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## Research Article

# Clinico-Etiological Profile of Cardiac Tamponade in a Tertiary Care Centre

### Abstract

**Background:** Pericardial tamponade, a life-threatening condition caused by the accumulation of fluid in the pericardial sac, can be acute or chronic. Mortality and morbidity can be minimized on prompt diagnosis and treatment with percutaneous drainage.

**Materials and methods:** 246 patients admitted with cardiac tamponade between Jan 2010 and Aug 2014 was enrolled in the study. After clinical examination and echocardiographic assessment, all the patients were subjected to emergency pericardiocentesis (both diagnostic and therapeutic). Three samples of the aspirate were sent for biochemical, serological, and cytological analysis. The data collected was then analyzed.

**Results:** Tuberculosis is the commonest cause in our study. Post procedural and post-surgical causes are insignificant in numbers. Overall mortality rate in our study is 6% which is much lesser than other studies. Procedure related cardiac tamponade mortality rate was 6%.

**Conclusion:** Initial assessment with clinical, serologic, and echocardiographic investigation and careful follow-up can in most cases yield a causal diagnosis. The prognosis depends chiefly upon the patient's underlying disease.

## Background

Cardiac tamponade is defined as a haemodynamically significant cardiac compression caused by pericardial fluid [1]. The fluid may be blood, pus, infusion (transudate or exudate) or air [2]. The principal haemodynamic effect is a constraint on atrial filling with a reduction in atrial diastolic volume, which causes an increase in atrial diastolic pressure [3]. The causes of a cardiac tamponade include an acute accumulation of pericardial fluid from a ruptured myocardium (following myocardial infarction, blunt or penetrating cardiac trauma or cardiac perforation following cardiac catheterisation), proximal dissecting aortic aneurysm, carcinomatous infiltrate of the pericardium and acute pericarditis [4]. Idiopathic or viral pericarditis, iatrogenic injury (invasive procedure-related, post-CABG), uraemia, collagen vascular disease, tuberculosis and bacterial infection may lead to cardiac tamponade [5]. The classical presentation of a cardiac tamponade is an elevated venous pressure, decreased systemic arterial pressure and a quiet heart (i.e. Beck's triad) [6]. Surgical placement of subxiphoid tube is the preferred technique for draining a small amount of effusion in patients with quickly developing pericardial tamponade such as those with acute traumatic hemopericardium [7,8]. For patients with massive effusion and slowly developing pericardial tamponade, there are 2 principal methods: percutaneous catheter drainage and surgical tube drainage [9-12]. A major risk of percutaneous pericardiocentesis is laceration of the heart, coronary arteries, or lungs. If needle pericardiocentesis is performed at the bed side without echocardiographic guidance or hemodynamic monitoring, the risk of life threatening complications is as high as 20% [12]. Echocardiographic guidance increases the success rate of pericardiocentesis by reducing this complication [13]. In this study, we evaluated the etiology and clinical profile of patients admitted with cardiac tamponade in a tertiary care centre.

## Methods

### Study design and study period

It was a prospective study which was carried out at a tertiary care centre in South India between January 2010 and August 2014.

### Inclusion criteria

All consecutive patients with cardiac tamponade diagnosed clinically or with the help of echocardiography, were primarily considered for this study. Finally, those patients who had given consent for pericardiocentesis were included in this study.

### Exclusion criteria

Patients who did not give consent for pericardiocentesis or did not have clinical or echocardiographic features of pericardial tamponade, were excluded from this study.

### Study protocol

Cardiac tamponade was defined by clinical and echocardiographic criteria [14-17]. In all cases location and distribution of the pericardial effusion leading to tamponade were confirmed by two dimensional and Doppler echocardiography. All patients were transported to catheterization laboratory after diagnosis of pericardial tamponade. Pericardiocentesis was done by subxiphoid approach. Pericardial fluid was fully drained and submitted for culture and cytological analysis. The sheath position was readily confirmed by injecting a small amount of agitated saline. The effusion was initially drained completely, as assessed by repeated echocardiography. Subsequently, intermittent aspirations were performed as clinically indicated; usually every 4 to 6 hours until the fluid aspirated over a 24 hour period has decreased to less than 25 ml or follow-up with two dimensional echocardiographic assessments reported mild pericardial effusion.

## Follow-up

All patients were followed up at 7 days and 1 month after discharge and thereafter, every three monthly.

## Ethics

This study was approved by our own institutional ethics committee and signed informed consent was taken from all patients before enrolment in this study.

## Results

We evaluated the clinical and etiological data of the 246 consecutive patients. The demographic and clinical parameters of our study patients have been given in Table 1. Successful pericardiocentesis was achieved on the 1st attempt in 190 patients, and rest required a 2nd or 3rd attempt. No patient required surgical intervention because of a failed puncture. No early complication of pericardial puncture, such as cardiac perforation, ventricular fibrillation, or pneumothorax was observed. There was no death as a consequence of the procedure. The average volume of pericardial fluid drained was 1,550 +/- 280 cc. No fever, infection, or hematoma was observed during follow-up. The macroscopic appearance of the drained materials was serous in 33 patients, haemorrhagic in 94 patients, straw coloured in 110 patients and purulent in 8 patients while 1 patient had golden yellow color. Biochemical analysis revealed that all specimens were exudates according to Light's criteria [18]. Frequent causes of cardiac tamponade in our study patients were tuberculosis, malignancy, uraemia, connective tissue disease and bacterial infections (Table 2).

## Hospital mortality

Only 12 patients died in the hospital. Major cause of the death was due to carcinoma with metastasis in 4 patients. Post procedural 1 patient died due to LA appendage perforation while doing Percutaneous Transvenous Mitral Commissurotomy (PTMC). 1 patient died post surgical Mitral valve Replacement (MVR) and 3 patients died due to acute anterior wall Myocardial infarction (MI).

## Follow up

Follow up ranged from 3 months to 3 years (mean of 18 ± 9 months). Ten patients did not turn up for follow-up at 1 month another 22 patients did not complete full follow-up till the end of this study. During the follow up period, symptomatic pericardial effusions occurred in 6 patients with known malignancy with metastasis and 2 patients with idiopathic pericardial effusion and 1 patient with connective tissue disease. A second pericardiocentesis procedure was required in four patients with malignant disease.

## Discussion

In most of our patients, it was possible to identify an underlying condition or disease as the cause of the cardiac tamponade. Among underlying illness, tuberculosis was the most common followed by malignant pericardial effusion.

These findings suggest that initial assessment by clinical, serological, cytological, biochemical and echocardiographic investigations followed by careful monitoring can enable the discovery of a cause in most cases of pericardial tamponade. In our series a

causal diagnosis was obtained by means of clinical assessment in 80% of the patient. Sagristà-Sauleda and colleagues reported that, in many patients, pericardial effusions were due to a known underlying disease or condition; in patients without known underlying disease, signs of inflammation, the size of the effusion, and the presence or absence of cardiac tamponade can be helpful in establishing causation. The etiologies of our patients' with cardiac tamponade were dissimilar

**Table 1:** Demographic and Clinical Parameters of study subjects.

Variables	No. of Patients (n=246)	%
Gender		
Female	124	50.4
Male	122	49.6
Age group (in years)		
1-10	9	4
11-20	28	11
21-30	37	15
31-40	58	24
41-50	23	9
51-60	31	13
61-70	45	18
71-80	14	6
>80	1	0.4
Dyspnea		
Present	214	87
Absent	32	13
Clinical presentation		
Dyspnea	214	87
Fatigue	99	40
Chest Pain	64	26
Fever	59	24
Tachycardia (HR >100 bpm)		
Present	122	49.6
Absent	124	50.4
Hypotension (SBP < 100 mm of Hg)		
Present	205	83
Absent	41	17
JVP		
Elevated	107	43.5
Not Elevated	139	56.5
Hypoxia (SpO2)		
Present	96	39
Absent	150	61
Tachypnea		
Present	246	100
Absent	0	0
Echocardiography		
RA collapse		
Present	229	93
Absent	17	7
RV Collapse		
Present	214	87
Absent	32	13
Investigation		
Anemia		
Present	187	76
Absent	59	24
Leukocytosis		
Present	109	44
Absent	137	56
Aspirated Fluid quantity (ml)		
<500	40	16
500-1000	142	58
1000-1500	52	21
>1500	12	5

to those found by Colombo's group. In their series, the most frequently encountered causal factors were neoplastic diseases (36%), idiopathic pericarditis (32%), and uremic pericarditis (20%). In our series the most important cause is tubercular cardiac tamponade (35%) and carcinoma (24%), Idiopathic cardiac tamponade (3%). In cases in which the causal diagnosis of Cardiac tamponade cannot be established by radio diagnostic and biochemical means, there remains considerable difficulty in diagnosis. These effusions are said to be idiopathic. Echo guided pericardiocentesis technique was first reported as safe and effective by Mayo Clinic Group in pilot studies in the early 1980s. Echo guided pericardiocentesis was confirmed to be safe and effective for treatment of clinically significant pericardial effusions. The procedural success rate was 97%. The overall total complications rate was 4.7% [19]. A retrospective series of 133 patients, observed that hemodynamic compromise, cardiomegaly, pleural effusion, and a large pericardial effusion were more common in patients with tuberculous or malignant pericardial disease than in patients with idiopathic pericarditis. Hemorrhagic pericardial effusion has been associated with neoplasia in some studies [20].

### Reducing the risk of pericardiocentesis

Percutaneous pericardiocentesis carries the risk of cardiac and coronary laceration, pneumothorax, liver trauma, and death. The efficacy and safety of echocardiographically guided puncture and catheter-based percutaneous drainage of the pericardium was confirmed. There is higher risk of developing cardiac tamponade with anticoagulant therapy in-patients with known or suspected pericardial disease. The subxiphoid approach remains the standard of practice for pericardiocentesis. Following the pericardiocentesis in our series, complications are very minimal.

### In hospital mortality

The fact is that early decompression must be obtained in patients with cardiac tamponade, otherwise their long term prognosis gets worsened. In our series, 12 patients died in the hospital. The high

mortality rate among cancer patients with cardiac tamponade is primarily related to the poor prognosis of malignant disease. The poor long term prospect of survival in these patients and their physical debilitation is a consequence both of primary disease and of ongoing chemotherapy and radiotherapy; we believe that pigtail catheter drainage is preferable to surgical intervention.

Uremic pericardial effusion is an expected complication in the course of chronic renal failure (3%). In our series, 6 patients with known chronic renal failure presented with overt hypotension and tachycardia during their dialysis sessions, which suggested pericardial tamponade. All these patients had successful pericardiocentesis, which yielded haemorrhagic pericardial fluid attributable to a coagulopathic state of uremic disease. In follow-up, the frequency of dialysis sessions were increased, and no patient developed recurrent effusion. We consider percutaneous catheter drainage to be an effective treatment for uremic pericardial effusions and tamponade.

In connective tissue diseases, clinically insignificant pericardial effusion is common but pericardial tamponade is rare. We established the diagnosis of systemic lupus erythematosus in 6 patients whose 1<sup>st</sup> presenting symptom was cardiac tamponade. Two patients had Mixed Connective Tissue Disease(MCTD) & two Patients had Rheumatoid arthritis(RA).

Dressler syndrome can cause pleural and pericardial effusions, but cardiac tamponade is an unusual result. Dressler syndrome is generally reported in patients with extensive myocardial infarctions who did not receive thrombolytic therapy. In our series, 7 patients developed cardiac tamponade due to acute anterior wall MI and free wall rupture.

### Conclusion

Findings in our large series of patients with cardiac tamponade indicate that the placement of an indwelling pericardial catheter, guided by 2-dimensional echocardiography and fluoroscopy are safe and effective for initial treatment. Tuberculosis was the most common cause in our study. Recurrence was uncommon except in those with neoplasm as an etiology. Initial assessment with clinical, serologic, and echocardiographic investigation and careful follow-up can in most cases yield a causal diagnosis. The prognosis depends chiefly upon the patient's underlying disease. A pericardial tissue biopsy is not essential in the initial evaluation of patients. We think that the combination of echocardiographically guided percutaneous pericardial puncture and fluoroscopically guided pigtail catheter placement is a safe and sufficient treatment for patients with cardiac tamponade.

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**Table 2:** Underlying Causes or Condition of Pericardial Tamponade in 246 Patients.

Final diagnosis	No. of patients (n=246)	%
1. Tuberculosis	86	35
2. Carcinoma	59	24
3. Post-surgical	28	11
4. Post procedural	18	7
5. Pyopericardium	10	4
6. CTD	10	4
7. CKD	8	3
8. Post MI	9	4
9. Hypothyroidism	6	3
10. HIV	4	2
11. Cholesterol Cardiac Tamponade	1	0
12. Idiopathic	7	3
Total	246	100

CTD- Connective tissue disorder; CKD- Chronic kidney disease; HIV- Human immunodeficiency virus.

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