

[ CASE REPORT ]

## Internal Pancreatic Fistula with Pleural Effusion Showing Elevated Levels of Amylase That Emerged 29 Years after Abdominal Surgery

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### Abstract:

A 65-year-old woman presented to a hospital with complaints of dyspnea and lumbar pain. Chest computed tomography (CT) showed left pleural effusion. Thoracentesis showed pleural effusion with elevated levels of amylase. Enhanced CT showed fluid accumulation from the thoracic crus of the diaphragm to the left iliopsoas muscle. Based on the postoperative notes following left nephrectomy performed 29 years ago, we suspected that the internal pancreatic fistula had resulted from the postoperative scar. Conservative management was performed. However, occlusion of the pancreatic fistula failed. Subsequently, she underwent pancreatic body tail spleen merger resection, and the pleural effusion disappeared.

**Key words:** internal pancreatic fistula, pleural effusion, pancreatitis, amylase, iliopsoas muscle

(Intern Med 59: 1427-1431, 2020)

(DOI: 10.2169/internalmedicine.4258-19)

### Introduction

Pancreatic fistula was mentioned or referenced by Rommelaere in 1877. It is defined as the leakage of pancreatic fluid into unphysiological channels (1, 2). Traumatic pancreatic pleural effusion was reported to account for <10% of all pancreatic pleural effusion cases (2). Pancreatic fistula after pancreatic resection has been occasionally reported; however, reports of pancreatic fistula following nephrectomy are rare.

We herein report a case of pancreatic fistula with left pleural effusion, ascites, and fluid in the left iliopsoas muscle that occurred approximately 29 years post-nephrectomy.

### Case Report

A 65-year-old woman presented to a hospital in June 2018 with complaints of dyspnea and lumbar pain. Chest computed tomography (CT) showed left pleural effusion (Fig. 1). Diagnostic thoracentesis showed exudative pleural

effusion, elevated levels of amylase, and low levels of adenosine deaminase (Table). She had an anamnestic history of left renal cell carcinoma and breast cancer. Therefore, the pleural effusion was considered to be malignant. She was later admitted to our hospital for an intensive examination and treatment.

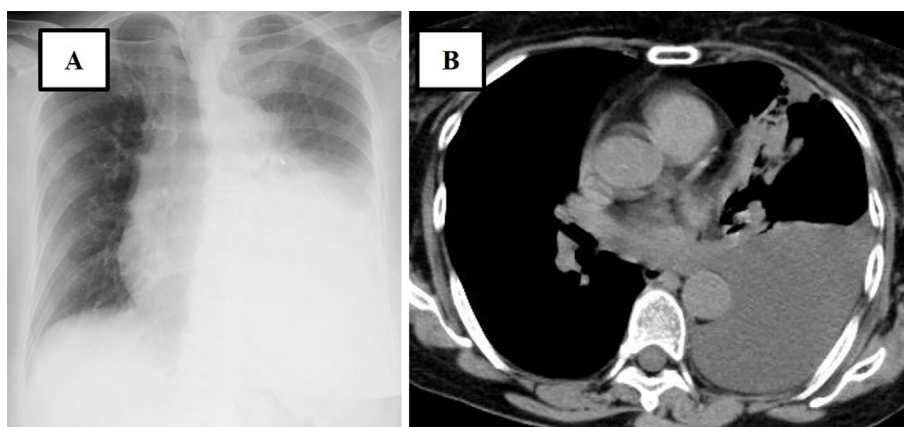
Whole-body contrast-enhanced CT additionally showed fluid accumulation from the thoracic crus of the diaphragm to the left iliopsoas muscle (Fig. 2). When she had undergone left nephrectomy via a transperitoneal approach 29 years earlier, the diaphragm had healed up to the upper surface of the left kidney. Therefore, the left diaphragm was removed with the tumor. This part of the diaphragm was then sutured with a Teflon patch. Based on her history, we suspected that the internal pancreatic fistula had emanated from a postoperative scar and led to the left pleural effusion, ascites, and fluid in the left iliopsoas muscle.

Since internal pancreatic fistula was suspected, magnetic resonance cholangiopancreatography (MRCP) was performed, but the internal pancreatic fistula remained unconfirmed. Consequently, endoscopic retrograde cholangiopan-

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Received for publication November 27, 2019; Accepted for publication January 20, 2020

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**Figure 1.** Chest X-ray (A) and chest computed tomography (B) showed left pleural effusion.

**Table.** Laboratory Data on Admission.

| [Blood] |                              |           |            | [Pleural effusion]        |                 |
|---------|------------------------------|-----------|------------|---------------------------|-----------------|
|         |                              |           |            | property                  | pale bloody     |
| WBC     | 8,300 / $\mu$ L              | AMY       | 338 U/L    | Neut                      | 22.5 %          |
| Neut    | 73.5 %                       | S-AMY     | 16.2 %     | Eos                       | 10.5 %          |
| Eos     | 5.0 %                        | P-AMY     | 83.8 %     | Lym                       | 29.0 %          |
| Lym     | 15.5 %                       |           |            | Mono                      | 18.5 %          |
| RBC     | $408 \times 10^4$ / $\mu$ L  |           |            | Mac                       | 16.5 %          |
| Hb      | 12.1 g/dL                    |           |            | Mesothelial cells         | 2.5 %           |
| MCV     | 90.7 %                       | CEA       | 1.2 ng/mL  | pH                        | 7.8             |
| Plt     | $29.0 \times 10^4$ / $\mu$ L | CYFRA     | 1.1 ng/mL  | Protein                   | 4.3 g/dL        |
| Na      | 143 mEq/L                    | ProGRP    | 40.3 pg/mL | Sugar                     | 89 mg/dL        |
| Cl      | 111 mEq/L                    | CA19-9    | 19 U/mL    | LDH                       | 604 U/L         |
| K       | 3.9 mEq/L                    | CA15-3    | 7.7 U/mL   | hyaluronic acid           | 9,130 ng/mL     |
| AST     | 12 U/L                       | CA125     | 153.2 U/mL | CEA                       | 1.0 ng/mL       |
| ALT     | 8 U/L                        |           |            | Cell number               | 3,358 / $\mu$ L |
| TP      | 6.4 g/dL                     | IGRA      | Negative   | ADA                       | 20.9 U/L        |
| Alb     | 3.1 g/dL                     | A antigen | 0          | AMY                       | 4,500 U/L       |
| LDH     | 181 U/L                      | B antigen | 0          |                           |                 |
| BUN     | 11.4 U/L                     |           |            | Pleural effusion cytology | Negative        |
| Cr      | 0.73 mg/dL                   |           |            | Mycobacteria culture      | Negative        |
| CRP     | 4.38 mg/dL                   |           |            |                           |                 |
| BS      | 98 mg/dL                     |           |            | Tb-PCR                    | Negative        |
|         |                              |           |            | MAC-PCR                   | Negative        |

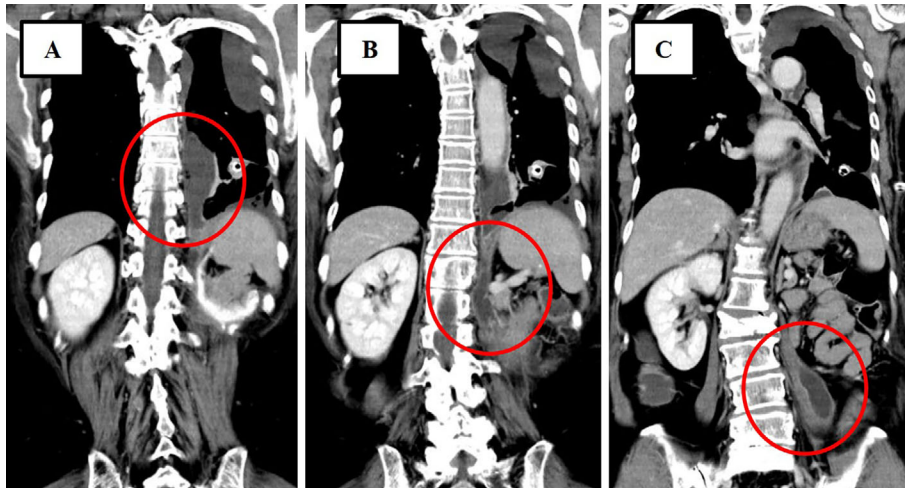
IGRA: Interferon-Gamma Release Assays, ADA: Adenosine deaminase, Tb-PCR: Tuberculosis-Polymerase Chain Reaction, MAC-PCR: Mycobacterium Avium Complex-Polymerase Chain Reaction

creatography (ERCP) was performed, and the imaging agent was observed to accumulate in the left side of the vertebral body. Abdominal CT also revealed that the imaging agent was leaking from the pancreas (Fig. 3).

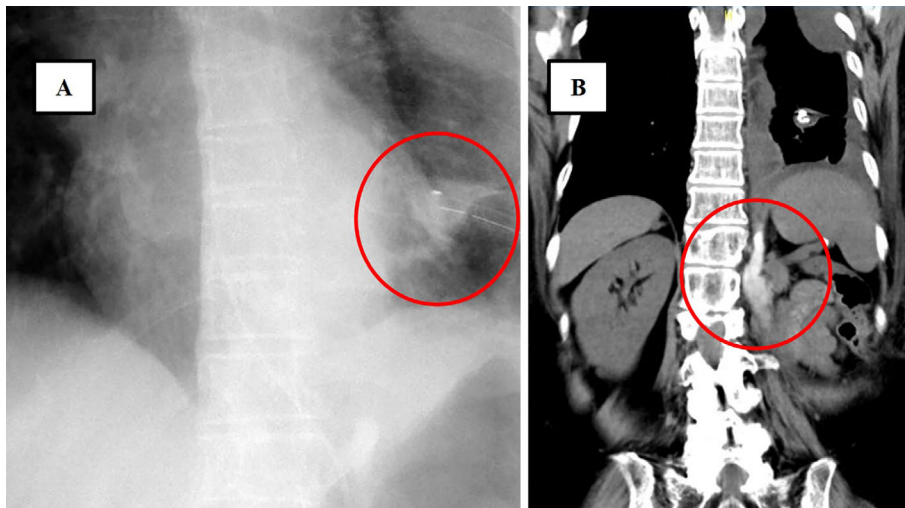
The course of treatment is described below. As conservative management, she was instructed to fast and given intravenous hyperalimentation along with endoscopic nasopancreatic drainage (ENPD) for four weeks. However, the pleural effusion and elevated serum amylase levels persisted; the occlusion of the pancreatic fistula thus failed. To provide a permanent cure, she received pancreatic body tail spleen merger resection.

Intraoperative findings showed that the pancreatic body was severely conglutinated with the anterior surface of the spleen, back face of the pancreas, and anterior surface of the spleen strongly crushed. No visible internal pancreatic fistula was confirmed.

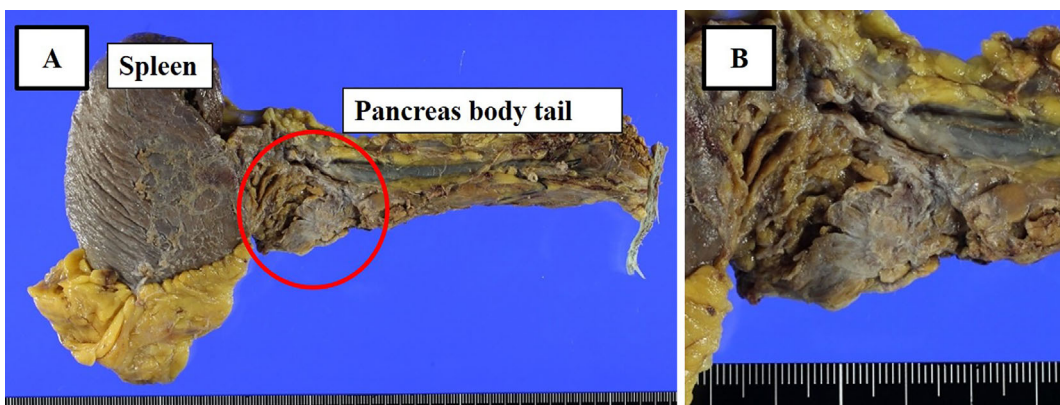
A hard, discotic mesh was found under the left diaphragm. No apparent abscess was confirmed in front of the left iliopsoas. The pathological findings showed artificial fibers, sclerosis, and chronic inflammation of the pancreas in the pancreatic body. Tissue melting was confirmed in the interspinous space in the tail of the pancreas. Acute necrotizing pancreatitis was suspected (Fig. 4).



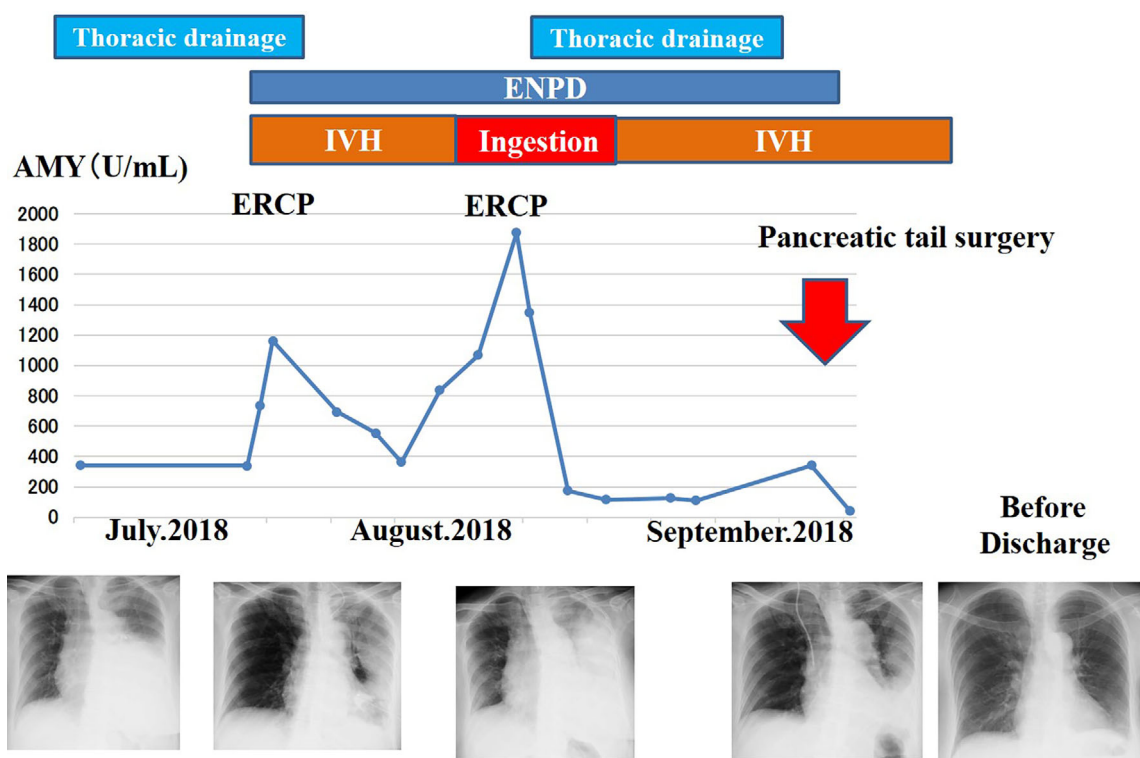
**Figure 2.** Contrast-enhanced thoracoabdominal computed tomography showing fluid accumulation in the left chest cavity (A), left crus of the diaphragm (B), and left iliopsoas muscle (C).



**Figure 3.** The accumulation of the contrast agent on the left side of the vertebra of the body was confirmed by endoscopic retrograde cholangiopancreatography (A). Immediate contrast-enhanced abdominal computed tomography showing leakage of the contrast agent outside the pancreas (B).



**Figure 4.** Surgical specimen of pancreatectomy. The tail and anterior surface of the pancreas had severely coalesced (A), and severe crush wound present (B).



**Figure 5.** Course of treatment.

Postoperatively, the serum amylase levels normalized, and the pleural effusion and ascites disappeared (Fig. 5). Finally, she was discharged from our hospital. She has been consulting a doctor regularly, and no pleural effusion or dyspnea have been observed.

## Discussion

Pancreatic fistula was first mentioned or referenced by Rommelaere in 1877. It is defined as the leakage of pancreatic fluid into unphysiological channels (1). Most patients are men (71%), and alcohol-associated chronic pancreatitis is predominant (51%) (3). Traumatic pancreatic pleural effusion was reported to constitute <10% of all pancreatic pleural effusion cases (2).

The mechanism is considered to involve rupture of a pseudocyst formed by the ruptured peripheral duct of the pancreas with occlusion of a protein plug after the occurrence of focal acute inflammation around the first branch of the pancreatic duct. A pancreatic fistula is classified according to the region of the leak; internal pancreatic fistula is passed inside the body cavity, while external pancreatic fistula is passed outside the body cavity (1). An internal pancreatic fistula is formed by the dissociative progress of leaking within the tissue space with low resistance. If the internal pancreatic fistula leak is ventral, it is called pancreatic ascites; however, if it is dorsal or cranial, it is called pancreatic pleural effusion. Internal pancreatic fistulas can reportedly leak dorsally and caudally to reach the inguinal area and femoral region through the iliopsoas fascia (1).

Postoperative pancreatic fistula is a complication of pan-

createctomy and is worsened when triggered by postoperative pancreatitis (4). Postoperative pancreatic fistula develops in the early postoperative period and can lead to fatality with infection and bleeding. The left kidney is anatomically situated close to the pancreas. Despite the risk of operative injury in nephrectomy, postoperative pancreatic fistula after nephrectomy is rarely reported (5). We believe that our case did not have the postoperative pancreatitis that occurs in the early postoperative period. While we cannot find any reports describing adverse effects related to the use of mesh for nephrectomy, in cases of inguinal herniorrhaphy, which are commonly treated with mesh plugs, perforation is frequently reported long after the procedure itself (e.g., 10 years later) (6, 7). Such perforation has been attributed to chronic inflammation due to stimulation by the continuous pressure induced by the mesh plug. We believe that a similar mechanism may have been involved in the present case.

ERCP was shown to benefit the diagnosis of fistula present between the duct of pancreas and chest cavity; however, it sometimes results in pancreatitis complications. Because MRCP does not require imaging agents, it rarely develops pancreatitis complications and is the preferred diagnostic option.

If the p-amylase levels are dominantly elevated in pleural effusion, pancreatitis should be considered, and if the s-amylase levels are dominantly elevated, pneumonia, perforation of the esophagus, or malignancy should be considered. The amylase levels in pleural effusion are reportedly higher than in the peripheral blood in cases of pancreatic pleural effusion (8). Therefore, pancreatic pleural effusion was suspected in our case.

Although MRCP was initially performed, a diagnosis was not obtained; subsequently, ERCP was performed, and the diagnosis was confirmed. Because pancreatitis has exacerbation at that time, fasting and intravenous hyperalimentation were essential.

Conservative management in cases of pancreatic fistulas includes ENPD and suppression of the pancreatic exocrine function by fasting and intravenous hyperalimentation (9, 10). However, if internal pancreatic fistula shows substantial resistance to conservative management, surgery is required. According to a recent report, operative treatment was more successful than medical therapy in most cases (94% vs. 31%) (3).

The present case is summarized as follows: Initially, because elevated amylase levels in the left pleural effusion and serum were confirmed, the pleural effusion was thought to be pancreatic pleural effusion. However, despite the pancreatic pleural effusion being initially reduced by ENPD, it showed repeated exacerbation. It was ultimately managed by distal pancreatectomy. We suspected that the pancreatic pleural effusion was caused by diaphragm invasion from her previous nephrectomy procedure. We also assumed that the reduction in the retroperitoneal tissue led to the accumulation of pancreatic pleural effusion in the iliopsoas muscle due to its proximity to the pancreas.

In conclusion, internal pancreatic fistula should be considered when encountering patients with elevated amylase levels in the pleural effusion and a history of abdominal resection. Particularly in cases of abdominal surgery treated with mesh, an internal pancreatic fistula can develop after several years and not merely in the acute period.

**The authors state that they have no Conflict of Interest (COI).**

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