe hemorrhagic complication requiring transfusion is much less common.[1,2] Furthermore, intraperitoneal hemorrhage from pseudoaneurysm, occurring after a large-volume paracentesis, has rarely been reported to date.[3] Here, we present highly unusual case with consecutive occurrence of intraperitoneal hemorrhage from pseudoaneurysms of circumflex iliac and inferior epigastric arteries after a large-volume paracentesis in a patient with alcoholic liver cirrhosis, which was successfully managed with coil embolization.

CASE REPORT

A 56-year-old man with alcoholic liver cirrhosis was admitted

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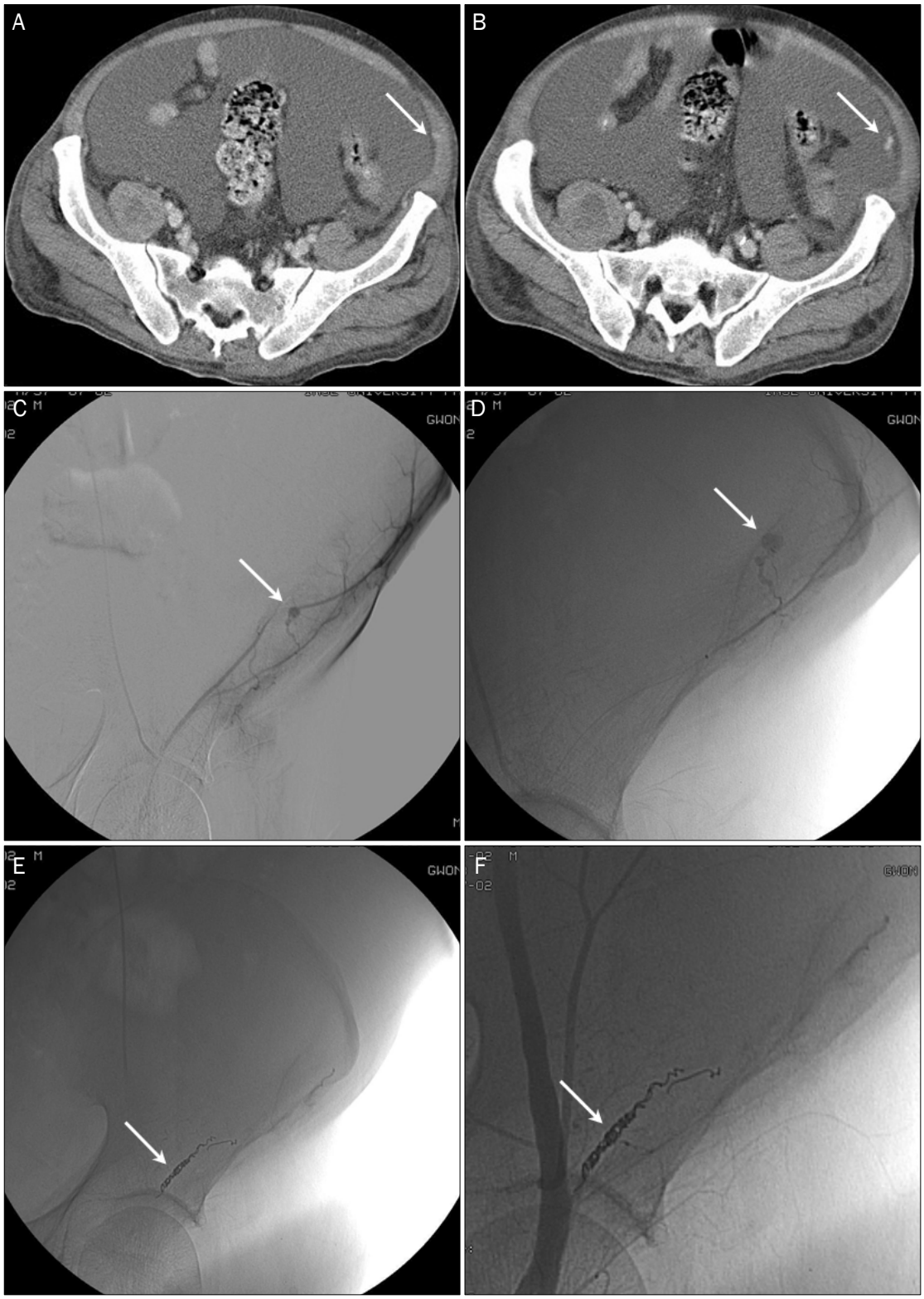

Fig. 1. The findings of abdominal CT and percutaneous iliac angiography. (A, B) CT shows active bleeding (arrow) on the left lower lateral peritoneum. (C, D) Percutaneous iliac angiography shows leakage of contrast media (arrow) from the branch of left superficial circumflex iliac artery. (E, F) After embolization with microcoils (arrow), no evidence of bleeding is seen the left iliac angiogram. CT, computed tomography.

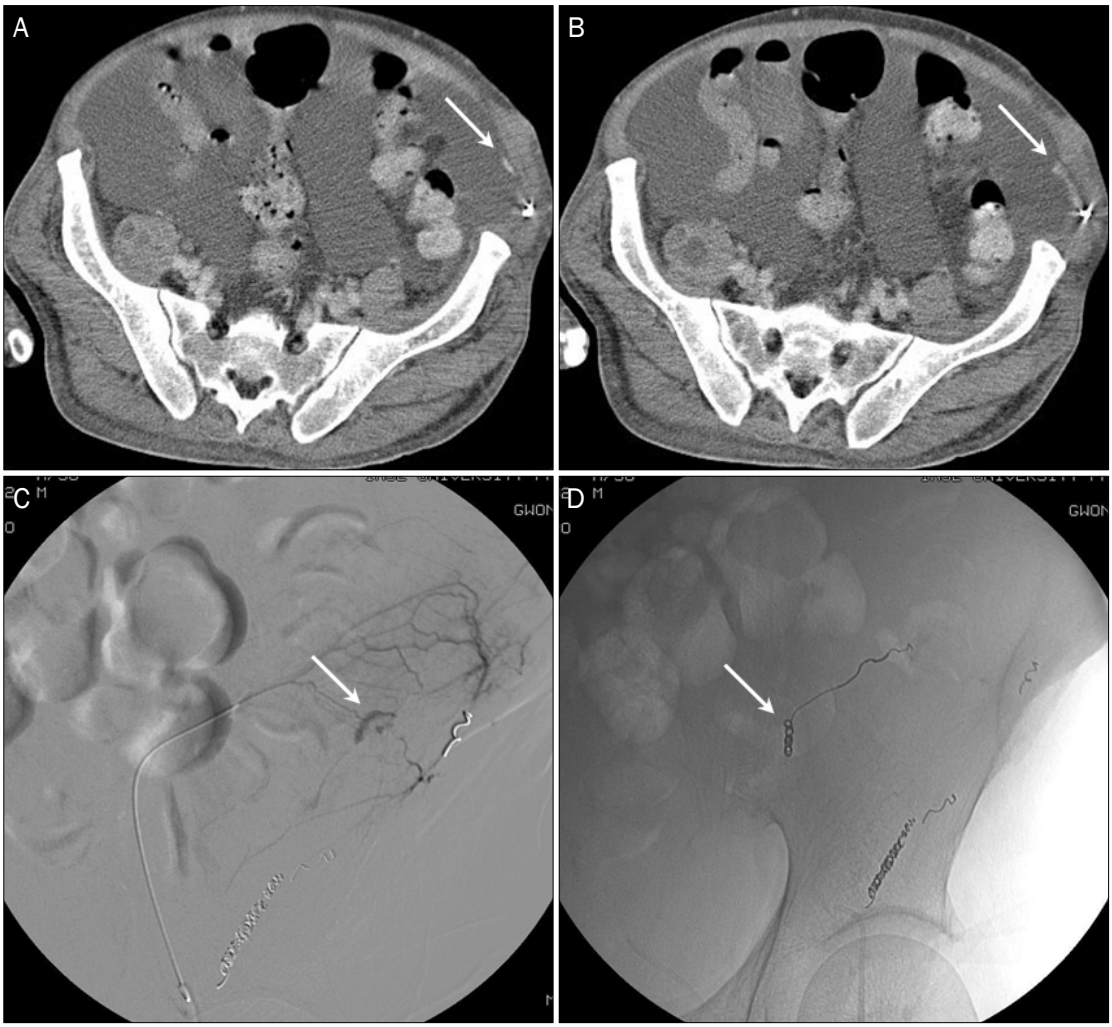

Fig. 2. The findings of abdominal CT and percutaneous iliac angiography. (A, B) CT shows a new active bleeding focus (arrow) on the left lower lateral peritoneal cavity anterior to metalic coils. (C) Extravasation of contrast media (arrow) from the branch of left inferior epigastric artery was shown. (D) Microcoil embolization (arrow) was performed.

for abdominal distention and dyspnea due to massive ascites. On presentation, laboratory data were remarkable: hemoglobin, 8.7 g/dL (normal range: 13.0-17.0 g/dL); hematocrit, 26% (39-52%); white blood cell count, 11,420/mm^3 (4,000-10,000/mm^3); platelet, 101,000/mm^3 (150,000-400,000/mm^3); serum alanine transaminase, 31 IU/L (0-41 IU/L); serum total protein, 6.2 mg/dL (6.7-8.3 mg/dL); serum albumin, 2.3 mg/dL (3.8-5.3 mg/dL); total bilirubin, 8.2 mg/dL (0.2-1.0 mg/dL); prothrombin time international normalized ratio, 2.26; blood urea nitrogen, 17.0 mg/dL (7-22 mg/dL); and serum creatinine, 0.9 mg/dL (0.5-1.3 mg/dL). A large-volume, ultrasound-guided paracentesis (4 L) was performed in the left lower quadrant of the abdomen using a 16-gauge needle. He tolerated the procedure well; his vital signs were stable.

Three days after the procedure, the patient became pale with sudden onset of dyspnea and abdominal distention. His blood pressure was 60/40 mmHg, with a pulse rate of 140 beats per minute and a respiration rate of 22 beats per minute. The level of blood hemoglobin had fallen from 7.6 mg/dL to 3.0 mg/dL in a single day. The possibility of gastrointestinal bleeding was excluded due to negative findings of a nasogastric lavage and digital rectal examination. Subsequent diagnostic paracentesis showed grossly bloody ascitic fluid with 13% hematocrit and a red blood cell count of 1,260/mm^3. Computed tomography (CT) scan of the abdomen and pelvis revealed acute bleeding in the left peritoneum and a large amount of hemoperitoneum (Fig. 1A, B). Percutaneous iliac angiography was performed immediately, revealing a leak-

age in a branch of the left circumflex iliac artery with pseudoaneurysm (Fig. 1C, D). Percutaneous embolization was successfully performed with 10 microcoils (Fig. 1E, F). After coil embolization, there was no evidence of bleeding, and the level of hemoglobin increased to 9.6 mg/dL after a transfusion of 12 units of packed red blood cells. Vital signs remained stable without further blood transfusion. Sixteen days after the first paracentesis, more than 3 L of ascitic fluid was removed again due to abdominal distension, and there was no evidence of newly developed bleeding. Two days later, there were no changes in vital signs, but the hemoglobin level decreased to 4.9 mg/dL. CT scan of the abdomen and pelvis revealed a new active bleeding at the left lower lateral peritoneal cavity, just anterior to metalic coils, and an increased amount of ascites (Fig. 2A, B). Percutaneous iliac angiography revealed a leak from a branch of the left inferior epigastric artery with formation of collateral vessel originating from the previous bleeding site (Fig. 2C). Percutaneous embolization was successfully performed using 6 microcoils (Fig. 2D). After coil embolization, there was no evidence of bleeding. Thereafter, the serum creatinine level increased and urine volume decreased continuously, suggesting clinical and laboratory features of hepatorenal syndrome. Ten days after the most recent procedure, he died of acute intracerebral and intraventricular hemorrhage.

DISCUSSION

Pseudoaneurysm is a well-recognized complication after surgery, arterial puncture, and trauma.[4,5] However, pseudoaneurysm formation and life-threatening bleeding, following abdominal paracentesis, is rare. Lam et al. reported, for the first time, 2 cases of inferior epigastric artery pseudoaneurysms following therapeutic paracentesis in ascitic patients.[3] In their experience, these two patients were treated by percutaneous embolization accomplished by placing multiple Gianturco coils in the inflow and outflow arteries. In the present case, we experienced pseudoaneurysms of both the inferior epigastric artery and circumflex iliac artery following a large-volume paracentesis resulted in severe intraabdominal hemorrhage and hypovolemic shock. To the best of our knowledge, consecutive occurrence of pseudoaneurysms of the circumflex iliac as well as the inferior epigastric arteries after paracentesis has never been reported. Percutaneous iliac angiography with microcoils immediately induced successful hemostasis. Although the patient died 10 days after the recent procedure, the cause of death was intracerebral and intraventricular hemorrhage, and not a recurrence of bleeding from pseudoaneurysms in the abdomen.

In case of hemorrhagic complications after abdominal paracentesis, symptoms and signs may include abdominal wall hematoma, abdominal distension and pain, tenderness, palpable nonpulsatile mass, dyspnea, and even hypovolemic shock.

Various factors may contribute to bleeding during or after paracentesis. When paracentesis is performed by an inexperienced operator, these complications may be more frequent.[6] However, Pache and Bilodeau reported that bleeding may not related to the experience of the operator.[7] Direct puncture of the superficial abdominal wall vein, collateral vein, or mesenteric varices may also bring abdominal wall hematoma or intraperitoneal hemorrhage.[8-10] In cases of hemorrhage from mesenteric varices, sudden reduction in intraperitoneal pressure after a large-volume paracentesis increases the pressure gradient across the wall of mesenteric varices, resulting in a rupture and bleeding. In the present case, a direct needle injury to the intraabdominal vessels during paracentesis may have contributed to the development of pesudoaneurysms, which provoked severe intraabdominal hemorrhage due to the pressure gradient across the wall of pseudoaneurysm after paracentesis.

Prolonged prothrombin time or thrombocytopenia may increase bleeding tendency. Recently, Lin et al. reported that severe hemorrhagic complication may occur more frequently in patients with liver disease than previously thought, and a low fibrinogen level is an independent predictor of bleeding events in patients with poor liver function.[11] However, on reviewing the previous literatures and recent practice guidelines, mild coagulopathy does not seem to be a contraindication for paracentesis.[2,7,10-13] Paracentesis is not recommended in cases when there is clinically evident fibrinolysis, disseminated intravascular coagulation, and serious coagulopathy.[1,2] The optimal levels of prothrombin time and platelet count for safe paracentesis are still controversial and routine prophylactic transfusion of fresh plasma or platelet before paracentesis is not recommended.[2,7,12,13] Severe liver failure with a high score of model for end stage liver disease or high Child-Pugh score and pre-existing renal dysfunction

are often associated with these hemorrhagic complications.[7]

For detection of pseudoaneurysm, a high-resolution duplex color doppler sonography is recommended because it is noninvasive, allows for the evaluation of turbulent flow within the pseudoaneurysm dynamically, and does not necessitate an administration of contrast media.[3,5] Moreover, enhanced CT scan and percutaneous angiography help identify localization, size, and extent of pseudoaneurysm. However, much attention should be paid to renal azotemia in patients with decreased renal function.[4,14] A retrospective review recommends that contrast medium-enhanced CT scan can be used to make a diagnosis and percutaneous embolization can be an effective treatment to control hemorrhage.[14] Percutaneous embolization has advantages, including minimal invasiveness and not needing contrast media; hence, it might be a preferred modality in patients with underlying renal dysfunction and poor surgical condition.[5]

In our case, we identified the approximate site of intraperitoneal bleeding using an enhanced CT scan. We could successfully treat it using percutaneous angiography.

The management of pseudoaneurysm include surgery for cases with larger pseudoaneurysms and embolization for cases with smaller lesions.[3,4,15] For the first time, Lam et al. reported that therapeutic paracentesis caused large pseudoaneurysm of the inferior epigastric artery, which was treated by a percutaneous coil embolization.[3] Ferrer et al. proposed that a surgical method might be appropriate for larger lesions and embolization for smaller lesions.[4] However, to date, there is no definite indication on which mode of treatment should be considered for pseudoaneurysm.

To avoid these hemorrhagic complications, including pseudoaneurysm, the following considerations should be noted. The procedure should be performed by an experienced operator or at least under proper supervision. The lower quadrant or avascular midline below the umbilicus should be preferred. Surgical scar should be avoided because the bowel is likely to adhere to the peritoneal wall beneath scar. Rectus muscle in which superficial and inferior epigastric vessels run and visible collateral veins on the abdomen should be avoided. On puncture, a small caliber needle should be preferred.[1,16] Ultrasonography-guided paracentesis is safer than blind puncture, especially in patients with tense ascites. Because inferior epigastric artery is displaced more laterally, due to distention and stretching of the abdominal wall, it is more liable to injury during paracentesis.[17,18]

In conclusion, pseudoaneurysm following therapeutic paracentesis is a rare complication; nonetheless, it can be fatal as it leads to massive bleeding. Here, we presented an unusual case of intraperitoneal hemorrhage from concurrent pseudoaneurysms of both the circumflex iliac and inferior epigastric arteries after a large-volume paracentesis in a patient with alcoholic liver cirrhosis, which was successfully managed using coil embolization.

REFERENCES

1. Runyon BA. Paracentesis of ascitic fluid. A safe procedure. Arch Intern Med 1986;146:2259-2261.
2. Runyon BA; Practice Guidelines Committee, American Association for the Study of Liver Diseases (AASLD). Management of adult patients with ascites due to cirrhosis. Hepatology 2004;39:841-856.
3. Lam EY, McLafferty RB, Taylor LM Jr, et al. Inferior epigastric artery pseudoaneurysm: a complication of paracentesis. J Vasc Surg 1998;28:566-569.
4. Ferrer JV, Soriano P, Zazpe C, Vicente F, Herrera J, Lera JM. Pseudoaneurysm of the inferior epigastric artery. Pathogenesis, diagnosis, and treatment. Arch Surg 1996;131:102-103.
5. Gage TS, Sussman SK, Conard FU 3rd, Hull D, Bartus SA. Pseudoaneurysm of the inferior epigastric artery: diagnosis and percutaneous treatment. AJR Am J Roentgenol 1990;155:529-530.
6. Runyon BA. Ascites and spontaneous bacterial peritonitis. In: Feldman M, Friedman LS, Sleisenger MH, eds. Sleisenger & Fordtran's Gastrointestinal and Liver Disease: Pathophysiology, Diagnosis, Management. Volume 2. 7th ed. Philadelphia, PA: W.B. Saunders Company, 2002;1517-1542.
7. Pache I, Bilodeau M. Severe haemorrhage following abdominal paracentesis for ascites in patients with liver disease. Aliment Pharmacol Ther 2005;21:525-529.
8. Martinet O, Reis ED, Mosimann F. Delayed hemoperitoneum following large-volume paracentesis in a patient with cirrhosis and ascites. Dig Dis Sci 2000;45:357-358.
9. Arnold C, Haag K, Blum HE, Rössle M. Acute hemoperitoneum after large-volume paracentesis. Gastroenterology 1997;113:978-982.
10. Webster ST, Brown KL, Lucey MR, Nostrant TT. Hemorrhagic complications of large volume abdominal paracentesis. Am J Gastroenterol 1996;91:366-368.
11. Lin S, Wang M, Zhu Y, et al. Hemorrhagic complications following abdominal paracentesis in acute on chronic liver failure: a propensity score analysis. Medicine (Baltimore). 2015;94:e2225
12. Lin CH, Shih FY, Ma MH, Chiang WC, Yang CW, Ko PC. Should bleeding tendency deter abdominal paracentesis? Dig Liver Dis 2005;37:946-951.
13. Grabau CM, Crago SF, Hoff LK, et al. Performance standards for therapeutic abdominal paracentesis. Hepatology 2004;40:

484-488.
14. Sobkin PR, Bloom AI, Wilson MW, et al. Massive abdominal wall hemorrhage from injury to the inferior epigastric artery: a retrospective review. J Vasc Interv Radiol 2008;19:327-332.
15. Makund A, Kumar Dp, Condati NK, Bhadoria AS, Sarin SK. Efficacy and safety of ultrasound guided percutaneous glue embolization in iatrogenic haemorrhagic complications of paracentesis and thoracocentesis in cirrhotic patients. Br J Radiol 2018;91:20170259.
16. Mallory A, Schaefer JW. Complications of diagnostic paracentesis in patients with liver disease. JAMA 1978;239:628-630.
17. Park SW, Choe WH, Lee CH, et al. Transcatheter embolization of a pseudoaneurysm of the inferior epigastric artery with N-butyl cyanoacrylate. Br J Radiol 2008;81:e64-e67.
18. Takase K, Kazama T, Abe K, et al. Pseudoaneurysm of the inferior epigastric artery successfully treated by ultrasound-guided compression. Cardiovasc Intervent Radiol 2004;27:520-522.