

Immediate Postoperative Results in the Surgical Treatment of Neoplastic Pericarditis – 76 Consecutive Cases

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Rezumat

Tratamentul chirurgical al pericarditelor maligne – rezultate postoperatorii imediate în 76 de cazuri consecutive

Introducere: Epansamentul pericardic, acumularea de lichid în sacul pericardic, se poate dezvolta în orice tip de cancer. A fost constatat la până la 20% din pacienții oncologici.

Metodă: Am efectuat un studiu retrospectiv a pacienților cu pericardita, internați în clinica noastră în anii 2010-2015. Am inclus în studiu 76 de pacienți consecutivi care au avut indicație de drenaj pericardic: peri-cardocenteza, fereastra pericardică subxifoidiană, fereastra pericardică paraxifoidiană stângă, chirurgie toracică video-asistată (CTVA) sau chirurgie toracică clasică. Am avut pacienți cu vârste cuprinse între 28 și 83 de ani, dintre care 23 pacienți au fost admiși cu tamponadă cardiacă.

Rezultate: Supraviețuirea postoperatorie imediată a fost 97.3%. Supraviețuirea postoperatorie la 30 de zile - 81.5 %.

Concluzii: Prognosticul imediat al pacienților cu pericardită neoplazică este influențat de sindromul debitului cardiac scăzut postoperator (Low-Cardiac-Output-Syndrome - LCOS), care rămâne principala cauză de mortalitate. Prognosticul pe termen lung este legat de tipul neoplaziei. Cea mai eficientă tehnică chirurgicală, cu cea mai mică rată de recurență, este fereastra pericardo-pleurală efectuată toracoscopic sau CTVA. Pericardocenteza are rata de recurență cea mai ridicată – 90% - și este asociată cu rate crescute de complicații cardiace și de mortalitate

Cuvinte cheie: efuziune pericardică, pericardită neoplazică,

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tamponadă cardiacă, chirurgie toracică video-asistată, (CTVA), fenestrare pericardică, fereastră pericardică subxifoidiană, fereastră pericardică paraxifoidiană

Abstract

Introduction: Pericardial effusion, accumulation of fluid in the pericardial sac, may develop in any type of cancer. It was revealed in up to 20% of oncological patients.

Method: We made a retrospective study of patients with pericardial efusion presented in our clinic between 2010 and 2015. We included 76 consecutive patients with indication for pericardial drainage - we performed on them 80 surgical procedures: pericardocentesis, subxiphoid pericardial window, left paraxifoidian pericardial window, intercostal video-assisted thoracic surgery (VATS) pericardial fenestration, and classical thoracic surgery (fenestration or partial pericardiectomy). We had patients with ages between 28 and 83 years. 23 patients were admitted with cardiac tamponade.

Results: The immediate postoperative survival is 97.3 % and the 30-days-postoperative survival is 81.5 %. The immediate postoperative mortality is 2.7% and the 30-days-postoperative mortality is 8.5%.

Conclusions: The immediate prognosis of the patient with malignant pericardial effusion is influenced by the risk of postoperative Low-Cardiac-Output-Syndrome (LCOS), or pericardial decompression syndrome (PDS), which remains the main cause of mortality. The long-term prognosis is related to the type of malignant tumor. The most effective tehnique with the lowest rate of recurrence is pericardo-pleural window done thoracoscopically/ by VATS; pericardocentesis has the highest rate of recurrence – 90% and is associated with high rates of cardiac complications and mortality.

Key words: pericardial effusion, neoplastic pericarditis, cardiac tamponade, video-assisted thoracic surgery (VATS) pericardial fenestration, subxiphoidian pericardial fenestration, paraxiphoidian pericardial fenestration

Introduction

Pericardial effusion is an accumulation of fluid in the pericardial sac. It has been determined that the normal quantity of fluid is less than 50 ml (1).

Patients may develop pericardial effusion in any type of cancer, but most frequently in lung cancer, breast cancer and lymphoma (2-4); the long-term prognosis of those patients depends on their type of malignancy and is not influenced by age, sex, surgical technique of pericardial drainage, or direct interest of the pericardium by the malignant process. Metastatic tumors of the pericardium are 40 times more frequent than primary tumors (5). The incidence of abnormal pericardial fluid in

patients with malignancy has been revealed in 1-21% of patients (6,7).

The rate of fluid accumulation in the pericardium is very important: fast accumulation of small amounts can cause tamponade; slow accumulations of large quantities of fluid in a long period of time can be surprisingly well tolerated (8).

Echocardiography is the main method for pericardial effusion assesment, detecting effusion, location and hemodynamic effect, concomitant heart or pericardial disease (5,9). The CT scan visualizes the presence, topography and thickness of the pericardial effusion, allowing the surgeon to choose the best surgical approach (3,10).

Materials and Methods

We studied retrospectively all the patients with pericardial effusion presented in our clinic between 2010 and 2015. We included in the study 76 patients who had indication for pericardial drainage. All patients had an underlying malignancy. There were 3 patients who had recurrence, and had to be submitted to another procedure to evacuate the pericardial fluid.

The surgical procedures were chosen according with the clinical state of the patient, using local or general anesthesia: pericardocentesis, subxiphoid pericardial window, left paraxifoidian pericardial window, intercostal video-assisted thoracic surgery VATS, or clasical thoracic surgery.

Results

The 76 patients were 43 men (55%) and 34 women (45%), with ages between 28 and 83 years. We observed an increased percentage of smokers (61%) in patients with pericardial effusion.

Thirty percent of the patients (23 cases) presented with cardiac tamponade (*Fig. 1*) and we performed pericardial drainage in emergency; some of them needed correction of coagulation status, severely altered after

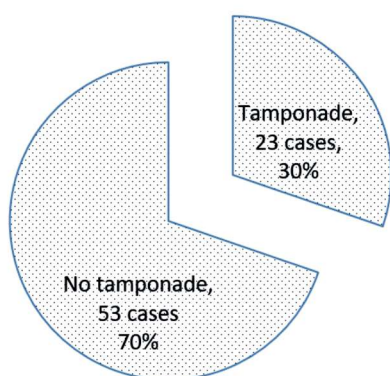


Figure 1. Distribution of cases with pericardial effusion according to the presence of cardiac tamponade at admission

chemotherapy or by the treatment of associated diseases.

Beside the pericardial drainage there were performed associated surgical procedures in 26 patients. We had 23 cases with pericardial drainage and chest tube drainage of the pleural fluid; in 3 cases we performed a pericardo-pleural window together with a pulmonary resections: 2 wedge-resections and one lobectomy.

Three patients developed recurrence of the pericardial fluid and needed reintervention: two patients had one recurrency, and one patient had 2 recurrences. The rate of recurrence was 3.89 %.

Regarding the underlying malignancy, the largest number of patients have developed pericardial effusion during the evolution of lung cancer – 54, followed by breast cancer - 16, and 7 patients had another type of cancer: uterin cervical cancer - 3, Hodgkin lymphoma - 1, colon - 1, lip - 1, ovary – 1 (*Fig. 2*).

Patients underwent different types of surgery, according to clinical status, topography of the fluid and presence of pleural fluid (*Fig. 3*). There was one female patient, known with stage IV cervix cancer, with right pleural and pericardial effusion at admission, which refused the pericardial drainage and accepted only the right chest tube drainage, along with the intensive medical treatment. Unfortunately

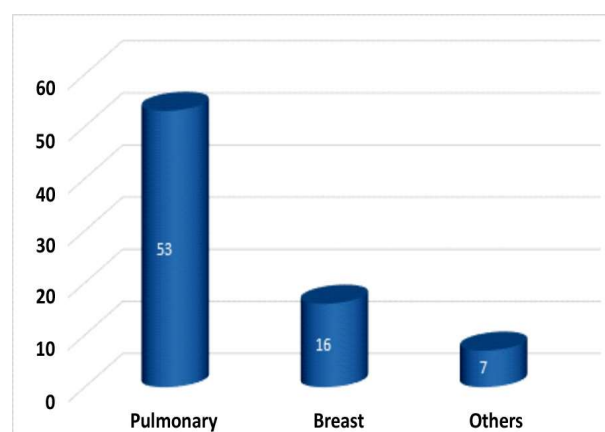


Figure 2. Underlying malignancies in patients with pericardial effusion from the lot of study

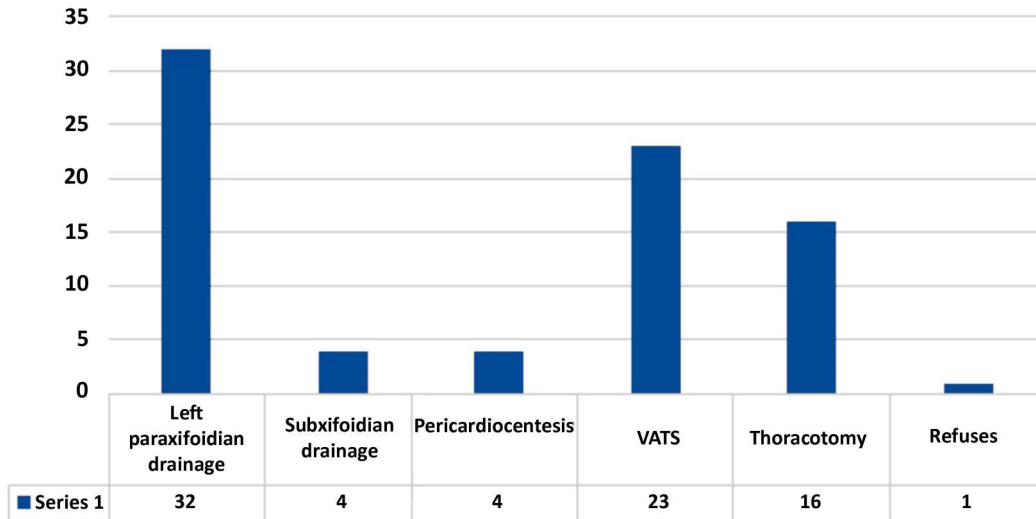


Figure 3. Type of surgical procedure performed for pericardial drainage in the lot of study. VATS = Video-Assisted-Thoracic-Surgery

her survival was only of 10 days.

The immediate postoperative survival is 97.3 %. We had two patients (with stage IV cancers) who developed severe bradycardia and cardiac arrest at pericardiocentesis, during the evacuation of the pericardial fluid.

Specific resuscitation measures were performed; both patients died within next 24 hours. The immediate postoperative mortality is 2.7%.

At one month survival is 81.5 % (Table 1). The 30-days-postoperative mortality is 8.5%.

Table 1. Immediate survival of oncologic patients with pericardial drainage, according to various variables

Variables	Patients (n)	Rate of survival (%)		Value p
		48 h	1 month	
Gender				0.09
Masculin	43	95.5	79.5	
Feminin	34	100	88.8	
Age				0.61
>65 Years	10	100	70	
<65 years	67	97.1	85.7	
Underlying malignancy				0.34
Pulmonary	53	98.2	87.5	
Breast	16	94.1	82.3	
Others	7	100	57.1	
Aspect of pericardial fluid				0.05
Hemoragic	38	95	85	
Serous	31	100	83.8	
Serohematic	7	100	87.5	
Smoking status				0.06
Smoker	46	97.9	79.1	
Nonsmoker	30	96.8	87.5	
Cardiac tamponade				0.11
Present	23	91.3	78.2	
Not present	57	100	2.4	

Discussions

Pericardial effusion may appear frequently in patients with malignancies. Heart and pericardium metastases can be detected in autopsy in 15-20 % of cancer patients (11) and nonmalignant pericardial effusion in 7% of patients (12). In our study, as we found in the literature (3, 10, 13), the most frequent type of cancer in patients with pericardial effusion was lung cancer, perhaps because lung cancer is the most frequent malignancy that we encounter in our daily practice and in which we have expertise (14-18). Most of those patients are severely affected by the evolution and complications of their malignancy (which may be multiple), by oncological treatments and their side effects, by their disfunctional immunological status and associated diseases (cardiac, renal, hepatic etc.).

Currently there is no standard effective treatment for malignant pleural effusion (19).

If the measured pericardial effusion is less than 1 cm, it usually does not progress (12). Patients without clinical symptoms should be kept under close observation, and treated for the underlying cancer. This does not affect mortality (12).

For pericardial drainage the following procedures can be used: pericardiocentesis, balloon pericardiotomy, subxiphoid or paraxiphoid window (*Fig. 4*), video-assisted thoracic surgery (VATS) pericardo-pleural fenestration (*Fig. 5*), thoracotomy pericardial window (*Fig. 6*), pericardial-peritoneal window, and pericardiectomy via sternotomy or thoracotomy (20). The goals of the pericardial drainage in oncological patients are to relieve symptoms, to obtain fluid and tissue for diagnosis, and to insure a low recurrence (2,20). In our study we performed almost all of those surgical procedures (*Fig. 3*).

In 32 cases we performed the paraxiphoidian approach (*Fig. 4*) developed and published by us in 2010 (11). The paraxiphoidian pericardial drainage can be performed under local anesthesia, knowing that in tamponade the blood pressure is

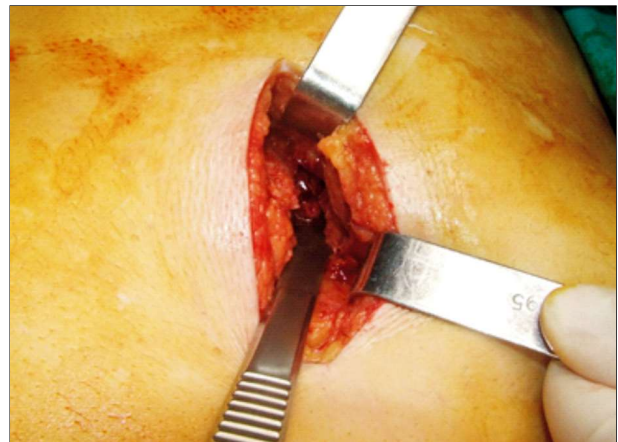


Figure 4. Left paraxiphoidian approach of the pericardium: skin incision on left side of the xiphoid process, left rectus abdominus de-inserted from the xiphoid; the pericardium is entered and evacuated; then the pericardial fenestration is performed



Figure 5. Pericardo-pleural window performed by left uniportal VATS (Video-Assisted-Thoracic-Surgery) – the fenestration is created (aprox. 4 cm²) and the pericardial fragment is almost completely detached using the thoracoscopic cauterium. Uniportal VATS is performed through a unique 3-3.5 cm incision

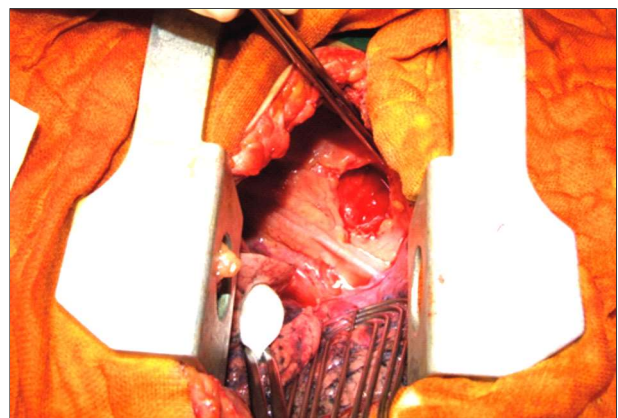


Figure 6. Pericardial window performed anterior to the frenic nerve, on the left side, by thoracotomy (open or classic thoracic surgery)

maintained by increased sympathetic tonus, which is interrupted at the induction of the general anesthesia, leading to hemodynamic collapse (11).

In 4 cases we performed transthoracic left intercostal pericardial needle drainage using ultrasound guidance because no other point of access was available (subxiphoidian or parasternal left or right), due to the anatomy modification caused by the underlying disease. Three of those 4 patients were in tamponade and the transthoracic pericardiocentesis was performed in emergency. Such difficult cases emphasize the need to perform a thoracic CT-scan in addition to echocardiography in order to assess correctly the anatomical modifications and the intrathoracic lesions due to malignancy and oncological treatment (especially radiotherapy).

Malignancy is a predictive factor of postoperative Low-Cardiac-Output-Syndrome (LCOS) after pericardial drainage (21). To prevent this potential lethal complication, it is mandatory to evacuate very slowly the pericardial fluid, to closely monitor the heart and to administrate intravenous inotropic support as soon as needed (3).

Immediate postoperative mortality in our study was 2.7% and 30-days postoperative mortality was 8.5% - the values are very good compared to some published: 36% operative mortality and 32% at 30 days in malignant patients (22).

Studies have shown that the most effective technique with the lowest rate of recurrence is pericardo-pleural window done thoracoscopically/ by video-assisted thoracic surgery (VATS); the pericardial drainage done by thoracotomy and pericardo-peritoneal window have a 10% rate of recurrence. Pericardiocentesis has the highest rate of recurrence – 90% - and is associated with high rates of mortality and cardiac complications (2).

In our study we had 3 patients with 4 recurrences: 2 recurrences after left paraxiphoidian drainage (solved by subxiphoidian drainage, and by VATS pericardo-pleural fenestration, respectively), 1 case after subxiphoidian drainage (solved by open partial peri-

cardiectomy) and 1 case after pericardo-pleural window (solved by paraxiphoidian drainage). All 3 patients were stage IV malignancy (lung and breast. The rate of recurrence was 3.89 %. In the literature we found published a recurrence rate of 13.6% (22) and of 19% (23) in patients with malignancy.

Conclusions

Pericardial effusion in neoplastic patients should be evaluated by cardiac ultrasound and, whenever possible, by thoracic CT-scan, in order to evaluate correctly the intrathoracic modifications due to malignancy and oncological treatment, and to choose the best pericardial approach in every case.

The immediate prognosis of the patient with malignant pericardial effusion is influenced by the risk of postoperative Low-Cardiac-Output Syndrome (LCOS), which remains the main cause of mortality. Slow evacuation, heart monitoring and inotropic support lower the risk of the LCOS and improve the immediate postoperative survival.

The long-term prognosis overlaps the prognosis of the underlying malignancy.

Conflict of Interest

None to declare.

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