

## Role of indwelling pleural catheters in hepatic hydrothorax

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### Abstract

**Background:** Hepatic hydrothorax is characterized by the presence of moderate to massive transudative pleural effusion seen in patients with cirrhosis of the liver without overt cardiopulmonary and pleural diseases. Patients who presents with massive pleural effusion leads to respiratory distress and failure which further increases morbidity and mortality in patients with cirrhosis. Indwelling tunneled pleural catheters (IPCs) plays a major role in palliative treatment for patients with stage IV malignancy who present with recurrent massive pleural effusion. IPC helps in reducing the symptoms of dyspnoea, chest pain etc. by therapeutic pleural drainage either by themselves or with help of their caregivers. In recent days usage of IPC is increased in non-malignant benign causes of recurrent pleural effusion. The present study aimed to study the feasibility of usage of indwelling pleural catheters in hepatic hydrothorax presenting with recurrent pleural effusions.

**Methodology:** This study was a retrospective analysis of medical records of patients who underwent IPC insertion for hepatic hydrothorax with cirrhosis /decompensated liver disease was done.

**Results:** 18 patients with hepatic hydrothorax were placed with indwelling pleural catheters. Mean age of patients was 52.5 years, and the most common etiology for underlying liver disease is Alcoholic liver cirrhosis. Almost all patients were male. 16 IPC (88.8%) were placed for right sided effusion only 2(11.1%) were placed for left sided effusion. Spontaneous pleurodesis was achieved in 10 of 18 patients (55.5%) and IPCs were removed in these patients. Mean time in which pleurodesis achieved was 120.8 days (range, 15–290 d).

**Conclusion:** Thus indwelling catheters are useful in patients with hepatic hydrothorax with refractory pleural effusion. It also improves the quality of life and alleviates dyspnoea in those patients. However further studies are needed with larger sample size.

### Introduction

Hepatic hydrothorax is characterized by the presence of moderate to massive transudative pleural effusion seen in patients with cirrhosis of the liver without overt cardiopulmonary and pleural diseases [1]. Hepatic hydrothorax predominantly presents as right-sided pleural effusion in 85% of cases and as left-sided effusion in 13%; bilateral effusion was seen in 2% of the cases [1]. Patients who presents with massive pleural effusion leads to respiratory distress and failure which further increases morbidity and mortality in patients with cirrhosis. Median survival in the presence of HH is 8-12 months [2]. Hepatic transplantation is the therapy of choice in these patients, but it is practically not possible immediately due to various technical factors and prolonged waiting period for donor liver, thus imposes difficulty in managing these patients. Indwelling tunneled pleural catheters (IPCs) plays a major role in palliative treatment for patients with stage IV malignancy who present with recurrent massive pleural

effusion. IPC helps in reducing the symptoms of dyspnea, chest pain etc. by therapeutic pleural drainage either by themselves or with help of their caregivers. In recent days usage of IPC is increased in non-malignant benign causes of recurrent pleural effusion.

The main aims and objectives of the present study was to understand the feasibility of usage of indwelling pleural catheters in hepatic hydrothorax presenting with recurrent pleural effusions.

### Materials and Methods

This study was conducted in Department of Respiratory Medicine, SMVMCH Puducherry after approval from Institutional ethics committee (IEC), SMVMCH. A retrospective analysis of medical records of patients who underwent IPC insertion for hepatic hydrothorax with cirrhosis/decompensated liver disease was done. Indwelling catheter was inserted only in the patients who had symptomatic relief of breathlessness after therapeutic pleural

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aspiration. A written informed consent was obtained from study subjects or next to kin.

### Definition

Successful pleurodesis was ascertained when the daily drain volume reduces to 50 mL for 3 consecutive days without aggravation of symptoms or recollection of fluid on chest radiography, IPC was removed after successful pleurodesis [15].

### Indwelling pleural catheter Insertion

IPCs was inserted in almost any position which allows access to the fluid collection. Procedure was performed with prior consent under local anaesthesia and conscious sedation. We routinely monitored pulse rate and oxygen saturation during the procedure.

The indwelling pleural catheter was inserted using a modified Seldinger technique and tunnelled between two separate incisions which are usually placed about 5-10 cm apart. This helps in easy access to the drain and creating sufficient length of tunnel reduces the chances of dislodgement IPC was sutured only in exit port where it lies in the subcutaneous tissue. Entry port of IPC is usually not sutured [3]. Method of drainage and daily dressing of the catheter was taught to patient and patients bystanders.

### Results

18 patients with hepatic hydrothorax were placed with indwelling pleural catheters. Mean age of patients was 52.5 years, and the most common etiology for underlying liver disease is Alcoholic liver cirrhosis. Almost all patients were male. 16 IPC (88.8%) were placed for right sided effusion only 2(11.1%) were placed for left sided effusion. Average number of thoracentesis done prior to insertion of indwelling pleural catheter was 1.9 (range, 1-4; SD, 1.04). In total, 8 of 18 patients received at least one TIPS procedure.

**Table 1**

Patients characteristics	Number
Mean age	52.5
Right sided effusion	16
Left sided effusion	2
Associated with ascites	15

**Table 2**

Etiology of decompensated liver disease	Number (%)
Alcoholic liver disease	12(66.66%)
Viral Hepatitis	3(16.66%)
Non-alcoholic hepatic steatosis	2(11.11%)
Cryptogenic	1(5.5%)

Spontaneous pleurodesis was achieved in 10 of 18 patients (55.5%) and IPCs were removed in these patients. Mean time in which pleurodesis achieved was 120.8 days (range, 15-290 d). None of the study subject required pleural fluid aspiration after IPC insertion. Spontaneous pleurodesis was achieved in four out of six patients who underwent TIPS procedures,

whereas failure of spontaneous pleurodesis without prior TIPS procedure after catheter insertion was noted.

Secondary bacterial infection of catheter occurred in 2(11.1%) patients however both did not required removal of the catheters, but were successfully treated conservatively with antibiotics and regular flushing of catheters with saline. The organisms isolated in culture includes Staphylococcus aureus and Streptococcus pyogenes.

Complication were minimal and were managed conservatively.

**Table 3**

Catheter related complication	Number (%)
Skin excoriation and rashes	5(27.7%)
Local cellulitis	1(5.5%)
Catheter blockage	2(11.11%)
Cloudy /purulent drain	1(5.5%)



**Fig. 1:** Chest X-ray of patient with hepatic hydrothorax with indwelling pleural catheter in situ

### Discussion

Hepatic hydrothorax is characterized by accumulation of transudative pleural effusion without any obvious cardiovascular/Respiratory/Renal diseases. The portal hypertension is the sole predictor for developing hepatic hydrothorax without decompensated liver disease [4]. Thus, the treatment of HH is complex in patients with portal hypertension [5].

The underlying mechanisms for HH are similar to those leading to fluid accumulation and ascites in portal hypertension. Various mechanisms were proposed for the development of HH in patients with liver cirrhosis [6]. These include percolation of ascitic fluid from the peritoneal space to the pleural space via diaphragmatic defects [7], Decreased oncotic pressure due to hypoalbuminemia [8] and lymphatic leakage from the thoracic duct [9].

Thoracentesis is effective in reducing the symptoms attributable to recurrent pleural effusion in hepatic hydrothorax, however procedure need to be repeated multiple times. Intercoastal drainage(ICD) may be required in some patients who presents with massive effusion But ICD insertion are generally avoided in these patients as it is associated with poor clinical outcomes and therefore should not be encouraged [10].

The treatment of hepatic hydrothorax is complex which needs multidisciplinary approach. Salt restricted diet is usually advised. Diuretics plays a role in those with signs of fluid overload. Furosemide and spironolactone combination is usually preferred.

Transjugular intrahepatic portal systemic shunt (TIPS) is a promising treatment strategy in patients with hepatic hydrothorax. TIPS improves the survival with prolonged symptom free period without need of therapeutic paracentesis/thoracocentesis [11].

Video-assisted thoracoscopic surgery with talc insufflation had been done successfully in selected patients with recurrent pleural effusion in hepatic hydrothorax [12]. Liver transplantation is the therapy of choice for cirrhosis /decompensated liver disease who presents with hepatic hydrothorax.

Although liver transplantation is considered as gold standard therapy of choice, it is rarely available instantly and the management of these cases often requires multidisciplinary approach. Hence, our study was aimed to assess the usage of IPC in patients with hepatic hydrothorax.

In our study, indwelling pleural catheters was inserted in 18 patients. Mean patient age was 52.5 years, and the most common etiology for underlying liver disease is Alcoholic liver cirrhosis. All the patients were male. 16 IPC (88.8%) were placed on the right sided effusion. Only 2(11.1%) IPC were placed for the left sided effusion. Average number of thoracocentesis done before insertion of indwelling pleural catheter was 1.9 (range, 1–4; SD, 1.04). In total, 8 of 18 patients received at least one TIPS procedure.

The results of this study supports the routine use of IPC in recurrent pleural effusions associated with hepatic hydrothorax. Spontaneous pleurodesis occurred in 10 of 18 patients (55.5%), followed by the removal of pleural catheter in these patients. Mean time in which pleurodesis achieved was 120.8 days (range, 15–290 d).

Our findings were similar to previous study by Alexander et al., [13] with spontaneous pleurodesis achieved in significant number of cases with hepatic hydrothorax but the average time for pleurodesis (131.8 days) was more in their study when compared to our study (120.8 days) [13].

Various strategies for counteracting infectious complications like empyema associated IPC was suggested [14], and most of the patients were successfully managed without obvious need for catheter removal. Patient was given antibiotic prophylactically just before the procedure. None of our patients got septicemia/catheter related sepsis. Indwelling pleural catheter was removed in only one case due to pleural infection and later reinserted after confirming with sterile culture of pleural fluid.

## Conclusions

Thus indwelling catheters are useful in patients with hepatic hydrothorax with refractory pleural effusion. It also improves the quality of life and alleviates dyspnea in those patients. However, further studies are needed with larger sample size.

## Limitations of our study

Our study was done with small sample size because hepatic hydrothorax is relatively rare which hinders to generalize our findings.

## Source of funding

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## Conflicts of interest

None declared.

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