CASE REPORT

Peritoneal–mediastinal communication complication of peritoneal dialysis demonstrated by multidetector-row CT peritoneography: A case report

Bai Jiao a, Zhong Hui b, Liu Rongbo c,*

a Department of Radiology, Affiliated Hospital of Luzhou Medical College, Luzhou, Sichuan 646000, China
b Department of Nephrology, West China Hospital, Sichuan University, Chengdu, Sichuan 610041, China
c Department of Radiology, West China Hospital, Sichuan University, Chengdu, Sichuan 610041, China

Received 7 March 2015; accepted 3 September 2015

KEYWORDS
Peritoneal–mediastinal communication; Pleural effusion; Peritoneal dialysis; Subserous space; Ultrafiltration failure; Computed tomographic peritoneography

Abstract Pleural effusion secondary to peritoneal–mediastinal communication is an uncommon complication in continuous ambulatory peritoneal dialysis (CAPD) patients. CT peritoneography (CTP) is a useful diagnostic and differential diagnosis method for evaluating a wide variety of complications due to CAPD. We report a case of peritoneal–mediastinal communication with specific imaging features on CTP.

1. Introduction

Ultrafiltration failure (UF) in a patient treated with continuous ambulatory peritoneal dialysis (CAPD) poses a diagnostic dilemma. There are many causes resulting in UF problems. Leakage, which is usually due to a tear in the membrane and causes migration of dialysis fluid, is one of the etiology (1). It usually presents with localized subcutaneous edema. However, in some situations, there is no localized subcutaneous edema (2). Hydrothorax may constitute a unique marker. UF accompanied by hydrothorax secondary to pleuroperitoneal communication is not an unusual complication of CAPD any more (3,4). However, leakage of dialysate to the mediastinum which results in hydrothorax has not been reported previously. Herein, we report a case of peritoneal–mediastinal communication using CT peritoneography (CTP).

2. Case report

A 40-year-old women with uremia secondary to chronic glomerulonephritis had been under CAPD treatment for 2 years. Her usual net ultrafiltration volume was 200 mL with 2.5% glucose dialysate solution and she performed four 2-L exchanges daily of glucose-based dialysate solution. She still
had daily urine volume of 800 mL. However, three weeks before admission, she complained of mild dyspnea and dry cough for about one month. She noticed a reduction in peritoneal dialysis effluent volume and developed progressive breathlessness. Her daily net ultrafiltration volume fell from 800 mL to 400 mL. Physical examination showed she had a weight gain of 3 kg, with only ankle edema and pulmonary congestion. There was no localized edema over the abdomen or perineum. Dialysate/plasma creatinine ratio measured 3 months prior was 0.60. Net ultrafiltration volume did not improve obviously, despite a higher concentration of dialysate solution being used. An abdominal X-ray revealed the Tenckhoff catheter was in good position. And chest radiography performed showed a moderate amount of bilateral pleural effusion and cardiomegaly. We suspected pleuroperitoneal leakage based on clinical impression and the timing of manifestation, but the supposed diagnosis had to be differentiated from other causes of transudative pleural effusion, such as congestive cardiac failure and hypoalbuminemia, or other causes of fluid overload. Pleural fluid analysis showed a normal glucose concentration, which also suggested no pleuroperitoneal leakage. The routine laboratory examinations, including the chemistries and electrolyte profiles, were unremarkable except for elevation of blood urea nitrogen/creatinine levels. Her blood pressure was 140/80 mmHg.

A CTP was performed to assess the presence of pleuroperitoneal leakage 5 days after admission. CT was performed using a 64-detector row CT system (Brilliance 64, Philips Medical Systems, Eindhoven, the Netherlands). 50 mL non-ionic contrast medium (iohexol, 300 mg iodine/mL; Beijing Beilu Pharmaceutical, Beijing, China) was mixed with 2 L dialysate and infused into the peritoneal cavity via a Tenckhoff catheter. After 30 min of ambulation to ensure an even distribution of fluid throughout the peritoneum, CT scans were obtained by using 145 mA and 120 kVp parameters. The CTP also showed a moderate amount of bilateral pleural effusion. There was no contrast leakage from the peritoneal cavity to the bilateral pleural cavities through bilateral diaphragms. However, peritoneal dialysis solution containing contrast media was showed in the posterior mediastinum, which suggests the possibility of peritoneal–mediastinal communication (Fig. 1a–c).

After temporary interruption of CAPD and switching to hemodialysis for about 2 months, a follow-up CTP performed and showed that peritoneal–mediastinal communication persisted. After weighting the poor long-term effectiveness of CAPD and surgical risk, the patient decided to switch to hemodialysis permanently. The pleural effusion resolved over a number of days. A follow-up chest radiograph was normal. The symptoms such as dyspnea and dry cough were also disappeared.

3. Discussion

CAPD is used to treat end-stage renal failure in an increasing number of patients all over the word (5). However, certain complications are more frequent with CAPD than with hemodialysis and often force cessation of CAPD. Patients on CAPD have a high incidence of abdominal hernias and dialysate leakage caused by chronically increased intraperitoneal pressure (6). As reported, intra-abdominal pressure measured at the inguinal level would be approximately 30 cm higher than that at the xiphoid in the vertical position, thus resulting in 38–40 cm of water pressure with a 2 L intra-abdominal dialysate (7). Other factors such as walking, coughing, and straining may induce abrupt increases in intra-abdominal pressure. In general, pressure-related complications in patients on CAPD include inguinal hernia, hiatal hernia, paraumbilical hernia, incisional hernia, subcutaneous leakage, retroperitoneal leakage, peritoneopleural communication and so on, which

Fig. 1 Non-enhanced CT (a) shows that a moderate amount of watery density shadow was seen in the posterior mediastinum (white arrow) and bilateral thoracic cavity (black arrow), axial (b) and coronal (c) CT peritoneography shows the posterior mediastinum surrounded by peritoneal dialysis solution containing contrast media (black arrow).
will result in genital swelling, localized edema, hydrothorax, acute ultrafiltration failure. Most of them must be diagnosed via imaging, which can demonstrate the site, size, and anatomy of leaks and hernias, provide information about the origin and extension of leakage (8,9). Many imaging modalities—especially CTP, MR peritoneography and peritoneal scintigraphy—play a critical role in ensuring that complications are detected early and managed appropriately (5,10). Among the various imaging modalities, the reference standard is CTP, which has a high detection rate, widespread availability, and relatively low cost and which is capable of depicting the entire peritoneal and thoracic cavity (5).

With the continuous improvement of technique on CAPD, the rate of common complications decreased and the survival rate increased significantly. However, uncommon and rare complications appeared gradually. Clinical diagnosis of peritoneal–mediastinal communication is difficult as there is no localizing or typical sign in the systemic examination. The clinical manifestations of peritoneal–mediastinal communication are similar to those of pleuropertoneal communication. Its symptoms include dyspnea and acute UF as seen in this case. Pleural effusion secondary to pleuropertoneal communication is not an unusual complication of CAPD any more (3,4). Pleuropertoneal communication should be suspected, but the supposed diagnosis had to be differentiated from other causes of transudative pleural effusion, such as congestive cardiac failure, hypoalbuminemia, or other causes of fluid overload. Imaging is needed to make differential diagnosis. And CTP is a useful diagnostic tool (9). However, in the current case, a CTP performed and showed no imaging features of peritoneal–pleural communication but the peritoneal–mediastinal communication existed. And the communication was found to have occurred through the esophageal hiatus, the embryonic continuity of the subperitoneal and subpleural spaces. The underlying pathogenesis of development of peritoneal–mediastinal communication is due to tears in the membranous subperitoneal and subpleural spaces. The embryonic continuity of subperitoneal and subpleural spaces. The embryonic continuity of subperitoneal and subpleural spaces. The embryonic continuity of subperitoneal and subpleural spaces.

The methods to treat peritoneal–mediastinal communication are similar to those of pleuropertoneal communication. Temporary interruption of CAPD and the introduction of intermittent cycling peritoneal dialysis, chemical pleurodesis, thoracotomy, videothoracoscopic obliteration may achieve a curative treatment for most patients with pleuropertoneal communication (12–14). In the current case, temporary interruption of CAPD and the introduction of intermittent cycling peritoneal dialysis were preferred. But it did not work for her. Unfortunately, she switched to hemodialysis permanently at last, which is an alternative option.

In conclusion, as more uncommon and rare complications appeared gradually in CAPD patients, the early and correct diagnosis is often the key to getting correct treatment. Again, CTP is a useful diagnostic and differential diagnosis tool for evaluating a wide variety of complications in CAPD patients. The mediastinum surrounded by peritoneal dialysis solution containing contrast media demonstrated on CTP might suggest a characteristic imaging feature of peritoneal–mediastinal communication.

Conflict of interest

The authors declare that there are no conflicts of interest.

References


