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Case Report

Successful Control of Malignant Pericardial Effusion from Endometrial Cancer Using Intrapericardial Chemotherapy: A Case Report

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Abstract: Endometrial cancer (EC) is one of the most common gynecologic malignancies worldwide, with increasing incidence and mortality. Although metastasis typically involves lymph nodes, peritoneum, and lungs, malignant pericardial effusion (MPE) is a rare and life-threatening complication, often associated with advanced disease and poor prognosis. We report the case of a 70-year-old woman with stage IIIB endometrial adenocarcinoma previously treated with surgery, chemotherapy, and radiotherapy, who presented three years later with cardiac tamponade due to MPE. Initial management with pericardiocentesis resulted in clinical stabilization; however, early recurrence occurred within 30 days, with cytological and histopathological confirmation of metastatic carcinoma of Müllerian origin. Given the high risk of recurrence, intrapericardial chemotherapy with cisplatin was administered (10 mg/20 mL daily for five days) via a pericardial catheter. The patient tolerated the procedure well, with no significant complications or systemic toxicity. Follow-up echocardiography demonstrated complete resolution of the effusion, and the patient remained asymptomatic at one-month follow-up, without evidence of early recurrence. This case highlights the feasibility and effectiveness of intrapericardial cisplatin as a locoregional treatment strategy for recurrent MPE in selected patients. Although evidence is limited and primarily derived from observational studies, this approach may reduce recurrence rates and the need for repeated invasive procedures. Intrapericardial chemotherapy should be considered within a multidisciplinary framework, particularly in palliative settings where local control is the primary goal.

Keywords: Malignant Pericardial Effusion; Cardiac Tamponade; Endometrial Cancer; Intrapericardial Chemotherapy.

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1. Introduction

Endometrial cancer (EC) is the most common gynecologic malignancy in developed countries, and its incidence continues to increase globally. In 2022, an estimated 420,368 new cases were reported, a trend largely driven by the growing prevalence of obesity and sedentary lifestyles [1]. Although most cases are diagnosed at early stages, locally advanced EC (including FIGO stage IIIB) and recurrent disease account for a disproportionate share of mortality and healthcare resource utilization and often require multimodal treatment strategies. In this setting, European guidelines (ESGO/ESTRO/ESP) recommend integrating surgery, external beam radiotherapy, brachytherapy, or systemic chemotherapy according to stage and prognostic factors. These guidelines also emphasize the incorporation of molecular parameters, such as mismatch repair (MMR) protein assessment,

p53 status, and identification of POLE mutations, which improve prognostic stratification and help individualize therapeutic decisions in high-risk and recurrent settings [5].

In advanced or recurrent stages, EC may lead to several complications, including malignant pericardial effusion (MPE), a cardio-oncologic emergency due to its potential progression to cardiac tamponade and obstructive shock [1–4]. Among cancer patients, neoplastic involvement accounts for a substantial proportion of tamponade cases. When hemodynamic instability is present, pericardial drainage is mandatory. Additionally, maintaining a pericardial catheter for several days after drainage is recommended to reduce recurrence and facilitate subsequent management [10].

A major clinical challenge is that MPE usually reflects advanced disease and is frequently associated with a recurrent course. Although image-guided pericardiocentesis remains the first-line procedure for immediate stabilization, recurrence of effusion and hospital readmissions are common in clinical practice, highlighting the need for sustained control strategies [14]. From a diagnostic standpoint, confirmation of malignancy may be challenging pericardial cytology is not always conclusive, and its diagnostic yield is variable. Therefore, integrating clinical, imaging, and biochemical data from the pericardial fluid becomes essential.

In oncologic series, malignant effusions typically present with low glucose levels and elevated lactate dehydrogenase (LDH), as well as a persistent or recurrent course. These findings strongly suggest a neoplastic etiology when they coexist with cardiac tamponade or a known history of cancer. In gynecologic malignancies, immunohistochemical support, for example, positivity for PAX8 and hormone receptors with negative pulmonary markers, may be crucial for establishing a Müllerian origin when the presentation corresponds to an unusual metastatic site [10].

For the management of recurrent MPE, available options include prolonged drainage, pericardial window, and chemical pericardiodesis. However, comparative evidence remains heterogeneous, and no universal standard has been established [14]. In this context, intrapericardial instillation of cisplatin has been described as a locoregional control strategy aimed at reducing recurrence after drainage, with the potential advantage of being less invasive than surgical options and reproducible in selected palliative settings. Contemporary series and retrospective cohorts in solid tumors suggest feasibility and acceptable safety profiles, supporting its integration as a therapeutic option within multidisciplinary pathways when early recurrence after drainage confers a high risk of further decompensation [13].

Based on these considerations, we present the case of a patient with previously treated EC with curative intent who developed recurrent MPE with hemodynamic compromise and histopathological and immunophenotypic confirmation of Müllerian origin. Intrapericardial cisplatin was used as a strategy for local control. Additionally, we review the recent literature focusing on selection criteria, administration regimens, clinical outcomes such as effusion control or recurrence, and safety considerations relevant to clinical decision-making.

2. Case Report

A 70-year-old woman with a medical history of arterial hypertension treated with enalapril 10 mg daily and type 2 diabetes mellitus managed with metformin 850 mg every 12 hours was diagnosed in June 2021 with stage IIIB endometrial cancer due to locoregional extension. In contemporary series, this stage is associated with an estimated 5-year overall survival of approximately 50%, supporting a multimodal treatment approach with curative intent in patients with adequate functional status.

Primary surgical treatment consisted of radical hysterectomy with bilateral salpingo-oophorectomy and lymph node staging according to the institutional protocol. Histopathological examination of the primary tumor revealed a grade 2 endometrioid adenocarcinoma (FIGO) with deep myometrial invasion (70%), cervical stromal involvement, and parametrial extension, as well as lymphovascular invasion, with negative surgical

margins. These findings were consistent with locally advanced disease (pT3b) and justified a multimodal therapeutic approach. Based on tumor stage and high-risk pathological features, the patient received adjuvant systemic chemotherapy with paclitaxel and carboplatin for six cycles, followed by external beam radiotherapy (50.4 Gy) and vaginal brachytherapy (21 Gy). She remained under oncologic follow-up at the Armed Forces Specialty Hospital No. 1, Quito, Ecuador.

The absence of molecular characterization (POLE, MMR, p53) represents a relevant limitation, particularly in the context of the integrated classification proposed by ESGO/ESTRO/ESP, which enables more precise prognostic stratification. This limitation prevents the classification of the case into molecular subgroups with distinct clinical behaviors, such as POLEmut, MMRd, or p53abn, thereby restricting the extrapolation of our findings and their generalizability to contemporary oncological practice. The patient experienced approximately three years of disease-free survival under active surveillance without clinical evidence of recurrence until November 2024, when she presented to the emergency department with progressive dyspnea for seven days, orthopnea, asthenia, and mild chest pressure, with marked deterioration during the preceding 24 hours.

On admission, she was hemodynamically unstable, with blood pressure 86/54 mmHg, heart rate 122 beats per minute, respiratory rate 28 breaths per minute, oxygen saturation 88% on room air, and temperature 36.7 °C. Physical examination revealed jugular venous distension, muffled heart sounds, cold skin with decreased distal perfusion, and clinically evident pulsus paradoxus, without signs suggestive of systemic infection.

Initial laboratory tests demonstrated normocytic anemia and abnormalities compatible with systemic disease. Complete blood count showed hemoglobin 9.8 g/dL (reference 11.3–17.6), hematocrit 30% (34.7–46.6), mean corpuscular volume 86 fL (80–100), platelets 312 $\times 10^3/\mu L$ (131–387), leukocytosis 11.4 $\times 10^3/\mu L$ (4.0–9.75), and neutrophilia 78% (41.2–73.5). Electrolyte analysis revealed mild hyponatremia (130 mmol/L; reference 137–147), potassium 4.5 mmol/L (3.5–5.3), chloride 99 mmol/L (99–110), and bicarbonate 20 mmol/L (22–26). Serum chemistry showed creatinine 1.1 mg/dL (0.8–1.3), urea 26 mg/dL (16.8–43.4), and hyperglycemia 214 mg/dL (70–99). Liver function tests were within normal limits: AST 28 U/L (0–31), ALT 22 U/L (0–34), and total bilirubin 0.8 mg/dL (0.3–1.1), with albumin 3.0 g/dL (3.5–5.5). C-reactive protein was markedly elevated at 38 mg/dL (0–0.4). High-sensitivity troponin was negative, and INR was 1.1. Electrocardiography demonstrated sinus tachycardia with low-voltage QRS complexes, without ischemic changes.

Chest computed tomography revealed a large-volume pericardial effusion with low attenuation (approximately 4 HU), with an estimated volume of 904 cm^3 (Figure 1). Although this value suggests relatively hypoattenuating content, CT attenuation was interpreted only as a supportive finding and not as a definitive criterion for a transudate, as final characterization depended on fluid analysis and cytology. Transthoracic echocardiography demonstrated a severe, non-loculated pericardial effusion with an estimated volume of 1000 mL (Figure 2A), associated with diastolic collapse of the right atrium and right ventricle, a dilated inferior vena cava with reduced inspiratory collapse, and increased respiratory variation in ventricular filling flows, findings consistent with cardiac tamponade (Figure 2B).

For cisplatin administration, a pigtail catheter was placed in the pericardial space, confirming correct positioning and initial drainage. Prior to initiating the regimen, 100 mg of intravenous hydrocortisone was administered. Subsequently, 10 mg of cisplatin diluted in 20 mL of saline was instilled over 10 minutes, with continuous monitoring of blood pressure, heart rate, and oxygen saturation.

After each installation, the catheter was kept closed for 2 hours to maximize local exposure and was then reopened for drainage. The regimen was repeated daily for 5 consecutive days. This approach was selected in accordance with historically described intrapericardial cisplatin protocols in the literature (10 mg in 20 mL for 1–5 days; maximum cumulative dose of 50 mg), aiming to maximize local exposure with minimal systemic

absorption. Maintenance of the catheter during this period allowed for serial drainage and repeated administration without the need for additional punctures.

Figure 1. Non-contrast chest computed tomography: A large pericardial effusion with low attenuation consistent with a transudative pattern (density ≈ 4 Hounsfield units) is observed, with an estimated volume of approximately 904 cm^3 (yellow arrow).

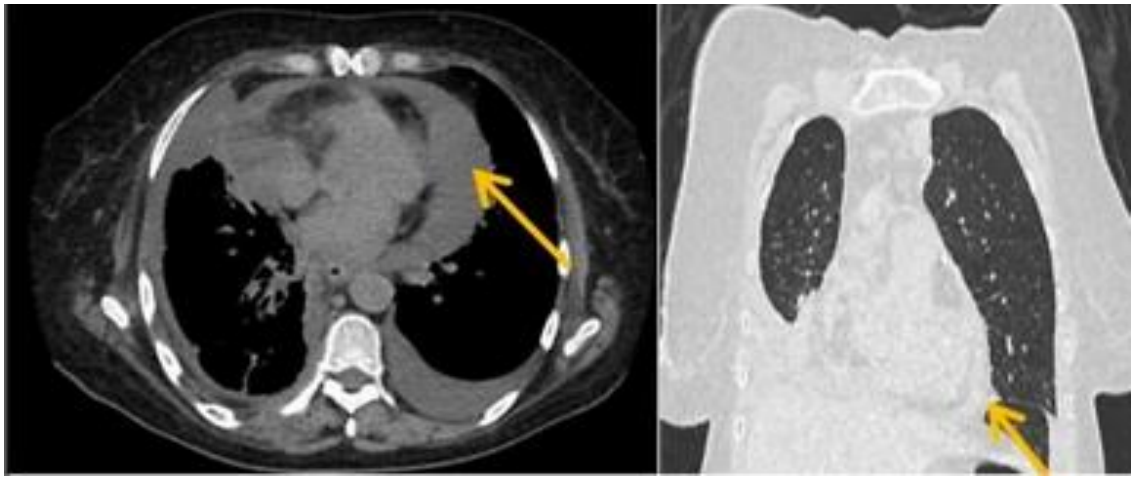
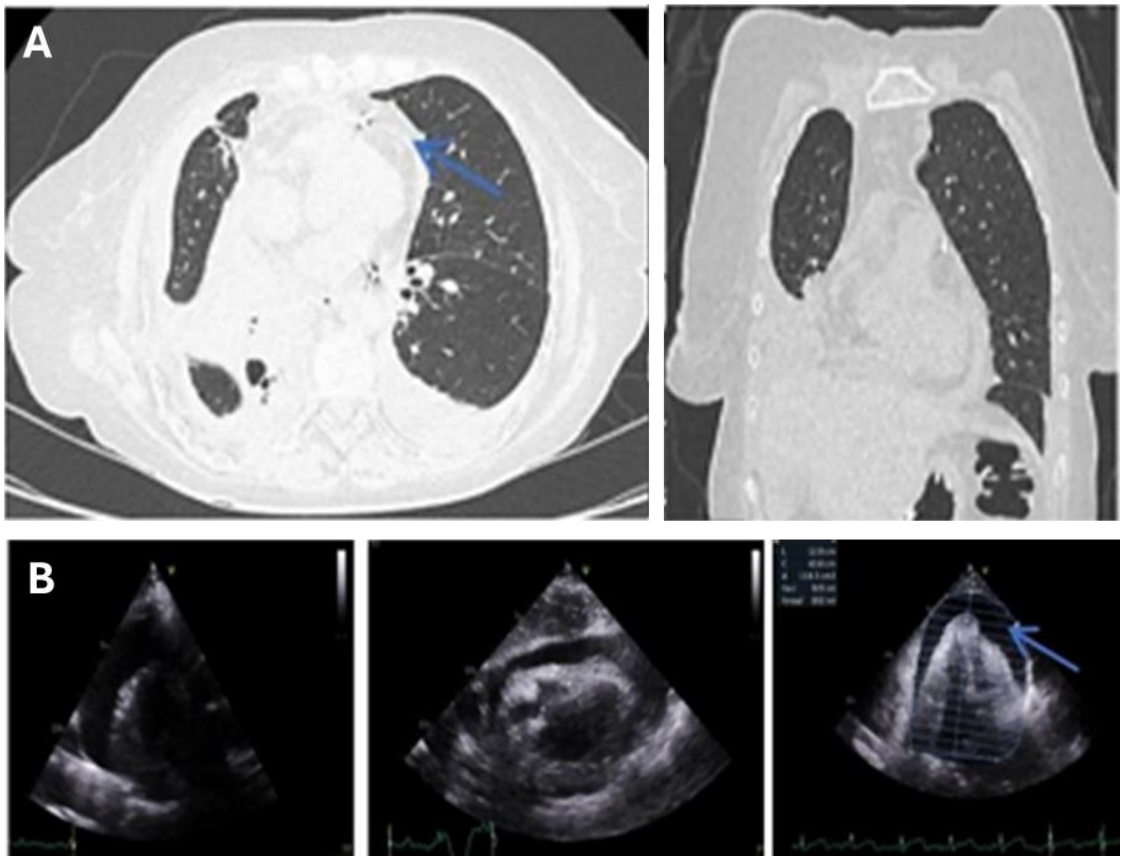


Figure 2. A. Axial and coronal CT images demonstrating pericardial effusion (blue arrow). B. Echocardiography: Severe non-loculated pericardial effusion, with an estimated volume of approximately 1000 mL, showing signs of cardiac tamponade, including collapse of the right atrium and right ventricle (blue arrow).



The patient tolerated the procedure without clinically significant hemodynamic or arrhythmic events, and without fever or refractory pain. No elevations in creatinine or clinical manifestations of systemic toxicity were documented during hospitalization. A

follow-up echocardiogram performed 3 days after completion of the regimen showed complete resolution of the pericardial effusion; therefore, the drain was removed and the patient was discharged.

At one-month outpatient follow-up in clinical oncology, the patient reported improvement in general condition, without dyspnea or chest pain, and no clinical signs of early recurrence. It is important to note that, at the time of manuscript submission, the documented follow-up was limited to one month. No later imaging follow-up was available for inclusion; therefore, the term "successful control" has been qualified as "early control of the effusion".

3. Discussion

According to GLOBOCAN 2022 (IARC/WHO), endometrial cancer accounted for 420,368 new cases and 97,723 deaths worldwide in 2022, reflecting a significant disease burden and substantial mortality even in the era of multimodal therapies [8]. In the United States, the incidence of uterine cancer, predominantly endometrial, was 28.3 per 100,000 women per year during the period 2018–2022, with a mortality rate of 5.3 per 100,000 women per year based on deaths reported between 2019–2023, highlighting its persistent impact on public health [2]. Regarding prognosis according to disease extent, population-based survival data (SEER) report a 5-year relative survival of approximately 72% for regional disease, which roughly corresponds to stage III scenarios, although it is not equivalent 1:1 with FIGO stage IIIB, and around 22% for distant disease [9]. These figures contextualize the baseline oncologic risk in locally advanced tumors (clinical stage IIIB) and the plausibility of late recurrences or atypical metastatic manifestations.

In our case, the patient was admitted in November 2024 with cardiac tamponade due to a large malignant pericardial effusion (MPE) confirmed by computed tomography and echocardiography. The first pericardiocentesis (Table 1) drained 500 mL of serosanguinous fluid, resulting in immediate hemodynamic stabilization and clinical improvement. The effusion was classified as malignant based on the combination of negative microbiology, negative ADA, and positive cytology for malignant cells in the pericardial fluid, findings consistent with neoplastic pericardial effusion. Clinical recurrence occurred 30 days later, with a new malignant effusion. A second pericardiocentesis was performed (drainage of 450 mL), and histopathological evaluation confirmed metastatic carcinoma, with an immunophenotype consistent with Müllerian/endometrial origin.

Table 1. Pericardial fluid analysis (first pericardiocentesis).

Parameter	Result
Appearence	Serosanguinous
Red blood cells	180.000/uL
Total Leucocytes	1.250/uL
Diferential	Lymphocytes 62%
	Neutrophils 28%
	Macrophages 10%
Proteins	4.8 g/dL
LDH	1.120 U/l
Glucose	46 mg/dL
pH	7.28
Gram/culture	Negative
ADA	Negative
Cytology	Positive for malignant cells (carcinoma)

Malignant pericardial effusion represents a severe cardio-oncologic complication. In oncologic patients, cancer accounts for approximately one-third of cardiac tamponade cases [6]. Presentation with cardiac tamponade is common; in a recent cohort of patients undergoing intrapericardial cisplatin instillation, 88% presented with echocardiographic evidence of tamponade. After isolated drainage, early recurrence is a major clinical issue. In this regard, the literature reports early recurrence rates of up to 70% after pericardiocentesis, supporting the consideration of additional local control strategies in selected cases [11].

Relevant clinical complications of malignant pericardial effusion include cardiac tamponade at diagnosis in approximately 50–88% of cases, high early recurrence rates after drainage, reaching figures close to 70%, and an overall poor prognosis after the diagnosis of MPE, with median survival typically measured in months. For example, a recent cohort in which intrapericardial cisplatin was administered reported a median survival of 5.4 months from the diagnosis of MPE, largely determined by the progression of the underlying malignancy [11].

Given the early recurrence (30 days), the cytological and histological confirmation of malignancy, and the objective of minimizing repeated interventions, local control with intrapericardial chemotherapy via a pigtail catheter was selected. Intrapericardial cisplatin 10 mg diluted in 20 mL of saline was administered over 10 minutes, with premedication using 100 mg intravenous hydrocortisone. The catheter was clamped for two hours after each installation, and the regimen was repeated daily for five days. The patient did not develop hemodynamic complications during the procedure. On the follow-up echocardiogram performed three days after completion of therapy, no residual pericardial effusion was observed. The patient was discharged and remained asymptomatic at the one-month follow-up, without clinical evidence of early recurrence.

The clinical course observed in this patient (Table 2), with absence of recurrence on early echocardiographic follow-up, is consistent with published outcomes of intrapericardial cisplatin in malignant pericardial effusion. For example, a classical study reported prevention of recurrence in 92.8% of patients during the first three months and 83.3% at six months following intrapericardial cisplatin therapy [12]. In a recent cohort study using a cisplatin instillation protocol, the recurrence rate within the first 30 days was 4.9% [11]. These data support that, in selected scenarios with high risk of recurrence after drainage, intrapericardial cisplatin may be associated with low early recurrence, although it does not necessarily modify the overall prognosis determined by the underlying malignancy [12].

Table 2. Clinical evolution and outcomes.

Variable	Initial event	Recurrence (30 days)	Post- intrapericardial cisplatin
Presentation	Malignant cardiac tamponade	Dyspnea + desaturation	Asymptomatic
Drained Volume	500 ml	450ml	N/A
Microbiology/ADA	Negative/ADA negative	Negative/ADA negative	-
Cytology	Positive from carcinoma	Positive for malignant cells	
Histopathology	-	Metastatic carcinoma	-
Local Intervention	Pericardiocentesis	Pericardiocentesis	Cisplatin instillation 10 mg/20 ml daily ×5, clamp 2 h
Procedure complications	No	No	No
Follow-up echocardiogram	Severe effusion with chamber collapse	Recurrent effusion	No effusion (day 3)
Early follow-up	-	Symptomatic recurrence	No clinical recurrence at 1 month

The patient presented with a locally advanced endometrioid carcinoma (pT3b) with high-risk pathological features (deep myometrial invasion, cervical and parametrial involvement, and lymphovascular invasion). In this context, the multimodal approach implemented in 2021, surgery with the intention of complete resection followed by adjuvant chemotherapy based on carboplatin/paclitaxel and pelvic radiotherapy with vaginal brachytherapy, is consistent with contemporary recommendations for high-risk and advanced-stage disease, where loco-regional control and reduction of systemic recurrence are prioritized through individualized combined treatment. The achievement of negative margins provided local control, while systemic adjuvant therapy and complementary irradiation addressed the elevated risk of recurrence characteristic of pT3 disease; therefore, the initial strategy is clinically defensible under current standards [5]. The absence of molecular characterization of the primary tumor (POLE, MMR, p53) represents a relevant limitation within the ESGO/ESTRO/ESP integrated classification, as it precludes assigning the case to molecular subgroups with distinct biological behavior and prognosis, thereby limiting the extrapolation of our findings and their clinical generalizability.

Years later, the patient presented malignant pericardial effusion (MPE) and cardiac tamponade, confirmed by echocardiography and positive cytology, with reasonable exclusion of infectious etiology (negative cultures and ADA). Computed tomography was obtained during the initial evaluation of the episode, prior to formal echocardiographic documentation of tamponade physiology; once hemodynamic compromise was established by echocardiography, urgent drainage was performed without delay. We acknowledge that, in contemporary practice, point-of-care ultrasound represents the first-line diagnostic tool in suspected tamponade. The clinical turning point was early recurrence at 30 days following initial drainage, together with histological confirmation of metastatic carcinoma and an immunoprofile consistent with Müllerian origin (PAX8+/CK7+/ER+, WT1−, TTF-1/Napsin A−).

Although GATA3 was not available in the initial panel, the combination of PAX8 and estrogen receptor positivity, along with negativity for TTF-1/Napsin A and the prior oncologic history, favored a gynecologic–endometrial origin; however, the absence of GATA3 should be acknowledged as a formal diagnostic limitation in the differential with other primary tumors. In oncologic patients, early recurrence after pericardiocentesis represents precisely the scenario in which the therapeutic goal shifts from acute decompression to local control of the pericardial space, aiming to reduce reaccumulation, repeated procedures, and the risk of recurrent hemodynamic compromise [15].

The decision to use intrapericardial chemotherapy with cisplatin was based on four key elements: (1) early recurrence after drainage; (2) cytological and histological confirmation of malignancy; (3) the need for a less invasive and reproducible local control strategy in a palliative setting; and (4) the existence of published experience with intrapericardial cisplatin using low dose multidose regimens. The choice of cisplatin over carboplatin or bleomycin was primarily supported by more consistent evidence for locoregional intrapericardial control and by its ability to achieve high local concentrations rather than systemic therapeutic effect. Given that prior exposure was to systemic carboplatin and not intrapericardial cisplatin, the objective was not to treat systemic platinum-sensitive disease, but rather to limit fluid reaccumulation within a closed anatomical compartment. In this context, potential platinum resistance remains a valid biological consideration but does not necessarily preclude a local palliative effect within the pericardial space. The protocol used (10 mg in 20 mL daily for 5 days, with catheter clamping for 2 hours) aligns with classical series and contemporary cohorts in which repeated instillation enabled cumulative local exposure with low rates of systemic toxicity.

Regarding comparative effectiveness, recent evidence on intrapericardial cisplatin is largely derived from observational studies but converges on clinically meaningful signals: low early recurrence, acceptable tolerability, and feasibility within multidisciplinary care pathways. In a contemporary retrospective cohort of 41 patients with solid tumors and cytology-confirmed MPE, intrapericardial cisplatin was administered a median of four

times, with a 30-day recurrence rate of 4.9% and no procedure-related fatal events. These findings are consistent with earlier series using 10 mg in 20 mL for 3–5 days, with cumulative doses up to 50 mg and minimal detectable systemic absorption. Therefore, the outcome in our patient, absence of effusion on follow-up echocardiography and clinical stability during early follow-up, should be interpreted as evidence of early local control rather than proof of survival benefit.

Intrapericardial chemotherapy offers comparative advantages over other palliative approaches in this metastatic pattern. Repeated pericardiocentesis, although effective for acute decompression, is associated with frequent recurrence in MPE. In oncologic cohorts, maintaining a pericardial drain for 3–5 days has been associated with lower recurrence rates and low infection risk, supporting temporary catheter maintenance when extended drainage and/or local therapy are pursued. Compared with surgical pericardial window, intrapericardial therapy provides a less invasive intervention, potentially preferable when the goal is to avoid general anesthesia and operative morbidity in patients with metastatic disease and palliative intent. Nevertheless, surgery retains a role in selected scenarios, such as loculated effusions, refractory recurrence, or patients with longer life expectancy [10–16].

Although promising, this therapy requires close monitoring to detect complications related to instillation and catheter use (arrhythmia, pain/pericarditis, infection, and systemic toxicity). In our case, no major clinical complications or acute renal impairment were documented during hospitalization; however, we acknowledge that the original manuscript did not sufficiently detail toxicity monitoring, and this aspect has now been clarified. The main limitations of this report are: (1) lack of molecular classification of the primary tumor (POLE/MMR/p53), precluding full integration into current molecular stratification models; (2) absence of GATA3 in the immunohistochemical panel; (3) lack of a more comprehensive systemic oncologic assessment beyond the pericardial compartment at the index event; and (4) short follow-up after instillation, limited to one month in the current version. Therefore, our findings should be interpreted as evidence of early effusion control and technical feasibility, rather than durable local control.

Overall, this case describes an endometrial neoplasm initially treated with curative intent using a guideline-concordant multimodal approach, followed years later by an unusual metastatic relapse involving the pericardium. Early recurrence of the effusion after drainage and its pathological confirmation justified a shift in therapeutic goals toward palliative local control. In this context, intrapericardial cisplatin, administered through a standardized and monitored protocol, allowed resolution of the effusion and clinical improvement without relevant toxicity, supporting its consideration as a less invasive alternative for recurrent MPE in selected patients, particularly when the aim is to reduce reinterventions and hospitalizations.

4. Conclusion

In endometrial cancer, surgery constitutes the cornerstone of treatment with curative intent in resectable disease (early stages and a significant proportion of locally advanced stages). In high-risk and stage III disease, a multimodal approach combining surgery with platinum-based chemotherapy and external radiotherapy is recommended, with vaginal brachytherapy according to risk factors and loco-regional control needs. Within this framework, the management received by the patient (clinical FIGO IIIB/pT3b), negative margins followed by carboplatin–paclitaxel and pelvic radiotherapy with brachytherapy, is consistent with contemporary guidelines for high-risk locally advanced disease and can therefore be considered appropriate under current standards [5].

Malignant pericardial effusion (MPE) due to endometrial cancer is exceptional (reported predominantly as isolated cases), although its presentation may be catastrophic when it manifests as cardiac tamponade [19]. In oncology patients, cancer accounts for a relevant proportion of tamponade cases, and recurrence after isolated drainage is a frequent clinical problem. Therefore, the reasonable therapeutic objective in recurrent MPE

is local control of the effusion and reduction of reinterventions [20]. In this context, intrapericardial chemotherapy with cisplatin represents a viable strategy for refractory or recurrent MPE. Recent observational evidence shows low early recurrence rates, for example, 4.9% within 30 days after intrapericardial cisplatin in a contemporary cohort, although the absence of randomized trials limits generalizability and the impact on overall survival, which is usually determined by systemic disease progression [17]. In our patient, after the regimen of cisplatin 10 mg/20 ml daily for 5 days with 2-hour catheter clamping, absence of effusion was documented on follow-up echocardiography (day 3 post-regimen), with no clinical recurrence at one month, consistent with the low early recurrence profile reported in the literature for selected patients [17].

Overall, this case supports that, in recurrent malignant pericardial effusion (MPE) confirmed by cytology, histology, and a Müllerian immunophenotype, and within a palliative care context, intrapericardial cisplatin instillation may be considered a feasible and well-tolerated alternative in selected patients, as part of a multidisciplinary decision-making process and with close monitoring. Given that this is a single case, we avoid extrapolating definitive conclusions regarding overall safety or durability of local control. Prospective studies and larger series with longer follow-up are required to standardize protocols and more precisely define clinically relevant outcomes [17].

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Research Ethics Committee Approval: The patient provided written informed consent for participation, and the study was conducted in accordance with the ethical guidelines outlined in the Declaration of Helsinki.

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Conflicts of Interest: All other authors declare no conflicts of interest.

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