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The Role of Videopericardioscopy in Evaluating Indeterminate Pericardial Effusions

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ABSTRACT

Background. The pericardial biopsy has opened a new perspective for the etiologic diagnosis of pericardial effusions, because adequate pericardial visualization via the use of a video camera can provide more accurate results. We assessed the usefulness of videopericardioscopy for the diagnosis and treatment of pericardial effusion of indeterminate origin.

Methods. We conducted a retrospective study of clinical data from patients who underwent videopericardioscopy examination for pericardial effusion without an established diagnosis. The video-assisted pericardioscopy procedure was performed through a small incision in the xiphoid area.

Results. From January 1998 to January 2007, 101 consecutive patients underwent videopericardioscopy evaluation for pericardial effusion. Ten patients were excluded because of lack of data. Fifty men and 41 women were included (mean age, 50 years; range, 14-76 years). All of the patients had moderate or significant pericardial effusion as demonstrated by echocardiography or computed tomography. The following diagnoses for the pericardial effusions were established: nonspecific inflammation, 50 cases (54.94%); neoplastic disorders, 22 cases (24.17%); tuberculous, 11 cases (12.08%); bacterial inflammatory process, 3 cases (3.29%); chylopericardial, 2 cases (2.19%); fungal infection, 2 cases (2.19%); and viral infection, 1 case (1.09%). Pericardioscopy evaluation provided the definitive diagnosis via the pericardial biopsy in 36.26% of the cases and via the results of fluid analyses in 13.18% of the cases; the use of both methods established the definitive diagnosis in 45.05% of the cases in this group of patients. The overall morbidity rate was 4.3%, and the most common complication was arrhythmia due to intraoperative manipulation, which ceased with the removal of the instruments from the pericardial cavity. We had 1 death, by cardiac tamponade, in the perioperative period.

Conclusion. Videopericardioscopy is a safe and efficient method for obtaining a better diagnosis of and satisfactory therapeutic results for pericardial effusions of indeterminate cause, and such results are obtained via an improved exploration of the pericardial cavity.

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This article includes 1 video and 1 animation that will be uploaded with 2 explanatory texts in the FTP area.

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INTRODUCTION

The first pericardial effusion was described in 160 BC by Galen, who also described inflammatory changes in the pericardium. Similar reports would not occur until the 17th century, when Lower described a case of cardiac tamponade after an effusion.

Even though the pericardium has been known since the origins of modern medicine, its management has always been avoided because of its location. In 1840, the first pericardial puncture was reported by Karanaeff [1840], and it was not until 30 years later that Rehn described the technique for its surgical management [Shumacker 1989].

The clinical investigation and diagnosis of pericardial diseases have increased in frequency. The etiologies of pericardial disease are not always easily discovered, however, and invasive techniques can be requested to obtain samples for pathologic examination.

The advent of pericardial biopsy has created a new perspective for the etiologic diagnosis of pericardial effusions [Fernandes 1998], and the use of video cameras can provide more accurate diagnostic results by enabling adequate visualization of the pericardium.

The technique for pericardial management had remained unaltered for almost 50 years, until 1977, when Santos and Frater described the use of a video camera for directly examining the pericardial cavity and thereby increasing the sensitivity of such examinations [Santos 1977].

The objective of the present study was to assess the usefulness of videopericardioscopy for the diagnosis and treatment of pericardial effusion of indeterminate origin.

MATERIALS AND METHODS

We conducted a retrospective study of a population of patients who had pericardial effusions without an established diagnosis and had undergone videopericardioscopy between

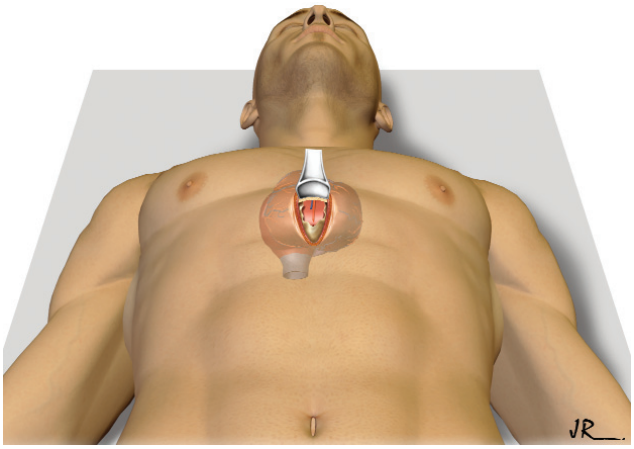

Figure 1. Anterior view to demonstrate the opening of the pericardium.

January 1998 and January 2007 in the Heart Institute (InCor), Hospital das Clínicas, São Paulo University Medical School. Patients with cardiac tamponade who had undergone pericardiocentesis were excluded. We reviewed medical records for the following information: sex, age, preoperative examinations, pericardial fluid analyses, pathologic results, established diagnoses, and intraoperative complications.

Operation Technique

The patient is placed in a horizontal supine position with the arms alongside the body while the patient is under general anesthesia with simple orotracheal intubation. We place a square pad between the patient's scapulae to maintain an elevated thorax and to improve the exposure of the subxiphoid region.

We carry out antisepsis from the menton to the inguinal region and laterally to the posterior axillary line (if an unintentional pleural opening occurs, a thoracic drainage can be required), and the surgical fields are placed to expose the area from the sternum to the umbilical scar.

A median incision is made over the xiphoid process with approximately 5 cm of extension. The dissection is performed in levels with electrocautery until the xiphoid process. The sheet of the rectus abdominis muscle is then viewed along with the preperitoneal fat below it. At this level, a careful blunt dissection is performed below the sternum in a cranial direction.

When the pericardium is found, it is held with 2 clamps, and an opening of approximately 1 cm is cut with surgical scissors (Figure 1). At this point, a sample of the liquid is collected for culture, biochemical, general, and oncotic cytology analyses.

To create a space in the pericardial cavity, we lift up the sternum with a retractor (Figure 2). Once the liquid has been evacuated from the pericardial cavity, we introduce the optical device (10 mm, 30°), which is coupled to the video camera (Stryker microcamera model 988; Stryker Endoscopy, San Jose, CA, USA). With this technique, we are able to examine the internal side of the pericardium and the anterior face of the heart. This procedure allows us to search for and examine affected areas and thus perform more precise and directed biopsies.

With use of endoscopic clamps, we remove representative pericardium fragments for anatomic and pathologic analyses. Mild bleeding can be controlled with aspiration and cauterization.

At the end of the procedure, we place a 36F tubular drain in the pericardial cavity and expose the drain via a median counteropening. The abdominal wall is closed with absorbable sutures.

RESULTS

From January 1998 to January 2007, 101 consecutive patients underwent a videopericardioscopic examination for

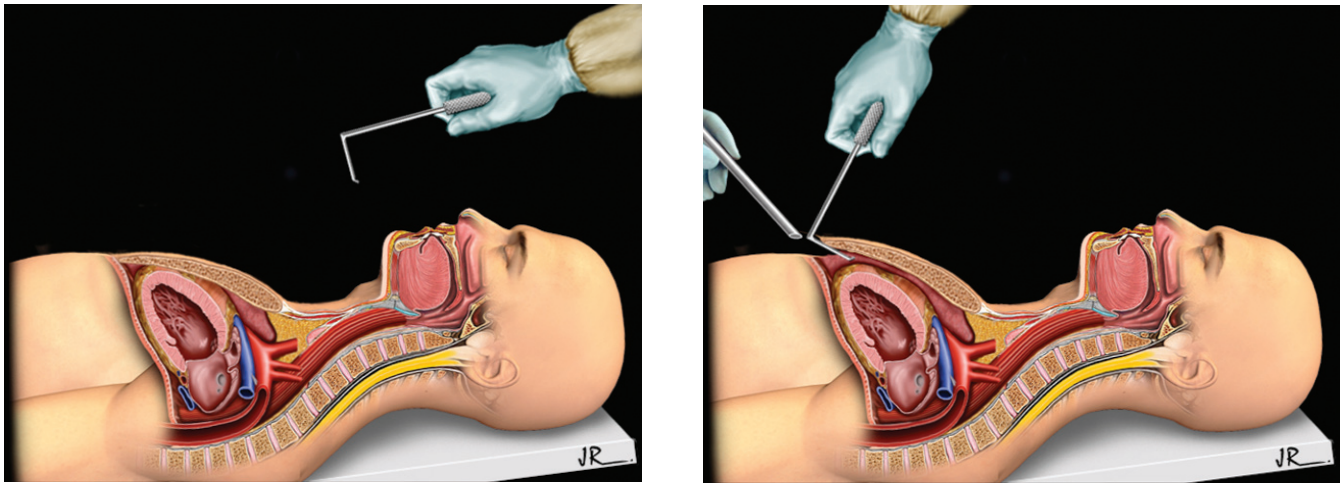

Figure 2. Lateral schematic views illustrating the use of the retractor to create space in the pericardial cavity.

pericardial effusion. Ten patients were excluded because of a lack of data. Fifty men and 41 women were included (mean age, 50 years; range, 14-76 years).

After an initial clinical evaluation, the pericardial cavity was studied, and the type of involvement was characterized via echocardiography or chest computed tomography, and such evaluations were complemented when necessary with a nuclear magnetic resonance examination.

The most frequently presented signs and symptoms in the patients were dyspnea (85%), thoracic pain (40%), anasarca (15%), ascites (15%), and fever (20%) (Table 1).

All cases had moderate or significant pericardial effusion demonstrated in echocardiography or chest computed tomography examinations during the preoperative assessment.

The diagnoses established for the pericardial effusions were as follows: nonspecific inflammation, 50 cases (54.94%); neoplastic disorders, 22 cases (24.17%); tuberculous, 11 cases (12.08%); bacterial inflammatory process, 3 cases (3.29%); chylopericardial, 2 cases (2.19%); fungal infection, 2 cases (2.19%); and viral infection, 1 case (1.09%) (Table 2).

Pericardioscopy evaluation established the definitive diagnosis via the pericardial biopsy in 36.26% of the cases and via the results of fluid analyses in 13.18% of the cases; the use of both methods established the definitive diagnosis in 45.05% of the cases in this group of patients.

The overall morbidity rate was 4.3%, and the most common complication was arrhythmias due to intraoperative manipulations, which ceased with the removal of the optical device and the instruments from the pericardial cavity. One death (1.09%), which was caused by cardiac tamponade at the beginning of the anesthesia, occurred in the perioperative period despite quick drainage of the pericardial effusion and other clinical measures.

DISCUSSION

Several diseases can affect the pericardial cavity and provoke pericardial effusion. Some of these diseases require specific therapy, so an accurate etiologic diagnosis is particularly important. Patients with symptomatic effusions can be severely unwell, and the primary aim must be the relief of symptoms, although secondary aims in these patients should include determination of the cause of the effusion and preventing its recurrence.

The Task Force on the Diagnosis and Management of Pericardial Diseases of the European Society of Cardiology [Maisch 2004] published Guidelines on the Diagnosis and Management of Pericardial Diseases, which indicated pericardioscopy by rigid or flexible endoscope whenever a histologic examination was required. The authors stated that pericardioscopy enables inspection of the pericardial surface, selection of a biopsy site, and the safe collection of numerous samples and that pericardioscopy was particularly useful in the diagnosis of neoplastic pericarditis.

Table 1. Major Signs and Symptoms of the Patients

Dyspnea	85%
Thoracic pain	40%
Fever	20%
Anasarca	15%
Ascites	15%

Table 2. Diagnosis Obtained through Video-Assisted Pericardioscopy

	Patients, n (%)
Nonspecific inflammation	50 (54.94)
Neoplastic disorders	22 (24.17)
Tuberculous	11 (12.08)
Bacterial inflammatory process	3 (3.29)
Chylopericardial	2 (2.19)
Fungal infection	2 (2.19)
Viral infection	1 (1.09)

In a study by Seferovic et al [2003], 49 patients with a large pericardial effusion underwent parietal pericardial biopsy. In group 1 (12 patients), pericardial biopsy was guided by fluoroscopy (3-6 samples/patient). Group 2 included 22 patients who underwent 4 to 6 pericardial biopsies guided by pericardioscopy (16F flexible endoscope). In group 3, extensive pericardial sampling (18-20 samples) was also guided by pericardioscopy. Sampling efficiency was better with pericardioscopy (group 2, 84.9%; group 3, 84.2%) than via fluoroscopic guidance (group 1, 43.7%; $P < .01$). Pericardial biopsy in group 3 had a higher diagnostic value than in group 1 in revealing a new diagnosis (40% versus 8.3%, $P < .05$) and etiology (53.3% versus 8.3%, $P < .05$). Pericardial biopsy was better for establishing etiology in group 2 than in group 1 (40.9% versus 8.3%, $P < .05$). Pericardial biopsy yielded 58.3% false negatives in group 1, compared with 6.7% in group 3 ($P < .01$). No major complications occurred. In groups 2 and 3, nonsustained ventricular tachycardia occurred during the procedure in 2 (5.4%) of 37 patients.

In a previous article published by our group [Pêgo-Fernandes 2001], the frequency of diagnostic positivity for biopsy performed by videopericardioscopy for pericardial effusion was 30% in a group of 20 patients. A fluid analysis ensures an etiologic diagnosis in 15% of the patients. An etiologic diagnosis was not obtained in 9 patients (45%).

Suen et al [1999] compared 2 modes of pericardial drainage (pericardiocentesis versus pericardiotomy) performed through the subxiphoid route. Nineteen of the 20 pericardiocenteses were successful with no complications, and all 27 pericardiotomies were successful with only minor complications. Cytologic results were positive for malignancy in 21% of the cases, and a culture for tuberculosis was positive in 1 case. Malignancy was the most common cause of effusion (41%), followed by uremia. Both techniques were considered safe and effective; however, the biopsies improved the diagnostic identification of either disease from 18% to 38%.

Nugue et al [1996] studied 141 patients who underwent pericardioscopies with a rigid mediastinoscope. The etiologic data obtained by pericardioscopy for each patient were compared with the results that would have been obtained

with only conventional surgical drainage and biopsy. After a complete workup, a specific cause was found in 69 cases (48.6%); the other 73 cases (51.4%) were considered idiopathic effusions. The intraoperative mortality rate was 2.1% (3 of 141 patients). Comparing the areas under the receiver-operator characteristic curves revealed the diagnostic advantage of pericardioscopy to be significant for the entire series (pericardioscopy, 0.98 ± 0.011; conventional surgical drainage, 0.89 ± 0.029; $P < .001$). The investigators concluded that pericardioscopy can increase diagnostic sensitivity, being more marked for some effusion types, such as neoplastic (21%) or purulent (83%) effusions.

In comparing our results with previously published data, we had a similar index of definitive diagnosis established by videopericardioscopy, and it was clearly marked in neoplastic diseases [Porte 1999]. However, the index for tuberculous pericarditis was particularly high compared with the series of other studies, a difference that is probably due to the high prevalence of this disease in our population. Accurate diagnosis of tuberculous pericarditis ensures the correct treatment of these patients and is important to reduce the incidence of recurrence of pericardial effusion and to provide a cure for the disease.

The mortality rate with the pericardioscopy procedure was significantly low in all of the series, with a variance of 2.1% to 3.5% in the studies with rigid endoscopes. Our results corroborate these data.

We think that routine use of the video camera to aid pericardioscopy can make the procedure easier, especially in training centers such as ours, without any increase in morbidity or mortality and can ensure better guidance for obtaining more accurate biopsies.

We conclude that videopericardioscopy is a safe and efficient method for obtaining an improved diagnosis and satisfactory therapeutic results in cases of pericardial effusions of indeterminate cause by enabling a better exploration of the pericardial cavity.

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