OPEN ACCESS Freely available online

Research Article

Journal of Cardiology and Heart Failure

Comparative Perioperative Outcomes Following Pericardioperitoneal and Pleuropericardial Window Procedures: A Retrospective Cohort Study

Noor Abu Hantash[1*], Mohammad Tayeh[2], Ahmad Yaish[1], Zainab Alsayes[1], Moaath Alsmady[3]

[1]*School of Medicine, University of Jordan, Amman, Jordan*
[2]*School of Medicine, Jordan University of Science and Technology, Al Ramtha, Jordan*
[3]*Cardiac Surgery Department, University of Jordan Hospital, Amman, Jordan*

[*]**Correspondence to:** Noor Abu Hantash, School of Medicine, University of Jordan, Amman, Jordan, E-mail: abuhantashnoor91@gmail.com

Received: May 18, 2026; **Manuscript No:** JCHF-26-2068; **Editor Assigned:** May 20, 2026; **PreQc No:** JCHF-26-2068(PQ); **Reviewed:** May 25, 2026; **Revised:** May 27, 2026; **Manuscript No:** JCHF-26-2068(R); **Published:** June 30, 2026

Citation: Hantash NA, Tayeh M, Yaish A, Alsayes Z, Alsmady M (2026). Comparative Perioperative Outcomes Following Pericardioperitoneal and Pleuropericardial Window Procedures: A Retrospective Cohort Study. J. Cardiol. Heart Fail. Vol.2 Iss.1, June (2026), pp:44-50.

ABSTRACT

Background

Pericardial window procedures are commonly performed for the management of recurrent or symptomatic pericardial effusion. Comparative data between pericardioperitoneal window (PPW) and pleuropericardial window (PLW) procedures remain limited. This study aimed to compare perioperative outcomes and complications between both techniques.

Methods

A retrospective exploratory cohort study was conducted including patients who underwent surgical pericardial window creation at Jordan University Hospital between 2000 and 2025. Patients were divided into PPW and PLW groups. Baseline characteristics, perioperative variables, postoperative complications, and length-of-stay outcomes were analyzed descriptively and comparatively. Continuous variables were reported as median [IQR], and categorical variables as n/N (%). Fisher's exact and Wilcoxon rank-sum tests were used where appropriate. Effect estimates were reported with 95% confidence intervals.

Results

The study cohort included 12 patients, of whom 5 underwent PPW and 7 underwent PLW. Median age was 55 [38–65] years in the PPW group and 52 [29–55] years in the PLW group. Early 30-day complications occurred in 3/5 (60.0%) PPW patients and 5/7 (71.4%) PLW patients (RR 1.19, 95% CI 0.51–2.80; p=1.000). PLW was numerically associated with shorter hospital length of stay (9 vs 13 days), shorter ICU stay (1 vs 2 days), lower estimated blood loss (50 vs 150 mL), and shorter chest tube duration (1 vs 4 days), although none reached statistical significance. Mortality data were available for only 6 patients, and follow-up duration was documented in only 1 patient, limiting assessment of long-term outcomes.

Conclusions

Both PPW and PLW procedures demonstrated substantial early complication rates without statistically conclusive differences between groups. Although PLW showed numerically favorable perioperative outcomes, findings were limited by the small sample size, temporal heterogeneity, and incomplete follow-up. Larger prospective multicenter studies are needed to better define comparative effectiveness and long-term durability.

Keywords: Preventive Cardiology; Cardiovascular Disease; Risk Assessment; Digital Health; Lifestyle Intervention; Public Health

INTRODUCTION

Pericardial effusion is a clinically significant condition characterized by the pathological accumulation of fluid within the pericardial cavity, which normally contains approximately 10–50 mL of serous fluid that facilitates cardiac motion [1]. The etiology of pericardial effusion is diverse and includes inflammatory and non-inflammatory causes such as malignancy, infection, autoimmune disorders, trauma, renal failure, and post-cardiac surgical states [1,2]. Although some patients remain asymptomatic, progressive fluid accumulation may result in cardiac tamponade, a life-threatening condition associated with hemodynamic instability and increased mortality if left untreated [2,3].

Management strategies depend on the etiology, severity, and hemodynamic consequences of the effusion. Pericardiocentesis is widely considered the first-line intervention in emergent settings because of its minimally invasive nature and high immediate success rate [4]. However, recurrence remains common, particularly in malignant or chronic effusions, often necessitating more definitive surgical drainage approaches [4,5].

Surgical pericardial window creation has emerged as a reliable technique for continuous drainage and prevention of recurrent fluid accumulation, especially in recurrent, loculated, or malignant effusions where percutaneous drainage may be insufficient [6]. Several surgical techniques have been described, most notably Pleuropericardial window (PLW) and Pericardioperitoneal window (PPW) procedures.

The Pleuropericardial approach establishes communication between the pericardial and pleural cavities and has demonstrated favorable perioperative outcomes and low recurrence rates in both open and thoracoscopic settings [7,8]. Minimally invasive thoracoscopic Pleuropericardial window techniques have also been associated with shorter hospital stay, rapid recovery, and low postoperative morbidity [8]. Similarly, studies comparing subxiphoid and thoracoscopic approaches have suggested that pleural-based drainage may provide effective long-term symptom relief with acceptable safety profiles [9].

The Pericardioperitoneal window procedure offers an alternative drainage route into the peritoneal cavity and may be particularly useful in recurrent or refractory effusions [10]. Previous reports have demonstrated durable symptomatic improvement and satisfactory recurrence prevention in selected patients with malignant pericardial effusion [10,11]. In addition, combined Pleuropericardial and Pericardioperitoneal approaches have been described in highly selected refractory cases with acceptable procedural outcomes [12].

Despite these promising findings, comparative evidence directly evaluating PPW and PLW remains limited. Most published literature consists of case reports, small retrospective series, or studies comparing surgical drainage with pericardiocentesis rather than direct comparisons between surgical techniques [5,9]. Furthermore, the rarity of these procedures and variability in patient selection continue to limit the development of standardized evidence-based recommendations. Given these gaps in the literature, this study aimed to perform a retrospective exploratory analysis comparing perioperative outcomes between Pleuropericardial and Pericardioperitoneal window procedures at Jordan University Hospital. By evaluating complications, recurrence, perioperative recovery parameters, and mortality, this study seeks to provide rare regional comparative data that may contribute to future multicenter investigations and guide individualized surgical decision-making.

MATERIALS AND METHODS

Study Design

This retrospective exploratory cohort study evaluated perioperative outcomes among patients who underwent surgical drainage of pericardial effusion using either pericardioperitoneal window (PPW) or pleuropericardial window (PLW) procedures at Jordan University Hospital (JUH).

Patients who underwent surgery between 1 January 2000 and 31 December 2025 were eligible for inclusion. The primary exposure variable was procedure type, categorized as PPW or PLW.

The primary outcome was the occurrence of early postoperative complications within 30 days of surgery. Secondary outcomes included recurrence of pericardial effusion, need for reintervention, readmission for the same cause, procedural success, respiratory complications, infection, bleeding, transfusion requirement, mortality, hospital length of stay (LOS), ICU LOS, estimated blood loss, operative time, drain output, and chest tube duration.

Study Population

This retrospective cohort included adult patients aged 18 years or older who underwent surgical drainage of clinically significant pericardial effusion using either PPW or PLW procedures at Jordan University Hospital. Patients with incomplete operative records preventing outcome assessment were excluded from the final analysis.

Data Collection

Clinical data were retrospectively extracted from electronic and paper-based hospital records, including operative reports, anesthesia documentation, ICU records, laboratory data, imaging reports, and discharge summaries.

Collected variables included demographic characteristics, comorbidities, indication for surgery, preoperative imaging findings, perioperative variables, postoperative complications, and follow-up outcomes.

Data Preparation and Quality Control

The final dataset underwent structured cleaning and validation procedures, including manual verification, unit standardization, consistency assessment, and logical quality-control checks.

Continuous variables were standardized into clinically consistent units. Hospital and ICU LOS were standardized to days, operative time to minutes, estimated blood loss and drain output to milliliters, and follow-up duration to months.

Binary variables were coded as present or absent. Missing or uncertain values were retained as missing and were not assumed to indicate absence of events.

Additional quality-control checks assessed implausible values, duplicate identifiers, inconsistencies between related variables, overlap between drain output and blood loss variables, and logical contradictions in recurrence and procedural success variables.

One hospital LOS value was considered implausible because the documented ICU stay exceeded the total hospital stay. Following source verification, this value was treated as missing for LOS analysis while the patient remained included in all other analyses.

Statistical Analysis

Continuous variables were summarized as median and interquartile range (IQR). Categorical variables were summarized as counts and percentages. Between-group comparisons for continuous variables were performed using the Wilcoxon rank-sum test. Fisher's exact test was used for categorical variables because of sparse event counts and small sample size.

Effect sizes including risk ratios, odds ratios, risk differences, and median differences were reported with 95% confidence intervals where appropriate. Outcomes with extremely sparse denominators were interpreted descriptively only. No multivariable regression analysis was performed because the small sample size and low event count would likely produce unstable estimates.

RESULTS

Study Cohort

The definitive study cohort comprised 12 patients. Among these, 5 underwent PPW procedures and 7 underwent PLW procedures.

Baseline Characteristics

Median age was 55 years [IQR, 38–65] in the PPW group and 52 years [IQR, 29–55] in the PLW group. BMI was numerically higher in the PLW group, with a median of 30.15 kg/m² [IQR, 29–41.5], compared with 22.5 kg/m² [IQR, 19.76–28.05] in the PPW group.

Female sex was more frequent in the PLW group, occurring in 5/7 patients (71.4%), compared with 2/5 patients (40.0%) in the PPW group. History of malignancy was documented in 1/5 patients (20.0%) in the PPW group and 2/7 patients (28.6%) in the PLW group. Idiopathic indication was present in 2/5 patients (40.0%) in the PPW group and 3/7 patients (42.9%) in the PLW group. Malignant indication was present in 0/5 PPW patients and 2/7 PLW patients (28.6%). Baseline characteristics are summarized in Table 1.

Variable	Overall (n=12)	PPW (n=5)	PLW (n=7)	Missing, n
Age, years	53.5 [33.5, 60]	55 [38, 65]	52 [29, 55]	0
BMI, kg/m²	29 [24.61, 31.3]	22.5 [19.76, 28.05]	30.15 [29, 41.5]	2
Symptom-to-surgery time, days	14 [3, 180]	13 [3.34, 284.25]	14 [3, 180]	1
Previous pericardiocentesis, count	0 [0, 1]	1 [0, 1]	0 [0, 1]	3
Female sex	7/12 (58.3%)	2/5 (40%)	5/7 (71.4%)	0
Smoker	3/12 (25%)	2/5 (40%)	1/7 (14.3%)	0
History of malignancy	3/12 (25%)	1/5 (20%)	2/7 (28.6%)	0
Stage IV/metastatic disease	1/2 (50%)	0/1 (0%)	1/1 (100%)	10
Hypertension	3/12 (25%)	2/5 (40%)	1/7 (14.3%)	0
Diabetes mellitus	3/12 (25%)	2/5 (40%)	1/7 (14.3%)	0
CKD/ESRD	0/12 (0%)	0/5 (0%)	0/7 (0%)	0
COPD	0/12 (0%)	0/5 (0%)	0/7 (0%)	0
IHD/CAD	1/12 (8.3%)	1/5 (20%)	0/7 (0%)	0
Heart failure	1/12 (8.3%)	1/5 (20%)	0/7 (0%)	0
Autoimmune disease	2/12 (16.7%)	0/5 (0%)	2/7 (28.6%)	0
Indication: idiopathic	5/12 (41.7%)	2/5 (40%)	3/7 (42.9%)	0
Indication: malignant	2/12 (16.7%)	0/5 (0%)	2/7 (28.6%)	0
Indication: other/unspecified	4/12 (33.3%)	2/5 (40%)	2/7 (28.6%)	0
Indication: traumatic	1/12 (8.3%)	1/5 (20%)	0/7 (0%)	0

Table 1: Baseline characteristics by procedure group

Primary Outcome

Early postoperative complications within 30 days occurred in 3/5 patients (60.0%) in the PPW group and 5/7 patients (71.4%) in the PLW group.

The absolute risk difference was 11.4 percentage points higher in the PLW group (95% CI: −42.9 to 65.7). The risk ratio was 1.19 (95% CI: 0.51–2.80).

Fisher's exact test did not demonstrate clear statistical evidence of a between-group difference (p=1.000).

Secondary Outcomes

Acute complications occurred in 2/5 PPW patients (40.0%) and 4/7 PLW patients (57.1%).

Transfusion was required in 1/5 PPW patients (20.0%) and 1/7 PLW patients (14.3%).

Mortality data were available for only 6 patients. Mortality occurred in 1/3 evaluable PPW patients and 0/3 evaluable PLW patients.

Recurrence data were available for only 3 patients. Reintervention and readmission data were similarly sparse and interpreted descriptively only.

No secondary binary outcome demonstrated statistically conclusive evidence of a difference between procedures.

Outcome	PPW	PLW	RD, percentage points (95% CI)	RR (95% CI)	OR (95% CI)	Fisher p	Missing, n
Early 30-day complications	3/5 (60.0%)	5/7 (71.4%)	11.4 (-42.9 to 65.7)	1.19 (0.51 to 2.80)	1.67 (0.15 to 18.88)	1	0
Acute complications	2/5 (40.0%)	4/7 (57.1%)	17.1 (-37.1 to 71.4)	1.43 (0.41 to 4.99)	2.00 (0.19 to 20.61)	1	0
Transfusion	1/5 (20.0%)	1/7 (14.3%)	-5.7 (-45.9 to 42.9)	0.71 (0.06 to 8.90)	0.67 (0.03 to 14.03)	1	0

Table 2A: Primary and evaluable secondary binary outcomes

Outcome	PPW	PLW	Missing, n	Interpretation
Documented mortality	1/3 (33.3%)	0/3 (0.0%)	6	Descriptive only due to missingness
Recurrence	0/1 (0.0%)	1/2 (50.0%)	9	Descriptive only due to sparse follow-up
Reintervention	0/4 (0.0%)	1/6 (16.7%)	2	Descriptive only
Readmission	0/4 (0.0%)	1/6 (16.7%)	2	Descriptive only
Procedural success	2/3 (66.7%)	3/4 (75.0%)	5	Descriptive only
Respiratory complication	1/1 (100.0%)	3/3 (100.0%)	8	Descriptive only; extremely sparse denominator
Infection	1/1 (100.0%)	1/1 (100.0%)	10	Descriptive only; extremely sparse denominator
Suspected infection	Not evaluable	Not evaluable	12	Not estimable / not evaluable
Bleeding	Not evaluable	Not evaluable	12	Not estimable / not evaluable

Table 2B: Sparse or descriptive binary outcomes

Length of Stay and Continuous Outcomes

Median hospital LOS was 13 days [IQR, 8.5–33] in the PPW group and 9 days [IQR, 6.5–20.5] in the PLW group.

Median ICU LOS was 2 days [IQR, 2–4] in the PPW group and 1 day [IQR, 1–2] in the PLW group.

Median estimated blood loss was 150 mL [IQR, 150–350] in the PPW group and 50 mL [IQR, 10–400] in the PLW group. Median chest tube duration was 4 days [IQR, 3–10] in the PPW group and 1 day [IQR, 1–3] in the PLW group.

Although PLW demonstrated numerically shorter LOS, shorter chest tube duration, and lower blood loss, confidence intervals were wide and estimates remained imprecise.

Outcome	PPW, n	PPW median [IQR]	PLW, n	PLW median [IQR]	Median difference (95% CI)	Wilcoxon p	Missing, n
Hospital LOS, days	4	13 [8.5, 33]	4	9 [6.5, 20.5]	-4.0 (-40.0 to 18.0)	0.561	4
ICU LOS, days	3	2 [2, 4]	4	1 [1, 2]	-1.0 (-3.0 to 1.0)	0.195	5
Blood loss, mL	5	150 [150, 350]	7	50 [10, 400]	-100.0 (-1450.0 to 380.0)	0.567	0
Operative time, min	5	55 [45, 90]	7	60 [60, 90]	5.0 (-90.0 to 45.0)	0.742	0
Drain output first 24h, mL	3	50 [0, 200]	5	100 [100, 300]	50.0 (-100.0 to 1050.0)	0.222	4
Total drain output, mL	2	325 [100, 550]	3	200 [100, 1000]	-125.0 (-450.0 to 900.0)	1.000	7
Chest tube duration, days	3	4 [3, 10]	5	1 [1, 3]	-3.0 (-9.0 to 11.0)	0.282	4

Table 3: Length of stay and continuous perioperative outcomes

Follow-up Ascertainment

Follow-up duration was documented in only one patient in the cohort. This patient belonged to the PPW group and had 6 months of documented follow-up. No follow-up duration was documented in the PLW group. Because follow-up documentation was extremely limited, long-term outcomes including recurrence, reintervention, and procedural durability were interpreted descriptively only.

Variable	PPW, n	PPW median [IQR]	PLW, n	PLW median [IQR]	Median difference (95% CI)	Wilcoxon p	Missing, n
Follow-up duration, months	1	6 [6, 6]	0	Not available	Not estimable	NA	11

Supplementary Table 1: Follow-up ascertainment

Note: PPW = pericardioperitoneal window; PLW = pleuropericardial window. Follow-up duration was documented in only 1 of 12 patients and was therefore used only to assess outcome ascertainment. Long-term outcomes should be interpreted descriptively because follow-up documentation was extremely limited.

QC check	Flagged rows
Invalid procedure group	0
Duplicate patient ID	0
Binary text/pre-conversion issues	0
Binary coding issues after conversion	0
Numeric text/unit contamination issues	0
Age issues	0
BMI issues	0
BMI/weight conflicts	0
Hospital LOS < ICU LOS conflicts	0
Blood loss range issues >5000 or <0	0
Blood loss high review >2000	0
Blood loss equals possible drain value	0
Symptom-to-surgery range issues	0
Follow-up range issues	0
Success logical conflicts	0
Recurrence/reintervention conflicts	0

Supplementary Table 2: Final QC summary

Note: Final quality-control decision: PASS. No critical data-quality issues were identified after final review. The dataset proceeded to exploratory statistical analysis. LOS = length of stay; ICU = intensive care unit.

DISCUSSION

Surgical pericardial window creation remains an important therapeutic option for recurrent or clinically significant pericardial effusion, particularly in patients with recurrent malignant effusion or failed percutaneous drainage [4,5]. Both pleuropericardial and pericardioperitoneal techniques have demonstrated acceptable safety profiles in previous reports, although direct comparative evidence remains limited.

In this exploratory cohort study, no statistically conclusive differences were identified between PPW and PLW procedures regarding early postoperative complications or acute perioperative outcomes. These findings are broadly consistent with previous literature suggesting that perioperative differences between surgical drainage techniques may be modest [8,9].

Although not statistically significant, PLW demonstrated numerically shorter ICU stay, hospital LOS, chest tube duration, and lower estimated blood loss. While these findings should not be interpreted as evidence of procedural superiority, they may suggest potential practical advantages of pleural drainage pathways in selected patients, particularly regarding postoperative recovery and chest tube management. Even modest reductions in ICU utilization, hospitalization, or drain duration may carry clinically meaningful implications in high-risk or resource-limited settings. These findings remain hypothesis-generating and require confirmation in adequately powered prospective studies.

The primary outcome of early postoperative complications occurred more frequently in the PLW group. However, the estimates were highly imprecise because of the small sample size and wide confidence intervals. In addition, PLW patients demonstrated higher BMI values and greater prevalence of certain comorbidities, suggesting possible baseline imbalance and confounding by indication.

Long-term durability remains one of the most clinically important considerations when selecting a surgical drainage strategy. Previous studies comparing surgical drainage with pericardiocentesis have reported lower recurrence rates with surgical window creation but increased procedural invasiveness and bleeding risk [5,6]. Similarly, minimally invasive thoracoscopic approaches have demonstrated favorable recurrence prevention and recovery outcomes in selected patients [7–9].

However, long-term outcomes in the present study could not be reliably assessed because of incomplete follow-up documentation. Follow-up duration was documented for onlyone patient, and mortality data were available for only half of the cohort. Consequently, recurrence, survival, and procedural durability could not be adequately evaluated.

An additional limitation is the prolonged study period spanning 25 years. During this interval, perioperative management, imaging modalities, anesthetic techniques, ICU care, and surgical practices likely evolved substantially. These temporal changes may have introduced confounding that could not be adequately controlled because of the retrospective design and limited cohort size [13-16].

Despite these limitations, this study represents one of the few regional comparative analyses evaluating PPW and PLW procedures within a single institutional cohort. Structured data cleaning, standardized outcome reporting, and transparent statistical interpretation improved methodological consistency and reporting quality.

Several limitations should be acknowledged. First, the retrospective single-center design introduces potential selection bias and residual confounding. Second, the small sample size limits statistical power and precision. Third, incomplete follow-up significantly restricted interpretation of long-term outcomes. Fourth, baseline differences between groups may have influenced perioperative outcomes. Finally, the prolonged inclusion period may have introduced temporal heterogeneity in perioperative care [16-20].

Overall, this exploratory study did not identify statistically conclusive superiority of either procedure. Numerical trends favoring PLW in several perioperative recovery parameters warrant further investigation in larger prospective multicenter cohorts.

CONCLUSION

In this retrospective exploratory cohort study, no statistically conclusive differences were identified between pericardioperitoneal and pleuropericardial window procedures regarding early postoperative outcomes. Although the pleuropericardial approach demonstrated numerically shorter hospital and ICU length of stay, shorter chest tube duration, and lower estimated blood loss, these findings were not statistically definitive.

Interpretation of the results is limited by the retrospective single-center design, small sample size, baseline imbalance between groups, temporal heterogeneity across the study period, and incomplete long-term follow-up. Both PPW and PLW appear to represent clinically acceptable surgical approaches for the management of pericardial effusion, and procedural selection should remain individualized according to patient characteristics, underlying pathology, anatomical considerations, and surgical expertise. Further prospective multicenter studies with larger sample sizes and standardized follow-up are required to better evaluate comparative safety, recurrence risk, and long-term procedural durability.

ETHICAL CONSIDERATIONS

The study protocol was approved by the Institutional Review Board (IRB) of Jordan University Hospital. The requirement for informed consent was waived because of their retrospective

nature of the study. Patient confidentiality was maintained through anonymization and secure handling of extracted data.

COMPETING INTERESTS

None

CONTRIBUTORSHIP

None

ACKNOWLEDGMENT

None

DISCLAIMER

The views expressed in the submitted article are the author's own and not an official opinion of the institution or funder.

FUNDING

No Funding

ETHICAL APPROVAL

Ethical approval was obtained from Jordan University Hospital IRB, code: 10/2025-27514

PATIENT AND PUBLIC INVOLVEMENT

No Closed involvement

REFERENCES

1. Yamani N, Abbasi A, Almas T, Mookadam F, Unzek S. Diagnosis, treatment, and management of pericardial effusion-review. Annals of Medicine and Surgery. 2022;80:104142.
2. Shanker DA, Gaur A, Warriner D. Pericardial Effusion: Overview of Aetiology, Pathophysiology, Diagnosis, and Management. Cureus. 2025;17(9):e92177.
3. Sagristà-Sauleda J, Angel J, Sánchez A, Permanyer-Miralda G, Soler-Soler J. Effusive–constrictive pericarditis. New England Journal of Medicine. 2004;350(5):469-75.
4. Tsang TS, Freeman WK, Barnes ME, Reeder GS, Packer DL, Seward JB. Rescue echocardiographically guided pericardiocentesis for cardiac perforation complicating catheter-based procedures: the Mayo Clinic experience. Journal of the American College of Cardiology. 1998;32(5):1345-50.
5. Langdon SE, Seery K, Kulik A. Contemporary outcomes after pericardial window surgery: impact of operative.
6. Hankins JR, Satterfield JR, Aisner J, Wiernik PH, McLaughlin JS. Pericardial window for malignant pericardial effusion. The Annals of thoracic surgery. 1980;30(5):465-71.
7. Özkan M, Beyazpınar DS, Çelik M, Günaydın Ç. Pleuropericardial Window Prevents Pericardial Effusion Following Surgical Atrial Septal Defect Closure. Anatolian Journal of Cardiology. 2022;26(9):696.
8. Pulle MV, Bansal M, Asaf BB, Puri HV, Bishnoi S, Kumar A. Safety and feasibility of thoracoscopic pericardial window in recurrent pericardial effusion–A single-centre experience. Journal of Minimal Access Surgery. 2024;20(1):19-23.
9. Allen KB, Faber LP, Warren WH, Shaar CJ. Pericardial effusion: subxiphoid pericardiostomy versus percutaneous catheter drainage. The Annals of thoracic surgery. 1999;67(2):437-40.
10. Kang Y, Cai Y, Pan W. Pericardial-Peritoneal Window as an Alternative Treatment for Large and Recurrent Pericardial Effusion Post-Pericardiotomy. Brazilian Journal of Cardiovascular Surgery. 2022;37(2):200.
11. Piehler JM, Pluth JR, Schaff HV, Danielson GK, Orszulak TA, Puga FJ. Surgical management of effusive pericardial disease: influence of extent of pericardial resection on clinical course. The Journal of thoracic and cardiovascular surgery. 1985;90(4):506-16.
12. Petrella F, Radice D, Colombo N, Mariolo AV, Diotti C, de Marinis F, Spaggiari L. Pericardial-peritoneal window for malignant pericardial effusion. Shanghai Chest. 2018;2(6).
13. Maisch B, Seferović PM, Ristić AD, Erbel R, Rienmüller R, Adler Y, Tomkowski WZ, Thiene G, Yacoub MH, Priori SG, Alonso Garcia MA. Guidelines on the diagnosis and management of pericardial diseases executive summary: the Task Force on the Diagnosis and Management of Pericardial Diseases of the European Society of Cardiology. European heart journal. 2004;25(7):587-610.
14. Gornik HL, Gerhard-Herman M, Beckman JA. Abnormal cytology predicts poor prognosis in cancer patients with pericardial effusion. Journal of clinical oncology. 2005;23(22):5211-6.
15. McDonald JM, Meyers BF, Guthrie TJ, Battafarano RJ, Cooper JD, Patterson GA. Comparison of open subxiphoid pericardial drainage with percutaneous catheter drainage for symptomatic pericardial effusion. The Annals of thoracic surgery. 2003;76(3): 811-6.
16. Burazor I, Imazio M, Markel G, Adler Y. Malignant pericardial effusion. Cardiology. 2013;124(4):224-32.
17. Refaat MM, Katz WE. Neoplastic pericardial effusion. Clinical cardiology. 2011;34(10):593-8.
18. Ristić AD, Imazio M, Adler Y, Anastasakis A, Badano LP, Brucato A, Caforio AL, Dubourg O, Elliott P, Gimeno J, Helio T. Triage strategy for urgent management of cardiac tamponade: a position statement of the European Society of Cardiology Working Group on Myocardial and Pericardial Diseases. European heart journal. 2014;35(34):2279-84.
19. Kopecky SL, Callahan JA, Tajik AJ, Seward JB. Percutaneous pericardial catheter drainage: report of 42 consecutive cases. The American journal of cardiology. 1986;58(7):633-5.
20. Ziskind AA, Pearce AC, Lemmon CC, Burstein S, Gimple LW, Herrmann HC, McKay R, Block PC, Waldman H, Palacios IF. Percutaneous balloon pericardiotomy for the treatment of cardiac tamponade and large pericardial effusions: description of technique and report of the first 50 cases. Journal of the American College of Cardiology. 1993;21(1):1-5.