Video-assisted Thoracoscopic Surgery for Peritoneal Dialysis-related Hydrothorax

Ming-Hong Yen, Jung-Sen Liu, T-S Yang*, S-H Fong*, S-J Perng*

Department of Surgery, *Department of Medicine, Cathay General Hospital
Introduction

- **PD-related hydrothorax** is a rare complication with the incidence rate of 1.6% to 2% of the PD population. If not treated properly, will cause the patient to abandon PD.

- We retrospectively reviewed the medical records for data analysis and outcome assessment, and focused on details of surgical procedures.
Materials and Methods

We started CAPD treatment modality since 1991, and collected approximately 420 consecutive patients receiving CAPD treatment up to January 2009. Among them only 2 patients suffered from PD related hydrothorax. The other 4 patients were referred from other hospitals.
Materials and Methods

- All VATS procedures were performed under general anesthesia using a double lumen endotracheal tube.
- Three thoracoports (1.2 cm, 1.2 cm and 0.5 cm in diameter) were used for creating the instrument pathway on the chest wall.
- The dyed dialysate was prepared by injecting 5 ml of gentian violet into 2000 ml dialysate (Baxter, USA)
Materials and Methods
Results

- All the 6 patients were female, and they complained of cough and/or dyspnea. Chest radiography revealed massive effusion of the right thorax. Tc99 shunt patency study demonstrated a gradually increasing tracer activity on case #1.
Case #1

- A 53 year-old female, 40.5 kg in weight, 153 cm in height, is a case of uremia and chronic hepatitis C with liver cirrhosis. A CAPD catheter was implanted on Oct. 30, 2001. Cough occurred 2 months later and right pleural effusion was noted on chest radiography (Fig. 1a). The Tc99 shunt patency study demonstrated a gradually increasing tracer activity (Fig. 1b). VATS was performed 1 month after the diagnosis of hydrothorax. A perforation 0.3 cm in diameter over the diaphragm was noted (Fig. 1c) and sutured with 2-0 Vicryl®. The CAPD modality resumed 2 weeks after the operation. There was no recurrence of hydrothorax during a five-year follow-up.
Fig. 1a
Fig. 1b
Tc99 shunt patency study
Fig. 1c
Case #2

A 38 year-old female, 40 kg in weight, 160 cm in height, is a case of SLE with lupus nephritis in chronic uremic stage. A CAPD catheter was implanted on Sep. 14, 2001. Cough occurred 4 months later and chest radiography revealed right side pleural effusion (Fig. 2a). PD related hydrothorax was diagnosed and VATS was performed 11 days later. A lot of dialysate was accumulated in the thorax (Fig. 2b). An attenuated perforation measured 1.5 cm in diameter over the right diaphragm was noted (Fig. 2c) and sutured with 2-0 Vicryl® (Fig. 2d). The CAPD treatment resumed 2 weeks after the operation. Five-year follow-up showed no recurrence.
Fig. 2a
Fig. 2b
Fig. 2d
Case #3

This 45-year-old female is a case of uremia with hemodialysis since 2002. A CAPD catheter was implanted on Nov. 04, 2005. Three weeks later, short of breath and cough were occurred. Because of right side hydrothorax was noted under chest X-ray (Fig. 3a), CAPD was stopped. However CAPD was tried again on Feb. 28, 2006, but short of breath appeared again. VATS was performed on May. 09, 2006, but it was converted to limited thoracotomy due to difficult of double lumen endotracheal tube intubation. About 0.4 cm diameter perforation over diaphragm was noted (Fig. 3b) and sutured with 2-0 Vicryl® (Fig. 3c). The CAPD treatment resumed 8 weeks after the operation. No more hydrothorax was occurred until now.
Case #4

- A 34 year-old female complained of inadequate outflow. She had had SLE for 9 years. CAPD started 8 months ago. Outflow being 100~200 ml less than inflow noted last month. Chest radiography revealed right side pleural effusion (Fig. 4a). PD related hydrothorax was diagnosed and CAPD was shifted to HD. VATS was performed 3 wks later. A perforation measured 0.3 cm in diameter over the right diaphragm was identified and sutured with 2-0 Vicryl® (Fig. 4b).
Fig. 4b
VATS view of case #4
## Results

- **Table 1. Clinical features and management of patients**

<table>
<thead>
<tr>
<th>Case #</th>
<th>Age</th>
<th>Presentations</th>
<th>Leakage side</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>53</td>
<td>Cough, dyspnea</td>
<td>Right</td>
<td>VATS, repair of diaphragm</td>
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<tr>
<td>2</td>
<td>38</td>
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<td>Right</td>
<td>VATS, repair of diaphragm</td>
</tr>
<tr>
<td>3</td>
<td>45</td>
<td>Cough, dyspnea</td>
<td>Right</td>
<td>VATS converted to limited thoracotomy, repair of diaphragm</td>
</tr>
<tr>
<td>4</td>
<td>34</td>
<td>Inadequat outflow</td>
<td>Right</td>
<td>VATS, repair of diaphragm</td>
</tr>
<tr>
<td>5</td>
<td>75</td>
<td>Cough, dyspnea</td>
<td>Right</td>
<td>VATS converted to limited thoracotomy, repair of diaphragm</td>
</tr>
<tr>
<td>6</td>
<td>44</td>
<td>Cough, dyspnea</td>
<td>Right</td>
<td>VATS, repair of diaphragm</td>
</tr>
</tbody>
</table>
Results

- The defects of diaphragm were all located in the tendinous portion.
- The numbers of defects were 2 to 5, and the sizes range from 2 mm to 5 mm.
- There was no peri-operative blood transfusion or complication.
- The VATS procedure took approximately 2 hours.
- All cases have no recurrence, sustaining the CAPD treatment well.
## Results

**Table 2. Intervals of symptoms, resumption of PD and follow-up**

<table>
<thead>
<tr>
<th>Case #</th>
<th>A (months)</th>
<th>B (weeks)</th>
<th>C (months)</th>
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<tbody>
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<td>1</td>
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<tr>
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<td>5</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

Remarks:

A: interval between start of PD and occurrence of hydrothorax

B: interval between repair of diaphragm and resumption of PD

C: interval of follow-up after operation
Discussion
Weak point of the diaphragm
Treatment

- Temporarily switched to HD
- Pleurodesis
  - Autologous blood
  - Minocycline/Tetracycline
  - Thoracoscopic mechanical and/or chemical
- Surgery
  - VATS or limited thoracotomy for repairing of diaphragm
Conclusion

- PD related hydrothorax can be treated safely and successfully by VATS or limited thoracotomy.
Thanks for Your Attention!!