

Pericardiocentesis in Critical Care Areas

Site Applicability: St. Paul's Hospital

Practice Level: Specialized

- Assisting with insertion of a pericardial drain requires critical care nursing skills
- Cardiac monitoring necessitates cardiac monitoring skills

Policy Statements

Decision-Making for Procedure

1. The on-call/inpatient Echocardiographer will be available to report and review potential tamponade studies on an urgent/emergent basis.
2. The Echocardiographer will provide input as to the presence or otherwise of echocardiographic tamponade, feasibility, risk and potential approaches for needle pericardiocentesis.
3. The decision to proceed with needle pericardiocentesis will be made by the on-call/inpatient Echocardiographer in consultation with the CICU most responsible physician (MRP). The decision will be recorded in the Progress Notes by the CICU team.
4. In case of disagreement between the CICU MRP and the inpatient/on-call Echocardiographer as to the need for/and or safety of needle pericardiocentesis, the inpatient/on-call Echocardiographer may request that the case be reviewed with the outpatient or alternate Echocardiographer. In those cases, an alternate Echocardiographer may attempt the planned pericardiocentesis.
5. The CICU MRP will not perform the pericardiocentesis if deemed to be unsuitable by Echocardiography.

Performance of Procedure

6. Responsibility for performing all **planned** needle pericardiocentesis resides with the on-call/inpatient Echocardiographer. If pericardiocentesis is needed for a patient in another critical care area, the on-call echocardiographer must be consulted. The CICU MRP may be required to perform **emergency** pericardiocentesis in the case of life-threatening hemodynamic instability, if the inpatient Echocardiographer or designate is not immediately available.
7. The on-call/inpatient Echocardiographer must determine the timing of the planned pericardiocentesis.
8. All pericardiocentesis procedures must be performed in a critical care unit, or ED (if emergent) with appropriate IV access, monitoring and nursing support.
9. Responsibility for ensuring pre-printed pericardiocentesis orders are signed and followed prior to the pericardiocentesis resides with the CICU team.
10. The need for additional imaging support must be determined by the inpatient/on call Echocardiographer.

11. The inpatient/on-call Echocardiographer must decide whether a Fellow can perform the procedure, and in that case, must supervise the procedure. This could be the CICU or Echocardiography fellow, but will be determined on a case-by-case basis. The CICU fellow should be actively involved in the process.
12. The CICU team must advise the on-call CV surgeon if and when a pericardiocentesis will be performed.
13. In the case of technically challenging pericardiocentesis, the CICU MRP must involve the on-call CV surgeon early in the decision-making process.
14. Standard post-procedure care (Pre-Printed Order PH781, Interdisciplinary guideline B-00-13-10196), must be followed by all members of the CICU team.
15. Responsibility for follow up on any results from the pericardial fluid analysis resides with the CICU MRP.

Need to Know

A pericardial effusion (see [Appendix A](#)) is an abnormal accumulation of more than 50 mL of fluid in the pericardial sac, identified by chest x-ray, echocardiography, and clinical findings. Pericardial effusion can impair both cardiac filling (reducing preload and cardiac output) and emptying (reducing cardiac output), and can lead to cardiac tamponade. Signs of cardiac tamponade include narrowing pulse pressure (less than 30 mmHg), hypotension, tachycardia, and neck vein distension.

Pericardiocentesis is performed to drain abnormal accumulations of pericardial fluid. The procedure is indicated when the effusion is compromising hemodynamic status or causing cardiac tamponade, or for obtaining fluid for a definitive diagnosis. The most commonly used site for pericardiocentesis is the subxiphoid (see [Appendix B, figure 1](#)). Pericardiocentesis is often performed with transthoracic echocardiographic guidance, for more accurate identification of the location and size of the effusion.

Equipment and Supplies

- Lidocaine 2% without epinephrine (20 mL)
- Fentanyl injectable
- Midazolam injectable
- Pericardiocentesis kit
- Saline, (2) 10 mL syringes and 3-way stopcock for bubble study
- (2) 60 mL luer lock syringes
- Dressing supplies and skin prep swabs
- Sterile drape for patient cover
- Sterile gown X 2
- Sterile ultrasound probe plastic cover
- Negative drainage bottle or closed wound suction kit (e.g. [Davol drain](#))
- Suture equipment or Stat Lock device
- Adaptor tubing for Davol drain
- Labelled specimen collection containers as per above

Protocol

Pre-Procedure	
Assessment	Intervention
Assess VS (BP, HR, RR, SpO ₂ , T), ECG rhythm, LOC, skin color and warmth, breath and heart sounds.	
	Keep NPO for 3 hours pre-procedure, if possible.
Assess patient need for pre-procedure analgesic and/or sedation.	Provide as needed.
Intra-Procedure	
Assessment	Intervention
	Assist physician with procedure and monitor/document patient response.
Monitor cardiac rhythm, oxygenation, LOC, BP, pain, respiratory status continuously.	Intervene as indicated.
	<p>Send “fresh” pericardial fluid to lab if possible (no fixative added) and <u>hand-deliver to lab immediately.</u></p> <p>If laboratory processing not immediately available, pericardial fluid specimens for cytology may be collected in specimen container with fixative (e.g. CytoLyt) solution:</p> <ul style="list-style-type: none"> • Pour approximately 80 mL pericardial fluid into sterile container with fixative solution (e.g. CytoLyt); replace lid • Ensure refrigeration for all specimens stored with fixative solution (e.g. CytoLyt) • Specimens collected in container with fixative solution can be stored safely in fridge for several days, until laboratory services available.
Post-Procedure	
Assessment	Intervention
	<p>Apply occlusive dry dressing to drain insertion site (or to aspirate site if drain is removed following pericardial tap), secure drain connections with tape.</p> <p>Change pericardial drain dressing daily and PRN.</p>
Assess Q15min following procedure until stable, then Q1H x 4, and then Q4H until pericardial drain is removed:	<p>Notify the physician immediately if:</p> <ul style="list-style-type: none"> • Decreased BP

<ul style="list-style-type: none"> • Cardiac rhythm • VS (BP, HR, RR, SpO₂), level of consciousness • Insertion site (monitor for bleeding) • Drainage (amount, character). <p>Assess heart sounds and breath sounds Q4H as per critical care physical assessment protocol.</p>	<ul style="list-style-type: none"> • Arrhythmias • Increased venous pressure • Change in mental or respiratory status • Distant (muffled) heart sounds • Decreasing QRS amplitude (if cardiac monitoring is in place) • Bleeding or hematoma at drain site • Decreasing hemoglobin.
	<p>If drain left in situ:</p> <p>CICU MD aspirate and flush catheter intermittently (<i>Guideline</i>: Q6H for sanguinous drainage; Q12H for serous drainage)</p> <ul style="list-style-type: none"> • Clean drain port with alcohol swab • Flush with sterile saline 5 mL • Aspirate all available fluid • Flush again with sterile saline 5 mL • Clean drain port with alcohol swab, connect to suction • Repeat based on suggested frequency.
	<p>If persistent pericardial pain, CICU MD flush with lidocaine:</p> <ul style="list-style-type: none"> • Clean drain port with alcohol swab • Instill 10 mL lidocaine 1% without epinephrine • Flush with 10 mL sterile saline • Clamp for 20-minute dwell; reconnect to drainage following • Repeat as needed for pain control (maximum Q2H PRN).
<p>Continue Q4H assessments for 24 hours more after drain removed.</p> <p>Assess for signs of infection (erythema, edema, purulent or foul-smelling drainage, T greater than 38°C).</p>	
	<p>Assist patient to mobilize as tolerated.</p>

Documentation

Intra-procedure:

Nurses' Notes (PHC-NF035): Date, time, insertion site and dressing characteristics, pericardial catheter used, appearance and amount of pericardial fluid aspirated during procedure, physician

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performing the procedure, specimens sent to laboratory, and any unexpected outcomes and emergency interventions that were required during procedure.

24-Hour Critical Care Flowsheet (Form no. PHC-IC037): Pre- and post- procedure VS and hemodynamic parameters

ECG Rhythm Strip Flowsheet (Form no. PHC-IC004): Pre-procedure rhythm strip and if changes in rhythm

Post-Procedure:

Nurses' Notes (PHC-NF035): Amount, consistency, and characteristics of pericardial fluid collected from closed wound suction kit (e.g. Davol drain) if in-dwelling pericardial drain insitu. Record dressing changes. Document removal of pericardial drain (if applicable), noting physician who performed procedure.

24-Hour Critical Care Flowsheet (PHC-IC037): Account for drainage volumes NOTE: Pericardial drains are usually removed when the total amount of draining has decreased to less than 25 to 30 mL over the preceding 24 hours.

Patient and Family Education

Pre-Procedure: explain reason procedure is needed, describe procedure; expected outcomes, alternatives, and possible complications and need for monitoring including frequency

Post-Procedure: instruct to report pain, drainage or bleeding at site.

Related Documents

1. [B-00-13-10017](#) – Physical Assessment (Critical Care Areas)
2. [B-00-13-10011](#) – Cardiac Monitoring

References

1. Becker, D. E. (2011). Pericardiocentesis (assist). In D. L. Weigand (Ed.), AACN procedure manual for critical care (6th ed., pp. 364-370). Philadelphia: Saunders.
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3. Corey, R. G. (2013). Diagnosis and treatment of pericardial effusion. In D. S. Baslow (Ed.), UpToDate. Waltham, MA: UpToDate.
4. Kern, M. E. (2011). Pericardial catheter management. In D. L. Weigand (Ed.), AACN procedure manual for critical care (6th ed., pp. 690-704). Philadelphia: Saunders.
5. Mankad, S., & Sinak, L. (2013). Technique of pericardiocentesis. In D. S. Baslow (Ed.), UpToDate. Waltham, MA: UpToDate.

6. Osborn, K. (2010). Caring for the patient with cardiac inflammatory disease. In K. Osborn, C. Wraa & A. Watson (Eds.), *Medical-surgical nursing: Preparation for practice* (pp. 1219-1277). Upper Saddle River, NJ: Pearson

Persons or Groups Consulted

Echocardiographers

CICU CNLs

CICU Nurse Educator

Author

Clinical Nurse Specialist, Cardiology

Appendix A

The heart sits in a thin sac called the pericardial sac. An abnormal accumulation of excessive fluid (greater than 50 mL) in the pericardial space is called a pericardial effusion; presence of excessive fluid in this space can restrict and squeeze the heart, restrict cardiac filling and emptying, and progress to cardiac tamponade, a life-threatening emergency.

Clinical presentation of pericardial effusion depends on two factors: the 1) amount of fluid that has accumulated in the pericardial space, and 2) how rapidly the fluid has accumulated. A slow, gradual buildup (days to weeks) of fluid in the pericardial space may provide time for the pericardial sac to stretch, accommodating up to 1 to 2 litres without causing cardiac compression. Rapid (minutes to hours) buildup of fluid in the pericardial space does not allow the pericardial sac to stretch and cardiac compression can occur with volumes of only 80 to 200 mL. Treatment for pericardial effusion is directed at removing the fluid in the pericardial space either through a single aspiration or with an indwelling drain attached to a drainage collection system (e.g. a Davol or Hemovac).

Appendix B

Figure 1.

Sub-xiphoid approach for pericardiocentesis

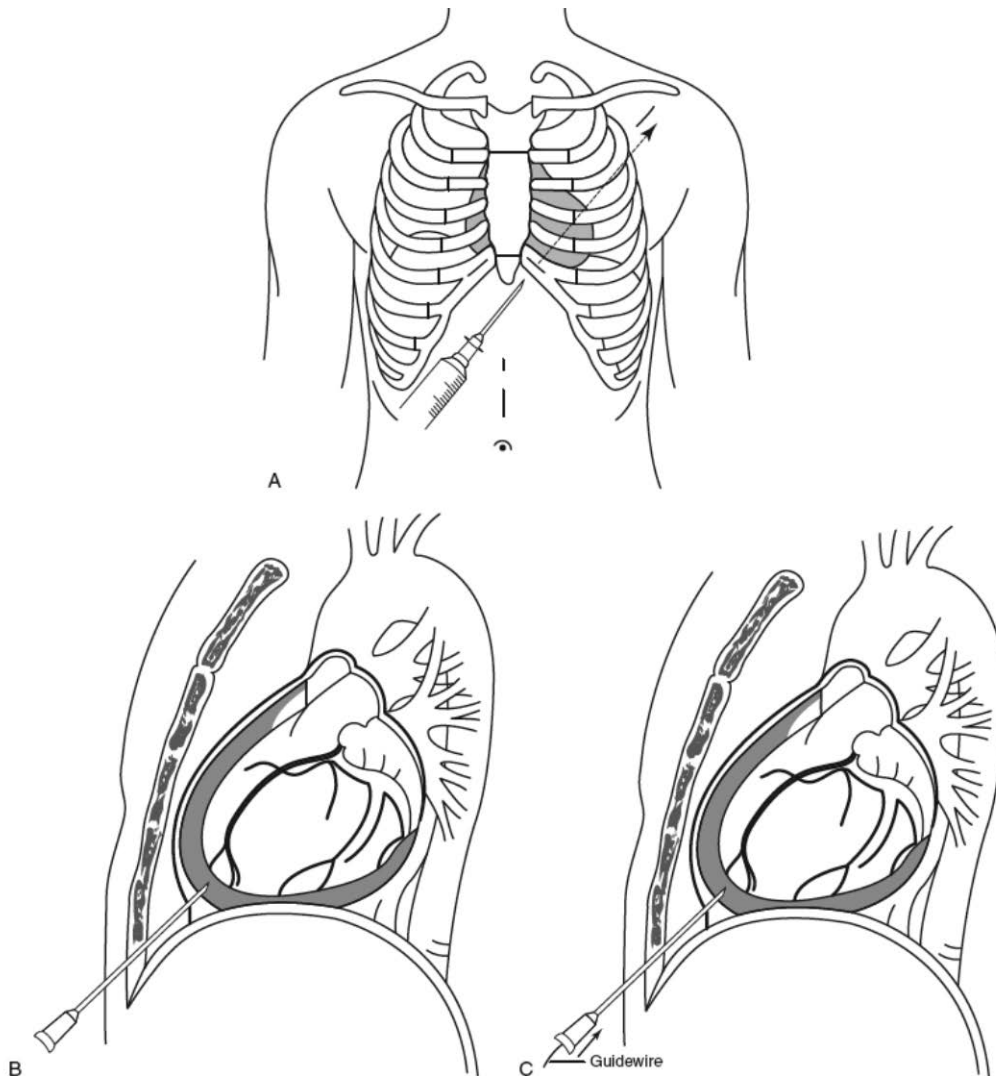


Figure 2. System for Pericardial Drainage



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