BRIEF COMMUNICATIONS

ECHOCARDIOGRAPHIC AND SURGICAL CORRELATION OF PERICARDIAL EFFUSIONS IN PATIENTS WITH MALIGNANT DISEASE

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Malignant disease is present in the pericardium of 15% to 20% of patients dying of cancer and examined post mortem,¹ and malignancy is the most common cause of cardiac tamponade in patients without previously suspected cancer.² Currently, the most sensitive and the least invasive method for detecting pericardial effusions is echocardiography, which can detect effusions as small as 15 ml, characterize total volume, and demonstrate the presence of fibrin bands, pericardial masses, loculations, thickened pericardial membranes, chamber compression, and dilatation of the inferior vena cava.^{2,3} However, it has not been clearly established whether such echocardiographically obtained information can characterize a pericardial effusion as being malignant or benign. Similarly, although needle pericardiocentesis is effective in draining pericardial effusions, it is unknown whether the additional information gained by histologic examination of pericardial tissue obtained during the performance of a pericardial window will increase the frequency of detection of malignant effusions. Defining the disease processes leading to an effusion is critical, because both overall prognosis and the treatment choice may be altered,⁴ and for a marginally stable patient with a potentially limited outlook, extensively invasive intervention may be inappropriate. Therefore, this retrospective study attempts (1) to correlate various echocardiographic signs with pathologic specimens to determine whether echocardiography may reliably characterize an effusion as malignant or benign and (2) to examine the sensitivity and specificity of pericardial fluid cytology and pericardial tissue histology in establishing the presence of intrapericardial malignant disease.

The records of 25 patients seen at Memorial Sloan-Kettering Cancer Center during the period of January 1, 1993, to December 30, 1994, with a history of malignant disease, transthoracic echocardiograms demonstrating pericardial fluid, and subsequent pericardial fluid and

tissue submitted for analysis were reviewed. All patients were grouped into one of two categories: those with malignant effusions and those with benign effusions. Intrapericardial malignancy was diagnosed when cytologic examination of pericardial fluid and/or pathologic examination of pericardial tissue demonstrated malignant cells. In addition, patient records were reviewed for age, sex, primary cancer diagnosis, prior thoracic irradiation, cardiac function, and relevant laboratory findings. All echocardiograms were again reviewed by one author (D.K.), blinded to cytologic and pathologic data, for the following: size of effusion; degree of collapse of the right atrium; right ventricle, or left atrium, dilatation of the inferior vena cava; and the presence of fibrin bands, loculations, or pericardial masses.

Ten men and 15 women, with a median age of 59 years (range 28 to 72 years), were studied. Effusions were confirmed by pericardial sac histology or pericardial fluid cytology as malignant in 13 of 25 patients (52%). The distribution of primary malignant tumors and the causes of the effusions are listed in Table I. Of patients with intrapericardial malignant disease, eight had positive cytology but negative pathology (lung carcinoma, $n = 5$; esophageal carcinoma, $n = 1$; sarcoma, $n = 1$; adenocarcinoma of unknown primary, $n = 1$), two had negative cytology but positive pathology (metastatic breast carcinoma, $n = 1$; mesothelioma, $n = 1$), and three had both positive cytology and pathology (lung carcinoma, $n = 1$; breast carcinoma, $n = 1$; adenocarcinoma of unknown primary, $n = 1$). Only one patient had received prior thoracic irradiation, and this patient was found to have both benign cytology and benign pathology. Cultures were performed on pericardial fluid from five patients with

Table I. *Primary malignant tumors and etiology of effusions*

Primary	Benign	Malignant	Total
Lung	2	6	8
Breast	2	2	4
Sarcoma	2	1	3
CML	2	0	2
Esophageal	1	1	2
ACA of unknown primary	0	2	2
Other	3 (cervical, thyroid, pancreas)	1 (mesothelioma)	4
Total	12	13	25

ACA, Adenocarcinoma; CML, chronic myelogenous leukemia.

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Table II. *Echocardiographic findings*

	<i>Benign effusions</i>		<i>Malignant effusions*</i>	
	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>
Right atrial collapse	6/12	(50)	9/12	(75)
Right ventricular collapse	4/12	(33)	8/12	(67)
Left atrial collapse	1/12	(8)	4/12	(33)
Cardiac tamponade†	2/12	(17)	7/12	(58)
Dilated inferior vena cava	2/12	(17)	1/12	(8)
Fibrin	10/12	(83)	7/13	(54)
Loculated	4/12	(33)	4/13	(31)
Pericardial masses	5/12	(42)	2/13	(15)

*Chamber collapse was assessed in only 12 of 13 patients with malignant effusion.

†Moderate to severe right atrial, right ventricular, or left atrial collapse.

malignant effusions and three with benign effusions: none of the cultures were positive for bacterial or fungal infection.

Echocardiographic findings and their distribution between the benign and malignant effusions are listed in Table II. In addition, the average volume was estimated to be 287 ml (median 250 ml) in the 19 patients for whom complete data were available. Nine of the malignant effusions (69%) were classified as large, as were six of the benign effusions (50%). Right atrial collapse was severe in one patient with malignant effusion, moderate in six patients (malignant, $n = 5$; benign, $n = 1$), mild in eight (malignant, $n = 3$; benign, $n = 5$), and not present in nine (malignant, $n = 3$; benign, $n = 6$). Right ventricular collapse was severe in one patient with a malignant effusion, moderate in four (malignant, $n = 2$; benign, $n = 2$), mild in seven (malignant, $n = 5$; benign, $n = 2$), and not present in 12 (malignant, $n = 4$; benign, $n = 8$). Left atrial collapse was moderate in one patient with benign

effusion, mild in four with malignant effusion, and not present in 18 (malignant, $n = 7$; benign, $n = 11$). Left ventricular function was normal in 22 patients, hypocontractile in one patient with benign effusion, and could not be characterized in two. Overall, cardiac tamponade, as evidenced by moderate to severe collapse of one or more chambers, was more common in patients with malignant effusions than benign effusions ($\chi^2 = 4.44$, $0.02 < p < 0.05$, $n = 24$). The median survival of patients with benign effusions was 219 days (range 8 days to 3.5 years) and for patients with malignant effusions 81 days (range 5 days to 3.8 years); two patients with benign effusions were alive at the end of the follow-up period.

Overall, echocardiographic evidence for the presence or absence of fibrin bands, loculations, pericardial masses, or inferior vena caval dilatation could not be correlated with the presence of malignancy, although moderate to severe chamber collapse did correlate with the diagnosis of malignant pericardial effusion. Pericardial fluid cytology and pericardial sac pathology are complementary tests, with the latter often informative when the former is negative; thus obtaining both pericardial tissue and fluid will increase the frequency of detection of intrapericardial malignant disease.

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SUCCESSFUL ESOPHAGEAL TRACHEOBRONCHOPLASTY FOR COMBINED TRACHEAL AND BRONCHIAL TRAUMATIC RUPTURE

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A mother fell down a flight of stairs while carrying her 5-year-old son in her arms. As she fell, she tightened her grip around the child's chest, leading to a blunt chest trauma with reflex closure of the glottis associated with trauma to the head. A medical emergency unit found the boy unconscious with subcutaneous emphysema of the neck and both hemithoraces. He was intubated without sedation with a No. 5 cuffed nasotracheal tube, and positive-pressure ventilation was initiated.

On admission to the hospital 1 hour later, the child was conscious and his respiratory status remained stable. A