

# **Hemoperitoneum due to Ruptured Paraumbilical Vein in a Cirrhotic Patient with Portal Hypertension: Treatment by means of Coil Embolization<sup>1</sup>**

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The paraumbilical vein is one of the anastomotic channels between the portal and systemic circulatory systems, and rupture of the intra-abdominal varix is an unusual complication of portal hypertension that can lead to life-threatening hemoperitoneum. We experienced a case of hemoperitoneum due to a ruptured paraumbilical vein revealed by ultrasonography (US), computed tomography (CT) and percutaneous transhepatic portography. The last mentioned demonstrated a dilated paraumbilical vein draining two branches of the left portal vein into the right external iliac vein, and we performed coil embolization at the site at which the presumed site of paraumbilical vein was presumed to cause hemoperitoneum. We describe this unusual case of hemoperitoneum due to a ruptured paraumbilical vein in a known liver cirrhosis patient in whom portal hypertension was treated by means of coil embolization.

**Index words :** Peritoneum, hemorrhage  
Portography  
Hypertension, portal

It is well known that portal hypertension opens the anastomotic channels between the portal and systemic circulatory systems. The major such channel is the paraumbilical vein. Hemoperitoneum due to intraperitoneal variceal bleeding is an uncommon complication in cirrhotic patients with portal hypertension. Our review of the literature brought to light 21 cases of intraperitoneal ruptured variceal bleeding (1, 2), though no such case has been reported in Korea. We describe a case in which this unusual intra-abdominal bleeding from a ruptured paraumbilical vein was treated by means of coil embolization.

## **Case Report**

A 40-year old woman with known alcoholic cirrhosis was admitted to our hospital with abdominal pain, abdominal distension, and jaundice, symptoms which had developed three days earlier. Physical examination revealed icteric sclera, anemic conjunctiva, and a palpable mass, about 10 cm in size, at the mid lower abdomen. Laboratory examination showed a hemoglobin level of 5.05 gm/dl, WBC 14,900/mm<sup>3</sup>, and total bilirubin 11.6 mg/dl. At presentation, the patient was hypotensive, with systolic blood pressure of 90 mmHg. Emergency ultrasound revealed a heterogeneous hyperechoic mass in the mid abdominal wall and another hyperechoic mass in the mid lower abdominal cavity (Fig. 1A). In addition, a dilated paraumbilical vein extending from the left portal vein to the umbilicus was seen in the right paramedial abdominal wall (Fig. 1B). Computed tomography following intravenous contrast administration re-

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vealed a high density hematoma in the left paramedial abdominal wall and mid lower abdominal cavity, and an enhanced dilated paraumbilical vein extending from the left portal vein to the abdominal wall hematoma (Fig. 2). A GI bleeding  $^{99m}\text{Tc}$ -RBC scan demonstrated a linear vessel like structure on the right paramedial side of the abdomen and tracer uptake in the mid lower abdomen (Fig. 3), and this was taken to be a dilated paraumbilical vein bleeding intra-abdominally. After conservative treatment, we first attempted direct percutaneous puncture of this vein under ultrasonic guidance, and performed coil embolization. The attempt failed, however, so we considered percutaneous transhepatic portography and coil embolization via the portal vein. We first punctured the right portal vein under ultrasonic guidance and inserted a 4-F gliding catheter (Cobra type, Terumo) in the main portal vein via a guide wire. Direct percutaneous transhepatic portography revealed a dilated paraumbilical vein originating from two branches of the left portal vein, heading toward the umbilicus, and communicating with the external iliac vein (Figs. 4A, 4B). Coil embolization of this dilated vein which originated from the superior and inferior branches of the left portal vein, involved the placement of spring coils (Cook, Bloomington, U. S. A.) at the umbilical recess level, and nearly complete occlusion was achieved (Fig. 4C). The coils used were one 3 cm  $\times$  8 mm, one 3 cm  $\times$  5 mm, and two 5 cm  $\times$  5 mm in the superior branch of the left portal vein; and one 5 cm  $\times$  8 mm, two 3 cm  $\times$  5 mm, and one 5 cm  $\times$  5 mm in the inferior branch of this vein.

After the procedure, the patient's blood pressure was stabilized at 120/80 mmHg, her hemoglobin level remained above 10 gm/dl, and no more bleeding occurred. Follow up CT scans obtained one month later showed a markedly decreased resolving hematoma in the abdomen (Fig. 5).

## Discussion

Spontaneous bleeding from an intraperitoneal varix is a rare condition, and the first such case was reported by Ellis et al in 1958 (3).

Among the anastomotic channels between the portal and systemic circulatory systems, the paraumbilical vein follows the path of the falciform ligament of the liver and anastomoses the anterior abdominal wall vein with the branches of the left portal vein. The umbilical vein normally collapses after birth, and in adults forms the ligamentum teres. With the development of portal hypertension, however, the umbilical vein may recanalize and serve as a porto-systemic collateral route. This condition is known as Cruveilhier-Baumgarten syndrome, defined by Armstrong et al. as liver cirrhosis with portal hypertension, systemic collateral venous circulation including dilated umbilical or paraumbilical vein, caput medusa, venous hum, and splenomegaly (4). The case we describe involves liver cirrhosis and includes portal hypertension, splenomegaly and a dilated paraumbilical vein, and is thus considered to be Cruveilhier-Baumgarten syndrome.

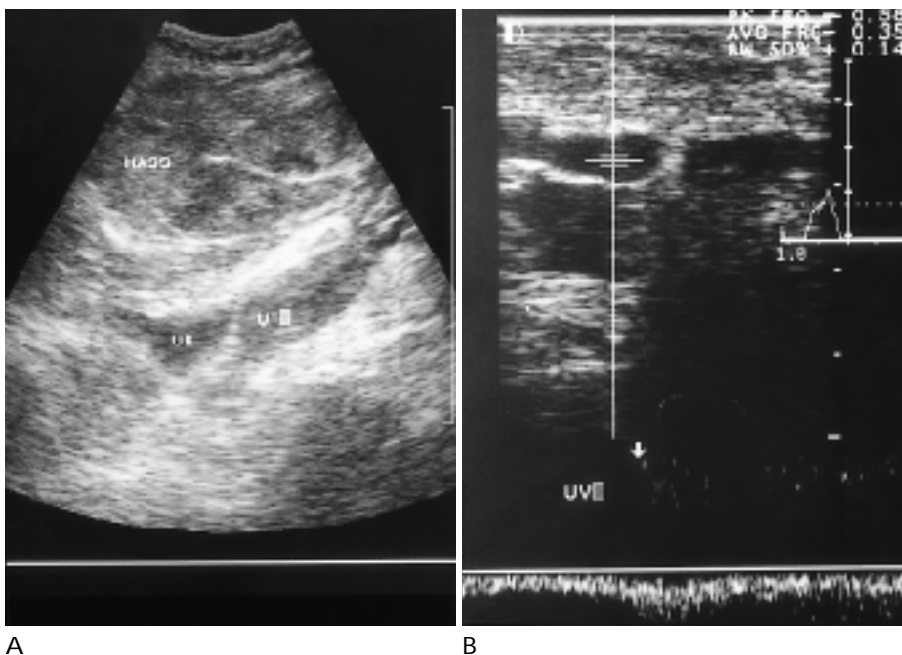


Fig. 1. A. Transverse sonogram in lower abdomen shows heterogeneous hyperechoic mass of hematoma in lower abdominal cavity. B. Longitudinal sonogram shows dilated paraumbilical vein in abdominal wall.

There is controversy as to whether recanalization of the umbilical vein occurs in portal hypertension or whether this vein simply fails to be obliterated during development in patients in whom it is patent. Using percutaneous transhepatic portography, Aagaard et al reported a 26% incidence of umbilical vein patency in 107 patients with liver cirrhosis (5). Lafortune et al found no examples of portosystemic shunting via the umbilical vein in portal hypertension (6), but reported an increase in the number and caliber of the paraumbilical vein in 12% of their patients. The issue of recanalization versus congenital patency of the portal vein is thus unresolved,

and the fact remains that some portal hypertensives use the umbilical or paraumbilical vein as a porto-systemic collateral pathway.

A special characteristic of the paraumbilical vein is the absence of valves. Anson and McVay have claimed that in cases of portal hypertension, the diameter of the portal vein may be similar to that of the little finger, and that these veins are anastomosed with a vein from the gall bladder, the lesser omentum, and the lesser curve of the stomach (7). We therefore believe that rupture of a dilated paraumbilical vein could be the cause of this intra-abdominal bleeding. We have found 21 cases of vari-

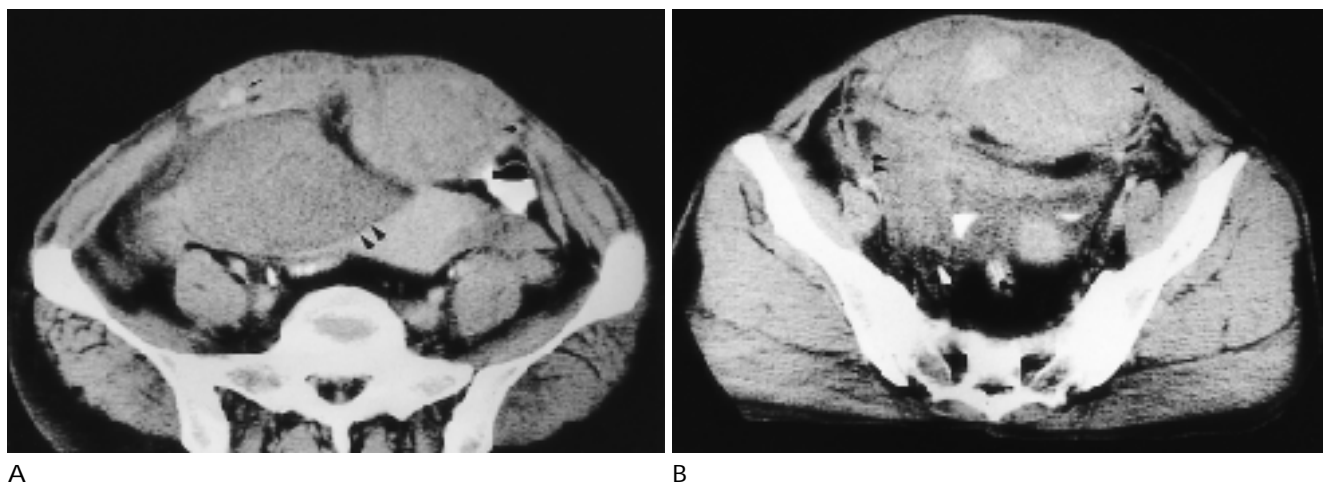


Fig. 2. Contrast enhanced pelvic CT.

A, B. Contrast enhanced CT obtained at iliac bone level (A) and more inferior level than A. (B) shows large hematoma in left abdominal wall (arrowhead) and intraperitoneal pelvic cavity (double arrowhead). Note prominent right inferior epigastric vein (arrow).

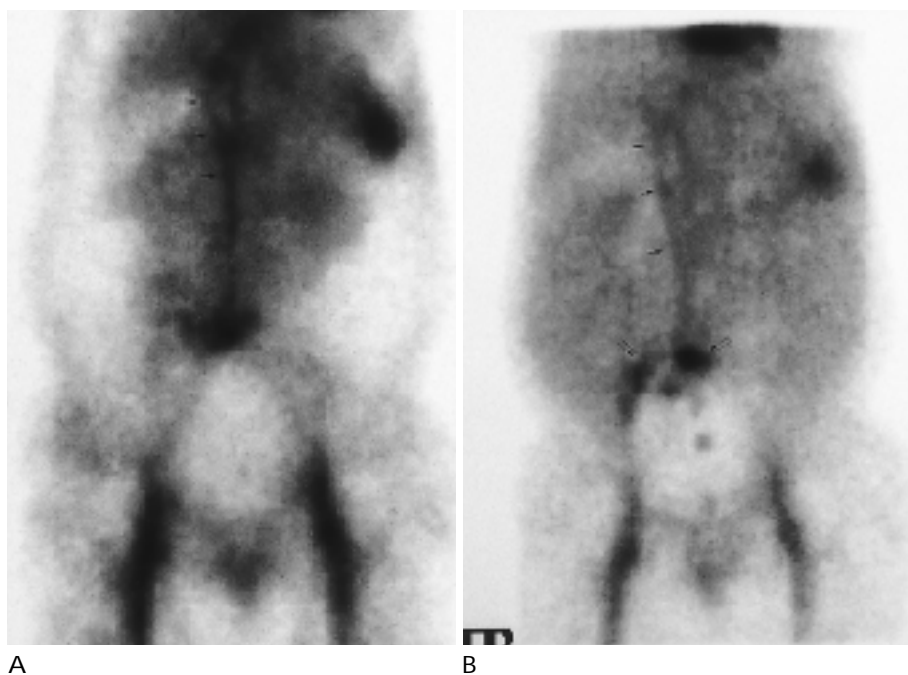


Fig. 3. GI bleeding  $^{99m}\text{Tc}$ -RBC scan.

A, B. Early 15 minutes image (A) shows vertical oriented linear structure presumed to be paraumbilical vein in right paramedian abdomen (arrows) and delayed 4 hours image (B) also shows focal tracer uptake at mid-lower abdomen suggesting active state intraabdominal bleeding (double arrows)

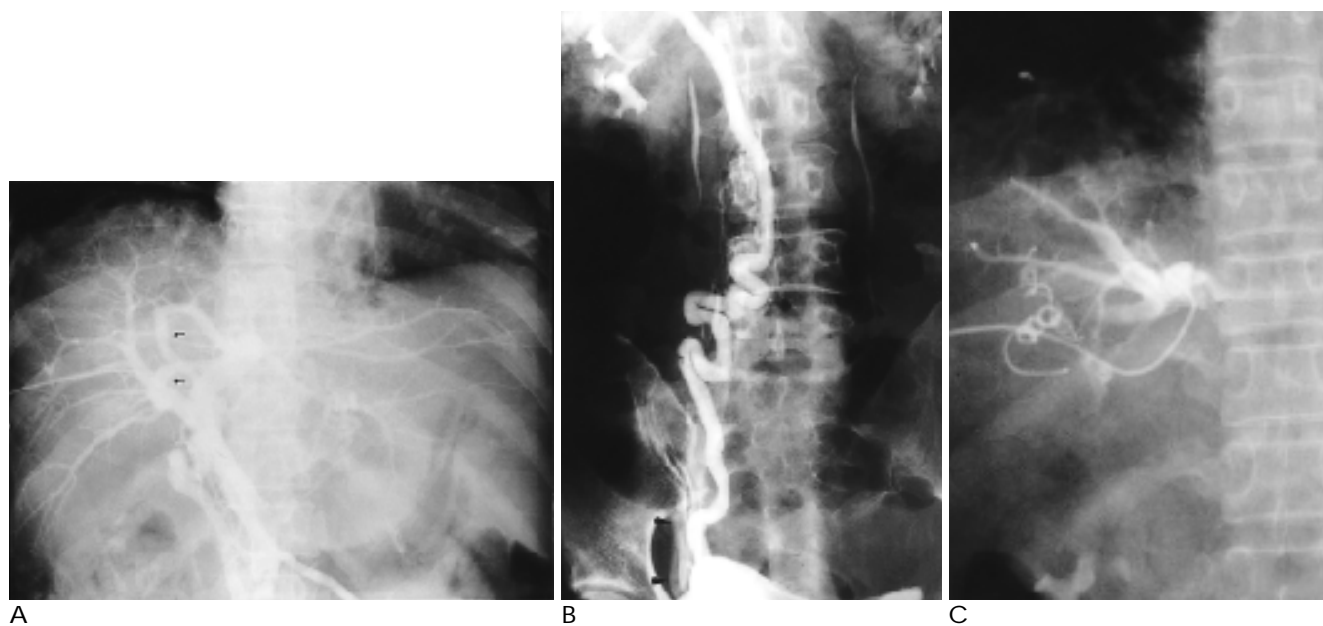


Fig. 4. Percutaneous transhepatic portography.

A, B. Percutaneous transhepatic portography shows dilated paraumbilical vein originated from two branches (arrows) of left portal vein heading toward umbilicus, and drained into the right external iliac vein (arrowhead).

C. After Coil embolization at proximal level of paraumbilical vein, no flow into dilated paraumbilical vein is noted.

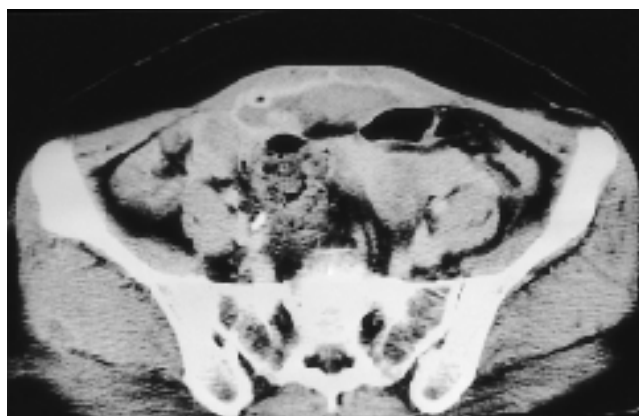


Fig. 5. Follow-up CT scans after 1 month showed markedly decreased size of the hematoma in abdomen.

ceal bleeding following intraperitoneal rupture, and six of these were shown to be due to rupture of a paraumbilical vein involved in surgery.

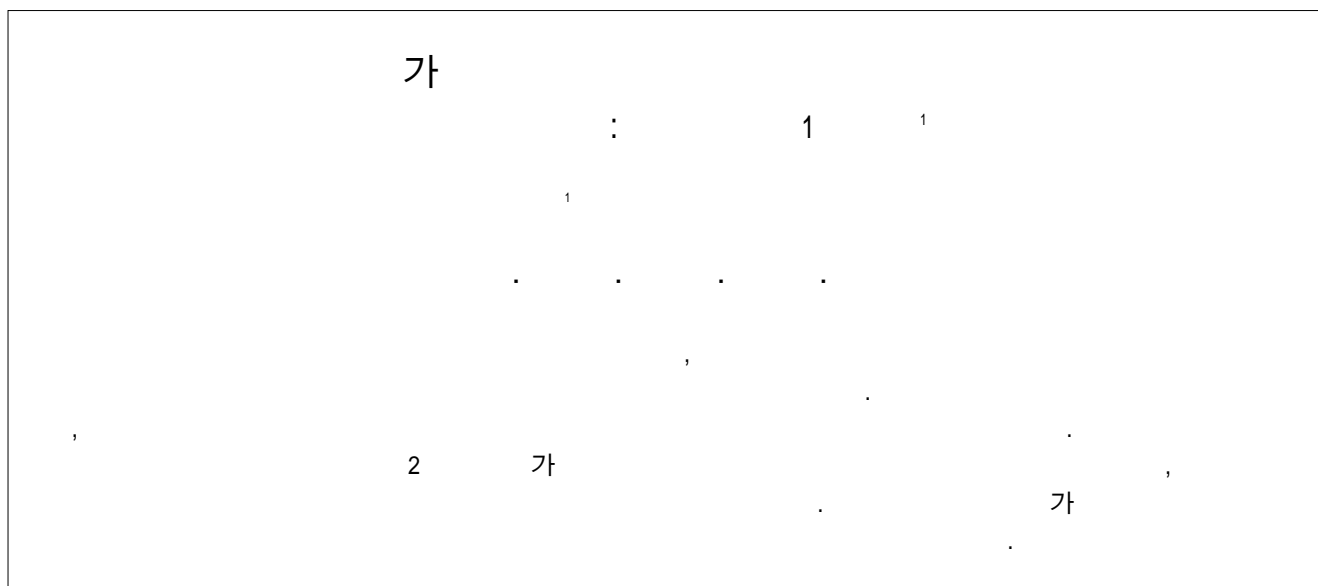
Characteristic findings in patients with cirrhosis and intraperitoneal hemorrhage are, as in our case, pain, abrupt abdominal distension and hypovolemic shock. Paracentesis plays an important role in the diagnosis of intraperitoneal hemorrhage. In our case, computed tomography revealed intra-abdominal hematoma in the paramedial abdominal wall and mid lower abdominal cavity, and to confirm intra-abdominal bleeding, we therefore immediately performed paracentesis. In many reported cases of hemoperitoneum resulting from

variceal bleeding, early recognition and operative intervention, with ligation of the varix, are critical features of successful management (8). To identify the dilated paraumbilical vein and locate the focus of bleeding, we planned to perform percutaneous transhepatic portography, and to this end considered coil embolization rather than surgical intervention. To our knowledge, there are many reports of transhepatic portal venous embolization of varices (9), but no report has described coil embolization of the paraumbilical vein in hemoperitoneum due to ruptured intra-abdominal varix in a cirrhotic patient with portal hypertension. Intuitively, it may appear that occlusion of these large collateral umbilical veins would increase portal pressure and lead to increased variceal bleeding, but no association has been found between umbilical vein patency and portal pressure. A large patent paraumbilical vein does not, therefore, effectively relieve portal hypertension, prevent gastroesophageal varices, or protect against variceal bleeding and ascites (10). In summary, in cases in which a cirrhotic patient with portal hypertension complains of acute abdominal pain, or shock which cannot be explained by other factors, the possibility of hemoperitoneum due to ruptured intra-abdominal varix should be borne in mind. Once hemoperitoneum is diagnosed, identification of the paraumbilical vein and the control of bleeding requires immediate percutaneous transhepatic portography. Coil embolization can then be performed.

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