12-1-2021

Hepatic Hydrothorax and Congestive Heart Failure Induced Pleural Effusion

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Recommended Citation

Husnain SMN, and Shojaee S. Hepatic Hydrothorax and Congestive Heart Failure Induced Pleural Effusion. Clin Chest Med 2021; 42(4):625-635.

Hepatic Hydrothorax and Congestive Heart Failure Induced Pleural Effusion

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KEYWORDS

• Congestive heart failure • Hepatic hydrothorax • Indwelling tunneled pleural catheters
• Pleural effusion • Non-malignant effusion

KEY POINTS

- Non-malignant recurrent pleural effusions such as refractory cardiac-induced pleural effusion and hepatic hydrothorax carry poor prognosis and indicate high 1-year mortality.
- The management of recurrent cardiac-induced pleural effusion and hepatic hydrothorax should always initiate with optimizing medical management.
- Management of hepatic hydrothorax that is refractory to medical management requires multidisciplinary discussion, a personalized approach and consideration of patient's TIPS and transplant candidacy.
- Management of cardiac-induced pleural effusion that is refractory to medical management requires multidisciplinary discussion, a personalized approach and consideration of patient's transplant candidacy and lung expandability.

INTRODUCTION

Pleural effusions (PEs) are frequently encountered in routine clinical practice, affecting more than 3000 people per million population every year. Transudative effusions are more common than exudative effusions and have varying diagnostic workup and prognostic and therapeutic implications.[1] Heart and liver failures are two of the most common causes of transudative PE. Because these effusions have nonmalignant etiologies, they are commonly referred to as benign effusions despite of the poor prognosis they foretell in their refractory stages. Like malignant effusions, symptom management is important and plays a significant role in palliation when these effusions become refractory to medical therapy. Herein, we review the pathophysiology and diagnosis of PE development in heart and liver failure and examine the existing evidence with particular focus on management and palliation.

LIVER FAILURE AND HEPATIC HYDROTHORAX

Chronic liver disease is the 5th leading cause of mortality worldwide.[2] PE in a patient with liver cirrhosis and portal hypertension in absence of cardiopulmonary disease is defined as hepatic hydrothorax (HH) and is seen in 5% to 15% of patients with end-stage liver disease (ESLD). Up to 25% of these patients have poor response to medical therapy (diuretics and salt restriction) with rapid recurrence of symptomatic effusion and are known as refractory HH.[3,4]

Pathophysiology

The exact mechanism by which HH develops is not completely understood. Proposed mechanisms described in literature are azygous vein hypertension causing formation of collateral anastomosis between portal and azygous system, transfer of peritoneal fluid through diaphragmatic

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Clin Chest Med 42 (2021) 625–635
https://doi.org/10.1016/j.ccm.2021.07.005

defects,[5] passage of fluid from peritoneal to pleural surface via transdiaphragmatic lymphatics,[6] hypoalbuminemia resulting in decreased colloid pressure, and lymphatic leakage from the thoracic duct.[7] Among these, the most widely accepted theory is the passage of ascitic fluid through diaphragmatic defects.[5]

Cirrhosis and portal hypertension, vasodilation of splanchnic and systemic arteries, and neurohormonal activation result in decreased sodium and water excretion, leading to ascites in the peritoneal space.[8] It is hypothesized that due to pressure gradient (positive intraabdominal pressure and negative intrathoracic pressure), fluid shifts through diaphragmatic defects known as pleuroperitoneal communications, resulting in HH. There are 4 types of pleuroperitoneal communications described in literature, ranging from no obvious defect (type 1), blebs on the diaphragm (type 2), defects or fenestration of the diaphragm (type 3, most common), and multiple gaps in the diaphragm (type 4).[9] These defects and blebs tend to occur more commonly in the right hemidiaphragm (59%-80%) compared with the more muscular and thicker left hemidiaphragm.[9]

Diagnostic Workup

Effusion in the setting of ascites and ESLD should raise suspicion of HH. A systematic approach is necessary for efficient diagnosis and management. Detailed clinical history and examination, radiographic/ultrasonographic assessment, and pleural fluid analysis are required in order to exclude cardiac, renal, and malignant causes of PE.[10,11] Paracentesis and thoracentesis in those with mild coagulation abnormalities are generally safe, although caution is warranted in the presence of anticoagulation or a bleeding diathesis, thrombocytopenia, and renal failure.[10,11]

Although HH is usually a transudative effusion, in cases where the effusion is mischaracterized, pleural fluid/serum bilirubin ratio less than 0.6 can be helpful.[12] Additionally, similar to serum–ascites albumin gradient, serum pleural fluid albumin gradient of greater than 1.1 g/dL is consistent with a transudative process[13] and tends to perform significantly better than just protein gradient of greater than 3.1 g/dL. On occasion, patients with cirrhosis have high liver capillary pressure, with a commensurate increase in lymphatic flow in the liver and the thoracic duct,[14] resulting in formation of chylous ascites, and triglyceride levels can help in their diagnosis.

For atypical presentation of hydrothorax and uncertain diagnosis, nuclear scans using intraperitoneal instillation of 99mTc-human serum albumin or 99mTc-sulfur-colloid[15] and scintigraphy are effective diagnostic tools which can help identify pleuroperitoneal communication even in the absence of ascites.[16,17]

Management of Hepatic Hydrothorax/ Refractory Hepatic Hydrothorax

Management of HH should be multidisciplinary and start with medical therapy. Once refractory HH is diagnosed, it is pivotal to assess for potentially curative liver transplantation. However, therapies like liver transplantation or other options such as transjugular intrahepatic portosystemic shunt (TIPS) do not follow a straightforward path as many patients do not qualify for either. In such patients, more personalized treatment strategies should be selected in a multidisciplinary fashion.

Management of excess fluid production

The sirst step in medical management is obtaining a negative sodium balance[18] to decrease ascitic fluid production and ultimately reduce fluid shift. Patients with ESLD and moderate ascites generally have weak sodium excretion and require sodium restriction.[19] Morando and colleagues[20] observed dietary sodium compliance in only 30% of patient.

However, in most cases, dietary restrictions are not sufficient, and diuretics are required. Treatment with distally acting aldosterone receptor antagonists and loop diuretics is the preferred regimen.[21] Medication titration is often required to achieve expected goals and require close monitoring of renal function, serum electrolytes, blood pressure, and orthostatic vitals.

An estimated 20% to 30% of patients who tolerate large doses of diuretics have lack of clinical response and continue to have recurrent HH (diuretic-resistant HH).[22] About 5% to 10% of patients cannot tolerate diuresis and experience diuretic induced hyponatremia and encephalopathy (diuretic-intractable HH).

Splanchnic and peripheral vasoconstrictors including octreotide, midodrine, and terlipressin have also been used to aid sodium excretion by decreasing the activation of renin–angiotensin–aldosterone system and increasing effective arterial volume causing sodium excretion.[23–25] More data are required to examine the role of these agents in management of HH.

Transjugular intrahepatic portosystemic shunt

Portal hypertension leads to fluid accumulation by increasing the portosystemic gradient (pressure between portal vein and hepatic vein/inferior vena cava [IVC]). Normal gradient is $\leq$ 5 mm

Hg,[26] and ascites rarely develop if postsinusoidal pressure gradient is $\leq$ 12 mm Hg.[27]

TIPS is a low resistance side-to-side shunt created between the intrahepatic branch of the portal vein and hepatic artery using a stent to decrease portal hypertension.[25]

A multidisciplinary team approach is necessary to evaluate a patient's candidacy for TIPS. Up to 50% of patients with refractory HH do not meet candidacy criteria.[28] Although TIPS has shown to reduce mortality in patients with variceal bleeding, no significant mortality benefit is seen for other conditions including HH.[29] In another study, TIPS performed for refractory HH versus refractory ascites did not show any survival benefit and response rate, and fluid accumulation was not different in either group.[30] A meta-analysis including 332 patients who received TIPS for HH showed 74% overall success (56% complete and 25% partial response). Hepatic encephalopathy occurred in 27% of patients, and 1-month and 1-year mortality rates were 19% and 48%, respectively.[31] Earlier studies used bare metal or uncovered stent; however, stent evolution has led to modern stent grafts that have superior patency and improved symptom control with less need for revision.[32–34]

Other means of bridge to transplant or palliation

Repeat thoracentesis Repeat thoracentesis is an effective and safe way to remove large fluid volumes and a standard procedure for symptom management in patients who are not TIPS or transplant candidates, although drainage of ascites before accessing the thoracic cavity is recommended.[3]

Coagulopathy, elevated international normalized ratio (INR), and thrombocytopenia are usual findings in patients with ESLD; however, the role of prethoracentesis plasma and platelet transfusion has not been studied.[35,36] Although thoracentesis is a safe procedure, most existing studies have not evaluated its safety within specific etiologies of PE.

In a single-center retrospective study, repeat thoracentesis in HH was safe although when compared with repeat thoracentesis in the non-HH group, the cumulative rate of complications increased with the increased number of thoracenteses.[37] The HH group (n = 82) required a higher median number of thoracentesis (5 vs 2) at shorter intervals (14 vs 35 days) compared with the non-HH group (n = 100). Within the HH group, higher Model For End-Stage Liver Disease (MELD) scores (odds ratio (OR) = 1.19, 95% confidence interval (CI) = 1.03–1.36, P = .012) and platelet count less than $50 \times 10^3/\mu L$ (OR = 9.67, 95% CI = 1.16–80.42, P = .035) were associated with higher hemothorax rates in multivariable analysis. Intercostal varicose veins leading to spontaneous hemothorax are reported in patients with ESLD.[38] Although not studied specifically in patients with HH, we recommend ultrasound examination of the intercostal space with a linear/vascular ultrasound probe before thoracentesis in patients with HH, particularly those with thrombocytopenia and higher MELD scores.

Conventional chest tubes Conventional chest tubes often placed with the goal of pleural space evacuation lead to large volume, electrolyte, and protein loss in patients with HH. Guidelines from the American Association for the Study of Liver Diseases recommend against conventional chest tubes in HH.[39,40] High complication rates and increased mortality have been observed in multiple case series.[41,42] In a retrospective study of 55 patients with HH, 88% developed infectious complications, renal failure, or electrolyte imbalance and reported mortality rate at 33%[43] due to empyema and sepsis following chest tubes placement. In a retrospective study of 140,573 patients with liver cirrhosis, 205 patients with chest tubes were compared with 1776 who underwent thoracentesis only and showed that mortality was twice as high in the chest tube subgroup.[44]

Indwelling tunneled pleural catheters Indwelling tunneled pleural catheters (IPCs) have shown great palliative benefit for malignant PEs (MPEs), but it was not until 2017 when they were approved by the FDA for non-MPEs.[45]

Single-center retrospective and prospective data on IPCs in HH show a spontaneous pleurodesis rate of 15% to 33% with a pleural space infection rate of 15% to 33% (**Table 1**).[46–52] In one multicenter retrospective study[50] of 79 patients who underwent IPC placement, pleural space infection occurred in 10% of the population with 2.5% mortality secondary to sepsis due to empyema. Importantly, only 2 cases of electrolyte imbalance or renal failure related to IPC placement were reported, which may suggest a superior safety profile compared with reported complications of conventional chest tubes. This difference may be related to the volume/day drained. While most conventional chest tubes are placed with purpose of complete evacuation of the pleural space, IPCs are drained at maximum of 1 L/every other day schedule or no more than 1 L/d on symptomatic days. The primary goal of an IPC is symptom palliation and not pleural space evacuation.

Spontaneous pleurodesis rate of 28% to 33% with IPCs may represent an overestimated number because many of the patients who have achieved "pleurodesis" in these studies have done so after receiving liver transplant.

Table 1
Indwelling pleural catheters in hepatic hydrothorax

Study/HH Ones	Study Design	Sample Size	Palliative vs Bridge to Transplant	Patient-Centric Outcomes	Complications (%)	Pleurodesis (%)/Time to Pleurodesis
Chalhoub et al,[46] 2011	Single-center retrospective	8	Palliative	3.8 + 0.4/4 procedure satisfaction score	Exit site infection (12.5%)	Not recorded/ 73.6 ± 9 (mean, SD)
Bhatnagar et al,[47] 2014	Multicenter retrospective	19	Palliative	Not reported	• Pleural infection (5.3%) • Renal failure (5.3%) • Loculation (5.3%) • IPC dislodgement (5.3%)	11%/median of 222 d
Chen et al,[48] 2016	Single-center prospective	24	• Bridge to transplant (20%)	Not reported	• Pleural infection (16.7%)	33%/131.8 d (range, 14–287 d)
Kniese et al,[49] 2018	Single-center retrospective	62	• Bridge to transplant (53.2%)	Not reported	• Overall (35%) • Empyema (16%) • Death due to infection (5%) • Cellulitis (2%) • IPC dislodgement (10%)	14.5%/118, ±139.6 d (mean, SD)
Shojaee et al,[50] 2018	Multicenter rerrospective	79	• Palliative (73%) • Bridge to transplant (27%)	Not reported	• Pleural infection (10%) • Death due to infection (2.5%) • Renal failure (2.5%) • Pleural fluid leakage (5%) • Seroma (6%)	28%/median of 55 d (range, 10–370)
Frost et al,[51] 2020	Single-center Retrospective	27	Palliative	No additional intervention needed in 93% of total population	37.3% (cellulitis, IPC malfunction)	21%/etiology-specific time not available
Li et al,[52] 2019	Single-center retrospective	42	Palliative	Not reported	Pleural infection (7.1%)	51%/median of 115 d (interquartile range (IQR): 57–191 d)

Future studies need to focus on the role of IPC in patient-centric outcomes. In patients, who are liver transplant candidates and require frequent thoracentesis, multidisciplinary discussion is of paramount importance, and IPC should be only considered after careful examination of other options and disclosure of high infection complication rates and mortality to patients.[53]

Surgical management

Thoracoscopy, pleurodesis, and diaphragmatic defect repair Chemical pleurodesis and talc poudrage during video-assisted thoracoscopic surgery (VATS) for management of HH have been reported in case reports and small case series. Pooled data from 20 case reports and 13 case series (180 patients) showed pleurodesis success rate of 72% and pooled complication rate of 82%. Report of recurrence or partial response was not available due to varying follow-up intervals.[54]

Baseline disease severity assessed by Child–Turcotte–Pugh (CTP) classification is an important predictor of success. Patients with CTP C are

shown to have a lower survival compared with CTP B (22% vs 50%) in a series of 11 patients with a median follow-up interval of 16 weeks.

Preoperative and postoperative optimization has been used in a surgical therapeutic modality known as the "4-step approach":(1) pneumoperitoneum induction for localization of diaphragmatic defects, (2) thoracoscopic pleurodesis, (3) postoperative continuous positive airway pressure (CPAP), and (4) drainage of ascites for abdominal decompression.[55,56]

Most retrospective case series in the literature include a small number of patients sampled over years to decades suggesting significant selection bias. This may also suggest that in carefully examined cases after multidisciplinary discussion, select patients benefit from surgical approaches to refractory HH.

Diaphragmatic defect surgical closure is associated with high mortality and has shown success in carefully selected population, primarily patients with CTP A class who do not meet criteria for other treatment options.[9] This treatment could have a high failure rate due to poor visualization of diaphragmatic defects (12%) during VATS.[57]

Liver transplant Liver transplantation is a definitive treatment of choice for decompensated cirrhosis. A referral for transplant evaluation should be made for patients with HH who are not already evaluated. Posttransplant outcomes are comparable for patients with HH with patients without HH.[58]

A retrospective study of 3487 patients with cirrhosis and PE showed that the most important determinant of the 3-year survival was liver transplantation. One- to 3-year mortality was 21.7% in patients who underwent liver transplantation compared with 77.5% in the nonliver transplant group.

Multidisciplinary discussion-based management

The overall short- and long-term outcome of a patient with HH is directly related to their candidacy for liver transplantation. Management of refractory HH needs multidisciplinary discussion among hepatology, pulmonary, transplant surgery, and interventional radiology. Despite the retrospective, single-center nature of most existing studies in the management of HH and significant selection bias in different therapeutic options, the literature has consistently shown that some of these management strategies carry significant morbidity and mortality.

Additionally, most of the studied palliative and therapeutic interventions of HH have not examined patient-centric outcomes. For these reasons, the palliative benefit of interventions should be balanced against potential risks and their downstream ramifications, such as exclusion from the transplant list. These interventions should also take into account patients' MELD score, history of prior hepatic encephalopathy, and numerous other predictive factors of outcomes in various interventions. As such, the care of a patient with cirrhosis and HH is one that should be highly personalized.

HEART FAILURE AND CARDIAC-INDUCED EFFUSION

Congestive heart failure (CHF) is the most common cause of transudative PE with an estimated 500,000 cases reported annually in the United States.[59] An estimated 87% of patients presenting with decompensated heart failure have PE on presentation.[60]

Presence of refractory PE in the setting of decompensated CHF has a 1-year mortality of 50%.[61] Most common presentation of CHF-induced PE is bilateral (70%), although unilateral right-sided (21%) and left-sided (9%) effusion can be seen.[62]

Pathophysiology

Primary mechanism for cardiac induced effusion is fluid entry from the lung interstitium into the pleural space.[63] The buildup of hydrostatic pressure in alveolar capillaries as a result of increased end diastolic left ventricular and left atrial pressure leads to increase in interstitial fluid. The fluid then moves to the pleural space form interstitial space due to pressure gradient. Additionally, due to increased downstream venous pressure, lymphatic flow is reduced and leads to fluid accumulation. Additionally, increased left atrial pressure or isolated right heart failure can result in elevated systemic venous pressure and enhanced fluid production and filtration from the parietal pleura and decreased lymphatic drainage due to pressure gradient.

Diagnostic Workup

CHF is the most common cause of bilateral PE. When the clinical presentation is that of decompensated heart failure, cardiomegaly, and bilateral PE, a clinical diagnosis can be made without thoracentesis and fluid analysis. If there are clinical suspicions of infection or presence of an underlying malignancy, diagnostic thoracentesis may be necessary.

A similar approach can be applied to unilateral effusions in the absence of other suspicious

etiologies and clinical presentation of heart failure with N-Terminal Pro-B-Type Natriuretic Peptide (NT-proBNP) levels greater than 1500 pg. In response to ventricular distention, natriuretic peptides are released, and serum levels of NT-proBNP are greatly valuable in the diagnosis of CHF-induced PE. A pleural fluid NT-proBNP level greater than 1500 pg is shown to have a sensitivity of 94% and specificity of 91%, for diagnosing CHF-induced PE in a meta-analysis, although serum levels of NT-proBNP were also comparable with similar results.[64] A serum NT-proBNP level greater than 1500 pg^{ml-1} is diagnostic of cardiac-induced PE.[65,66] However, unilateral effusion with atypical features, such as large unilateral effusions (occupying 2/3 of hemithorax) or presence of pleuritic chest pain or fever, warrants fluid analysis including microbiology and cytology.

Although CHF is the most common cause of transudative PE, many CHF-induced effusions in patients treated with diuretics are pseudoexudates by Light's criteria. Serum albumin-PF gradient greater than 1.2 g/dl or a serum pleural fluid protein gradient of more than 3.1 g/dL can recategorize these effusions as transudates.

When the patient continues to be symptomatic despite optimization of medical therapy, therapeutic thoracentesis is indicated for symptom management.[67]

In summary, diagnosis of CHF-induced PE is usually established clinically in bilateral effusions and does not require pleural fluid analysis. However, in select cases where infection or malignancy is suspected, diagnostic and therapeutic thoracentesis should be performed.

Ultrasound examination of the pleural space is helpful in diagnosis and typically shows an unechoic nonseptated simple effusion.[68]

Management of Pleural Effusion Secondary to Heart Failure

Management of excess fluid production

Medical management with focus on cardiac function optimization is the mainstay of therapy. Most cardiac-induced PEs will resolve with diuresis. In a prospective study of patients with decompensated heart failure, optimization of cardiac function with oxygen, digoxin, nitrates, sympathomimetic agents, synthetic α natriuretic peptides, and diuretics lead to resolution of effusion in 89% of patients. Loop diuretics are mainstay of therapy,[69] as well as maintaining a negative sodium balance with minimal activation of neurohormonal pathways.

Unfortunately, 30% to 50% of patients with decompensated heart failure become refractory to medical therapy annually due to adverse events such as renal failure and electrolyte imbalance, hypotension, and syncope.[61]

Thoracentesis

Thoracentesis is the primary method in the management of refractory cardiac-induced effusion. Frequent thoracentesis may be necessary for symptom management and can be complex due to the combination of dual antiplatelets and anticoagulation therapy in many patients with decompensated heart failure. Although the risk of pleural procedures on these medications has not been specifically assessed in the population with CHF, Dangers and colleagues[70] noted that among 182 patient who were on antiplatelet therapy compared with 942 who were not, the 24-h incidence of bleeding was 3.23% (95% CI, 1.08%-5.91%) in the antiplatelet group and 0.96% (95% CI, 0.43%- .60%) in the control group. Bleeding was significantly associated with antiplatelet therapy in multivariate analysis (OR = 4.13; 95% CI = 1.01–17.03; P = .044).[70] Frequent thoracentesis can also be a significant burden and limit quality of life. Although this has never been studied directly, Greener and colleagues,[71] studied factors leading to palliative care consultation among inpatients with advanced heart failure (HF) and found that thoracentesis was the most significant factor (OR = 4.125, 95% CI = 2.023–8.411) on multivariable analysis.

Indwelling pleural catheters

The use of IPCs for CHF-induced PE was first reported in 2009[72] in a small case series (n = 5). Majid and colleagues[73] compared thoracoscopic talc pleurodesis plus IPC versus IPC alone in CHF-induced PE. All patients experienced symptomatic palliation. Spontaneous pleurodesis occurred in 29% of the IPC group over a median of 66 days as compared with 11.5 days in the talc poudrage group, and all patients reported significant symptomatic improvement. Catheter-related infection was reported among 2 participants and was treated with antibiotics alone without catheter removal. In a propensity-matched study by Freeman and colleagues, IPC was compared with thoracoscopic pleurodesis. Patients with IPC had a shorter hospital stay (2 ± 2 days, =<0.001), lower operative morbidity of 2.5% compared with 20% in the thoracoscopic poudrage group, lower readmission rate, and lower mortality (0 vs 5%).

In a recent systematic review and meta-analysis on management of IPCs for non-MPEs, 325 patients from 13 studies were included. CHF-induced PE was the most common cause (50%) of non-MPEs requiring IPC placement. Spontaneous pleurodesis

Table 2
Indwelling pleural catheters in CHF-induced refractory effusion

Study/CHF Ones	Study Design	Sample Size	Symptom Palliation/ Patient-Centric Outcomes	Complications (%)	Pleurodesis (%) and Time to Pleurodesis
Herlihy et al,[72] 2009	Single-center retrospective case series	5	NYHA class improved from IV to II	• Empyema: 40% • Death due to empyema (20%)	Not recorded/not recorded
Chalhoub et al,[46] 2011	Single-center retrospective	13	3.8 + 0.4/4 procedure satisfaction score	None	Not recorded/ 113 + 36 d
Srour et al,[76] 2013	Single-center prospective	43	Dyspnea index (BDI, 2.24; 95% CI, 1.53–2.94 vs TDI, 6.19; 95% CI, 5.56–6.82)	• Moderate to large pneumothorax (possibly ex vacuo) (11.6%)	29%/66 d (IQR, 34–242 d)
Freeman et al,[75] 2014	Single-center retrospective propensity matched (IPC vs talc pleurodesis)	40 in the IPC group	Symptom palliation in all patients	None	35%/mean of 150 d
Bhatnagar et al,[47] 2014	Multicenter retrospective	9	Not reported	• Acute renal failure (11%)	44%/median of 38 d
Majid et al,[77] 2016, group 1	Single-center retrospective (Talc pleurodesis + IPC)	15	Immediate postprocedure symptom relief in all patients	• Cellulitis (13%) • Periprocedural hypotension (6%)	80%/median of 11.5 d (range, 2–22 d)
Majid et al,[77] 2016, group 2	Single-center retrospective (IPC alone)	28	Immediate post-procedure symptom relief in all patients	• 3.5% Empyema • 3.5% CPPE • 3.5% Cellulitis	25%/median of 66 d (range, 31–205 d)
Frost et al,[51] 2020	Single-center retrospective	30	No additional intervention needed in 93% of total population	• 16.7% complication (cellulitis, IPC malfunction)	24%/etiology-specific time not available

Abbreviations: BDI, baseline dyspnea index; CHF, congestive heart failure; CPPE, complex parapneumonic effusion; d, day; TDI, traditional dyspnae index.

was achieved in 42.1% (95% CI = 20.1%-64.1%) of CHF-induced PEs. The median time to pleurodesis ranged from 66 to 150 days.[74]

Although most reported studies to date are single center, retrospective with potential selection bias, these results suggest that IPC use in refractory CHF-induced PEs may lead to reduced length of hospital stay and provide symptomatic palliation to patients who would otherwise undergo frequent thoracenteses (**Table 2**).[46,47,51,72,75–77]

Pleurodesis

Literature on chemical pleurodesis in CHF-induced PE is scant and often includes single-center retrospective studies with heterogeneous population of nonmalignant etiology. In a study comparing IPC drainage (n = 28) with thoracoscopic talc poudrage plus IPC (n = 15) in patients with CHF-induced PEs,[73] the talc poudrage group achieved 80% pleurodesis compared with 25% in the IPC-only group. The median time to IPC removal was 11.5 days (2–22 days). The potential safety and efficacy of IPCs in this study is also confirmed in a propensity-matched comparison of IPC and thoracoscopic pleurodesis by Freeman and colleagues.[75] Patients were divided in 2 groups of 40, with New York heart Association (NYHA) class III or IV HF with no significant difference in age, sex, and functional class. At 6-month follow-up, there was no significant difference in palliation. The patient who underwent pleurodesis had a longer hospital stay of 6 $\pm$ 4 days, 23% readmission rate, and 5% mortality. An overall morbidity of 20% was reported in the pleurodesis group as compared with 2.5% in the IPC group with complications including but not limited to respiratory insufficiency, pulmonary embolism, and atrial fibrillation. Results of this study favored use of IPC for palliation compared with thoracoscopic pleurodesis. Prospective randomized trials with focus on patient-centric outcomes comparing chemical pleurodesis versus IPC in patients with refractory CHF-induced PEs are required to further assess their utility.

Prognosis

The presence of PEs in the setting of CHF does not portend a poor outcome. Instead, a refractory PE carries a poor prognosis because it indicates inadequate response to therapy in patients with decompensated heart failure. In one study, PEs found incidentally on routine transthoracic echocardiography (TTE) had 1- and 5 year survival rates of 81% and 70%, respectively.[78] In a study examining the association between PE and 6-month mortality, there was no association with mortality or hospital readmission, with relative risk of 1.393 (95% CI = 0.644–3.014).[79] The effusions mentioned in these studies however were small and did not require thoracentesis.

In a prospective single-center study of patients with non-MPEs by Walker and colleagues,[61] 1-year mortality was as high as 50% [HR = 0.61 (0.44–0.84); P = .02] in patients with CHF-induced effusion (n = 86), which is comparable with 1-year mortality rate (46%) of patients with acute decompensated heart failure admitted to intensive coronary care units.[80] Patients with HH (n = 12) had 1-year mortality of 25% [Hazard Ratio (HR) = 0.23 (0.07–0.71); P = .011];[72] however, mortality is reported to be as high as 48% in studies with larger population of HH.[31]

SUMMARY

Although HF-induced PE and HH are transudative non-MPEs, they are markers of disease severity, associated with significant morbidity and mortality and carry a high symptomatic burden. A systemic and multidisciplinary approach is often required when these effusions become refractory to medical therapy. Treatment decisions depend on goals of treatment and palliation and often need to be highly personalized, particularly in patients with ESLD who maybe future transplant candidates.

DISCLOSURE

The authors have nothing to disclose.

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