

Percutaneous Therapy in Pericardial Diseases



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KEYWORDS

- Pericardiocentesis • Pericarditis • Pericardial effusion • Cardiac tamponade
- Intrapericardial therapy • Percutaneous balloon pericardiectomy
- Percutaneous intrapericardial left atrial appendage ligation

KEY POINTS

- Echocardiographic and fluoroscopic guidance have greatly increased safety and feasibility for pericardiocentesis, providing current major complication rates of less than 2% and essentially no mortality.
- Devices for pericardiocentesis facilitate access to the pericardium in the absence of effusion, but are not needed routinely for patients with pericardial disease.
- Intrapericardial application of fibrinolytics can facilitate complete drainage of dense pericardial effusion in purulent or tuberculous pericarditis.
- Intrapericardial cytostatic treatment could be useful in preventing recurrences of neoplastic pericardial effusion; intrapericardial steroids can be applied in managing recurrent autoreactive pericardial disease.
- Percutaneous balloon pericardiectomy or percutaneous pericardiostomy can be used for palliative management of patients with recurrent neoplastic and autoreactive pericardial effusions.

INTRODUCTION

Depending on the etiology, clinical presentation, and hemodynamic status, patients with pericardial diseases may require interventional procedures in addition to medical management. In patients with a rapidly accumulating pericardial effusion and cardiac tamponade, urgent drainage of the pericardial effusion is lifesaving.¹ Echocardiographic and/or fluoroscopic guidance for this procedure has greatly increased safety and feasibility.² Several devices have been tested to facilitate

pericardiocentesis (PerDucer, PeriAttacher, AttachLifter, visual puncture systems, Grasper, Scissors, and Reverse slitter), although these are mainly intended to enable access to the pericardium in the absence of effusion for epicardial ablation or left atrial appendage ligation. Purulent or tuberculous infections are life threatening and require prompt drainage; intrapericardial application of a fibrinolytic agent or surgical management may sometimes be needed.^{2,3} In recurrent, large pericardial effusions or cardiac tamponade

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various medications can be applied intrapericardially to prevent further relapses or perform sclerotherapy. Percutaneous balloon pericardiectomy or percutaneous pericardiostomy are rarely applied alternatives to manage and prevent recurrent pericardial effusion.

PERICARDIOCENTESIS AND PERCUTANEOUS DRAINAGE OF PERICARDIAL EFFUSION

Drainage of a pericardial effusion is indicated in patients with cardiac tamponade, for symptomatic moderate to large pericardial effusions not responsive to medical therapy, and for effusions with suspected bacterial or neoplastic etiologies.⁴ Large, chronic effusions have a 30% to 35% risk of progression to cardiac tamponade.⁵ Also, subacute, large effusions not responsive to conventional therapy and with collapse of the right chambers have an increased risk of progression with potential benefit of preventive drainage.⁶ Halpern and colleagues⁷ introduced a scoring index to assist in the selection of patients for pericardiocentesis, based on clinical presentation, laboratory data, echocardiographic assessment, and hemodynamics. In 2014, the European Society of Cardiology Working Group on Myocardial and Pericardial Diseases proposed an alternative triage strategy that incorporated probabilities of progression to cardiac tamponade for different etiologies and clinical symptoms and signs, as well as the parameters obtained by imaging.¹

The routine part of preparation for the procedure should include a basic laboratory screen, especially taking note of the coagulation status. An International Normalized Ratio of greater than 1.5 and thrombocytopenia of less than 50,000/mL are relative contraindications and should be corrected before the procedure.⁴ However, in a recent percutaneous pericardiocentesis study in 212 patients with cancer, no procedure-related deaths were recorded and only 4 patients had major procedure-related bleeding (1.9%), regardless of whether the platelet count was greater than or less than 50,000/mL ($P = .1281$).⁸ In a retrospective analysis of 60 echocardiography-guided and fluoroscopy-guided pericardial procedures in patients with cancer with thrombocytopenia, Iliescu and colleagues as well as Tsang and colleagues^{9,10} also reported a low rate of major complications (2%) comparable with the rates reported in large series of echocardiography-guided pericardiocenteses in the general population. The complications included 1 entry site hematoma, 1 small pleural effusion, and 1 left hemothorax requiring surgical evacuation. Platelet transfusion did not modify the overall risk of the procedure,

presumably because 15% to 25% of patients with malignancies are refractory to platelet transfusion. Although 25% of the subjects had critical thrombocytopenia (<20,000 platelets/mL) and 40% had 20,000 to 50,000 platelets/mL, the micropuncture technique and a lateral approach for pericardiocentesis with echocardiography and fluoroscopy guidance seemed to be as safe as when performed in the general population.⁹ Accordingly, pericardiocentesis can be performed safely in patients with thrombocytopenia, assuming that proper imaging guidance is used.¹¹

PERCUTANEOUS PERICARDIOCENTESIS VERSUS SURGICAL PERICARDIOTOMY

Before the advent of echocardiography, clinicians had 2 choices: open surgical drainage or blind pericardiocentesis. At that time, a small subxyphoid incision and drainage of the pericardium under direct vision was safer than the blind puncture, given the risk of cardiac chamber perforation and a periprocedural mortality of up to 4% with the blind approach.¹² A percutaneous approach did, however, have a lower risk of a secondary infection. With echocardiographic guidance, the feasibility and safety of percutaneous pericardiocentesis increased tremendously because the size and distribution of the effusion could be identified at the time of puncture. Pericardiocentesis and percutaneous drainage of pericardial effusion is nowadays feasible and safe in the great majority of patients with pericardial disease. Surgical management remains reserved for hemopericardium owing to trauma, type A aortic dissection, ventricular free wall rupture in acute myocardial infarction, and some patients with purulent pericarditis and rare complications of interventional or electrophysiology procedures. If surgery is not available promptly or the patient is too unstable to survive the transfer, pericardiocentesis and controlled pericardial drainage of very small volumes of a hemorrhagic effusion can be attempted to stabilize the patient (mean total volume drained was 40.1 ± 30.6 mL, in several small portions, just to maintain a systolic blood pressure of approximately 90 mm Hg).^{13,14}

ECHOCARDIOGRAPHY-GUIDED PERICARDIOCENTESIS

Pericardiocentesis can be performed in the catheterization laboratory, the echocardiography laboratory, or even as a bedside procedure in emergencies. The needle trajectory should follow the angulation of the imaging transducer. The best spot for pericardiocentesis is the one on the

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