Case report

Video-assisted thoracoscopic treatment for pleuroperitoneal communication in peritoneal dialysis

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Abstract

Massive hydrothorax is an uncommon but well-recognized complication of continuous ambulatory peritoneal dialysis (CAPD). We performed a video-assisted thoracoscopic resection of the pleuro-peritoneal communication and pleurodesis in a patient with massive right hydrothorax secondary to CAPD. Histologically, the resected diaphragm was lacking in common tissue, tendons and skeletal muscle tissues, is displaced to fibrous connective tissue. These anatomic findings suggested that the cause of communication was congenital diaphragmatic change. Video-assisted thoracoscopic treatment facilitated efficient inspection and easy resection of the weak portion of the diaphragm in the case of pleuroperitoneal communication.

Keywords: Pleuroperitoneal communication; Continuous ambulatory peritoneal dialysis; Bleb; Video-assisted thoracic surgery; Pleurodesis

1. Introduction

Continuous ambulatory peritoneal dialysis (CAPD) is now established as an effective treatment in end-stage renal disease patients. Massive hydrothorax is an uncommon but well-recognized complication of CAPD and is often regarded as a contraindication to its use. Its pathogenesis is unclear and several methods of treating this complication have been reported, but a standard management has not yet been established. We recently performed successful video-assisted thoracoscopic surgery for a patient with right hydrothorax secondary to CAPD. We discuss the management and thoracoscopic findings.

2. Case report

A 61-year-old male with end-staged renal failure due to polycystic kidneys commenced hemodialysis in January 1973. The patient developed ventricular arrhythmia and was medicated in February 1990, Stokes-Adams attacks due to complete atrial-ventricular block developed requiring a pacemaker. Hemodialysis was stopped in July 1999, CAPD was recommenced, but 5 months later massive right hydrothorax developed. The pleural effusion obtained by pleural puncture was a transparent fluid with a high glucose concentration (285 mg/dl) and with a low protein level concentration (0.35 g/dl). We suspected that hydrothorax was due to CAPD-induced diaphragmatic communication, and investigated by peritoneopleural scintigraphy. Radioisotope Tc\textsuperscript{99m}-Sn colloid 5 mCi with 600 ml of peritoneal dialysate was instilled through a Tenckhoff peritoneal catheter, pleuroperitoneal communication was demonstrated.

Surgery was performed under general anesthesia, using a double lumen endotracheal tube. For definitive diagnosis and treatment, video-assisted thoracoscopic surgery was performed. The thoracoscope was inserted in the right mid-axially in the sixth intercostal space. On the inner, central tendons part of the diaphragm, a collapsed bleb was rested (Fig. 1). We carefully observed the surface of the diaphragm but there were no abnormal findings or flaws, except for the bleb. Twenty minutes after 1 l of peritoneal dialysis solution containing 2 ml methylene blue dye was instilled in to the abdomen, the bleb was tense and colored blue by the dye solution. Two additional ports were placed in the anterior and posterior-axially to the eighth intercostal space. On the lower port, the diaphragmatic lesion containing a bleb was grasped by long forceps and stapled with an Endo-cutter stapler (Ethicon, Johnson and Johnson Medical Corp., USA). Pleurodesis with mechanical abrasion of the parietal pleura near the diaphragm, the diaphragm surface...
and basal surface of lung was performed with folded gauze and Endopass Cherry Dissector (BCD10, Ethicon Endo-Surgery, Inc. USA). Histologically, resected diaphragm (5.5 × 4.5 cm) containing the bleb was very thin and lacking in common tissue, tendons and skeletal muscle tissues and was replaced by fibrous connective tissue. An obvious defect in the diaphragma was not shown, but there were histiocytes accumulated over the internal surface of the bleb, the raptured bleb could be a window of pleuroperitoneal communication (Fig. 2). A chest drain was extubated after 48 h postoperatively.

He resumed CAPD with same volume dialysate 2 weeks later, with no recurrence of hydrothorax for more than 6 months.

3. Comment

The first case of hydrothorax complicating CAPD was reported in 1967 [1]. Since then, others have reported such cases and examined this complication, which affects 1.6% of CAPD patients [2]. This complication forces the patient to withdraw from CAPD and accept permanent transfer hemodialysis.

As to its pathogenesis, some authors suggest that, in Meig’s syndrome and hepatic cirrhosis, hydrothorax is due to a transfer of ascites via diaphragmatic lymphatics [3,4]. Others suggest that the fluid passes through anatomical, congenital or acquired, defects in the diaphragm that the cause is pleuroperitoneal communication via the diaphragm.
Once a pleuroperitoneal communication arises, negative pressure in the pleural cavity and positive pressure in the peritoneal cavity promote the transfer of dialysate from the abdomen to the chest. In the present case, the communication was judged by a bleb on the diaphragm thoracoscopically. Pathological findings of resected diaphragm were very thin and lacked both of muscle fibers and connective tissue, suggesting that the cause of communication was congenital diaphragmatic change in this case. However, obvious defect of diaphragma was not shown, mechanical pressure from the abdomen is a clue to injury of the diaphragm and removal of dialysate. It is an appropriate pathology that the communication results from high abdominal pressure in congenital anatomical background.

Several treatment procedures for diaphragmatic communication have been reported. Many authors reported pleurodesis procedure using irritants or adhesive agents, tetracycline, OK432 (hemolytic streptococcal derivatives) or fibrin glue instilled into pleural cavity via thoracic tubes. However, some authors reported unsuccessful treatment by pleurodesis only and chemical pleurodesis is painful [7,8]. Indeed adhesive administration through a thoracic tube is considered the first choice for patient at high risk for general anesthesia, but we think that video-assisted thoracoscopic examination is the first choice for all most patients. Once pleurodesis procedure using irritants or adhesive agents is performed, irregular adhesion between the lung and parietal pleura occur, preventing thoracoscopic treatment from being performed. Especially in the present case, thoracoscopic inspection is effective in detecting even a tiny abnormal lesion in organ depth, or diaphragm curve surface. In the present case, the bleb was dyed blue after peritoneal dialysis solution containing methylene blue dye was instilled into the abdomen and was judged to be the communication site. The lesion was then resected. However, we thought that tiny communications other than the bleb might exist, and performed pleurodesis thoracoscopically. Bisceglie et al. [9] reported two tiny flaws measuring about 1 mm that were identified in the diaphragm by thoracoscopy and performed direct suture of these diaphragm flaws. Thus, communication sites are not always singular and other communication sites may exist even if one abnormal point is revealed thoracoscopically. Therefore, we think that mechanical pleurodesis is necessary for all cases even if an abnormal lesion can be revealed.

In conclusion, video-assisted thoracoscopic partial resection of diaphragma containing pleuro-peritoneal communication along with mechanical pleurodesis is an effective and recommendable procedure for diaphragmatic communication.

References