International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2020): 7.803

Study of Clinical, Etiological and Laboratory Profile of Pericardial Effusion

Jyoti M. Kharche[1], Sushen Limbaji Ghadge[2], Indrajit Vithalrao Suryavanshi[3]

[1]Associate Professor, Department of Medicine, Mahatma Gandhi Mission's Medical College & Hospital, Aurangabad [MH], India

[2]Assistant Professor, Department of Medicine, Mahatma Gandhi Mission's Medical College & Hospital, Aurangabad [MH], India

[3] Junior resident, Department of Medicine, Mahatma Gandhi Mission's Medical College & Hospital, Aurangabad [MH], India
Corresponding author Email: *suryaindra007[at]gmail.com*

Abstract: ***Introduction: Pericardial effusion is one of the common diseases. The aetiology of pericardial effusion varies according to demography like age, geography and co-morbidity. Pericardial effusion can be caused by various local and systemic disorders, like infections, malignancy, renal failure etc. In developing countries it remains under reported like India and that is why study was undertaken to study clinical profile of pericardial effusion, laboratory profile of pericardial effusion and etiological factors of pericardial effusion. Material & Methods: The observational hospital based study is carried out in the department of medicine, MGM Medical College and Hospital, Aurangabad [MH], India. The duration of study is 2 years. Any patient admitted with pericardial effusion and confirmed by echocardiography underwent complete clinical examination. Observations and Results: In present study, out of 40 studied subjects, there are 25 (62.5%) males and 15 (37.5 %) females. The predominant symptom 90% is dyspnoea followed by fever 70%. Predominant cardiomegaly (92.5%) as the sign. Others being tachycardia, pedal oedema, pericardial rub and raised JVP.55% patients had serous fluid appearance.17.5% cases had haemorrhagic fluid appearance. Very low i. e.7.5% patients had purulent fluid appearance. Tuberculosis is the most common cause 37.5% of pericardial effusion followed by uraemia 20%. Conclusion: In present study, 72.5% cases have moderate and 27.5% have severe pericardial effusion. Dyspnoea, fever are predominant symptoms and Tachycardia being the commonest sign. Tuberculosis pericardial effusion is one of the commonest causes of pericardial effusion in our country and early diagnosis and treatment can prevent complications.***

Keywords: pericardial effusion, Tuberculosis, Echocardiography

1. Introduction

Pericardial effusion is one of the common diseases presenting in emergency and outpatient department of a tertiary care centre in India. It affects all ages and population, There is little data regarding prevalence and incidence of pericardial effusion. Studies have shown that it was 3% and 9% in a 6 year window in large Italian hospital [1] it remains under reported in developing countries like India.

The aetiology of pericardial effusion varies according to demography like age, geography and co-morbidity. Pericardial effusion can be caused by various local and systemic disorders, like infections, malignancy, renal failure, collagen vascular diseases, hypothyroidism, post MI, Post cardiac surgery, radiation and Idiopathic [2].

Pericardial effusion can be acute or chronic and time of development has great impact and the cause of abnormal fluid production depends on the underlying aetiology, Transudative fluids result from obstruction to fluid drainage, which occurs through lymphatic channels. Exudative effusion occurs secondary to inflammatory, infectious, malignant or autoimmune processes within the pericardium. Clinical manifestations of pericardial effusion are highly dependent on the rate of accumulation of fluid in the pericardial sac.

Rapid accumulation of pericardial fluid may cause elevated intrapericardial pressures with as little as 80 ml of fluid, while as slowly progressing effusions can on symptoms and clinical features commonly associated with pericardial effusion are chest heaviness, chest pain, hypotension, tachycardia accumulate upto 2 liters without symptoms [3].

Large idiopathic pericardial effusion is well tolerated for a long period by most patients but severe pericardial effusion can occur at any time [4].

In developed countries the different study shows the following results such as commonest cause of pericardial effusion is neoplastic, idiopathic and uremic. Malignancy is common in developed countries whereas Tuberculosis and purulent effusion is common in developing world.

The aetiology of pericardial effusion varies in different parts of the world and is related to the relative prevalence of different diseases known to cause it, although there is abundant literature regarding the clinical and etiological profile of pericardial effusion and cardiac tamponade in developed countries, but in developing countries it remains under reported like India and that is why we did this study to know etiological, clinical and laboratory profile of pericardial effusion.

2. Material and Methods

A prospective observational study was done in the department of medicine, MGM Medical College and Hospital, Aurangabad [MH], India during October 2017 to September 2019.

Sample Size: 40 patients who satisfying inclusion and exclusion criteria.

Inclusion Criteria:

- All patients presented with pericardial effusion and is confirmed by 2D ECHO.
- Age > 18 years
- All patients willing to participate in study.

Exclusion Criteria:

- Post traumatic pericardial effusion.
- Post cardiac surgery pericardial effusion.

Methods

The observational hospital based study is carried out in the department of medicine, MGM Medical College and Hospital, Aurangabad. The duration of study is 2 years. Any patient admitted with pericardial effusion and confirmed by echocardiography underwent complete clinical examination according to proforma.

Evaluation for the cause of pericardial effusion, include complete blood count with ESR, Blood urea, serum creatinine, chest X-ray, ECG, thyroid profile and the specific investigations like ANA, rheumatoid factor, anti CCP antibodies, as and if needed.

The patients were categorised by echocardiography as, Mild pericardial effusion when echo free space is < 10 mm by M-mode echocardiography while the moderate effusions were defined as an echo free space of anterior plus posterior pericardial spaces of 10-20 mm during diastole, and severe effusions as a sum of echo-free spaces > 20 mm.

Patients with moderate to severe pericardial effusion underwent pericardiocentesis. The Pericardial fluid is analysed for cells, proteins, LDH, malignant cells, ADA, gram staining, AFB staining and cultures. Final diagnosis based on clinical history, examination, and laboratory investigations for tuberculosis, uraemia, malignancy, collagen vascular disease hypothyroidism etc. The diagnosis of acute idiopathic/viral aetiology is presumptive and based on the clinical picture, and negative screening tests for other aetiologies.

Therapeutic Echo-guided percutaneous pericardiocentesis performed by placing pigtail catheter in pericardial space through subxiphoid approach.

Statistical Analysis

The collected data is entered in MS EXCEL sheet. All the analysis done by using the windows based SPPS statistical package (version 24.0, SPSS INC: Chicago, il USA). The qualitative data is represented in form of frequencies and percentages. The quantitative data is represented in form of mean, standard deviation. Both the qualitative and quantitative data is represented in form of visual impression like bar diagram. .

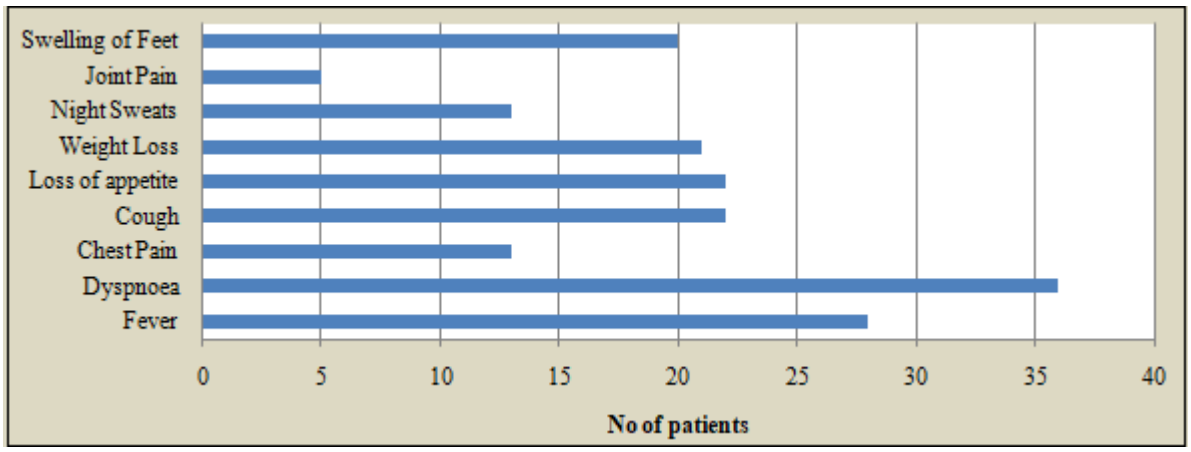
3. Observations and Results

In present study, out of 40 studied subjects, there are 25 (62.5%) males and 15 (37.5 %) females.

Table 1: Age Incidence in Pericardial Effusion

Age group (years)	Number of Patients	Percentage
18-20	04	10.0
21-30	14	35.0
31-40	06	15.0
41-50	06	15.0
51-60	05	12.5
61-70	02	5.0
>70	03	7.5
Total	40	100
Mean ± SD	56.41±15.6 years	

The mean age is 56.41±15.6 years with 95% confidence interval.35% patients belong to 21-30 years of age group which is maximum among the age group studied.



Graph 1: Symptoms in Pericardial Effusion

The predominant symptom 90% is dyspnoea followed by fever 70%.32% patients had chest pain and 50 % patients had swelling of feet.

Table 2: Signs in Pericardial Effusion

Signs	Number of Patients	Percentage
Pedal oedema	20	50.0
Tachycardia-heart rate > 100 BPM	22	55.0
Raised JVP	11	27.5
Cardiomegaly	37	92.5
Muffled heart sound	28	70.0
Pericardial Rub	15	37.5
Lymphadenopathy	05	12.5
Hypotension-SBP < 100 mmHg	06	15.0

The above table shows predominant cardiomegaly (92.5%) as the sign. Others being tachycardia, pedal oedema, pericardial rub and raised JVP.70% had muffled heart sounds (diminished intensity of sound). Lymphadenopathy and hypotension is observed in very less number of cases. None of the case has pulsus paradoxsus.

Table 3: Ascultatory findings in patients of pericardial effusion-

Investigation Findings in Study–Cardiovascular Examination	Number of Patients	Percentage
Heart Sounds		
Muffled heart souds	28	70.0
Pericardial Friction rub	15	37.5

70% patients had (diminished intensity) muffled heart sounds and 37.5 % patients had pericardial friction rub. Clinical examination with muffled heart sounds should also be evaluated with pericardial effusion.

Table 4: X-Ray findings in pericardial effusion-

X-ray Findings	Number of Patients	Percentage
Cardiomegaly	37	92.5
Pulmonary tuberculosis	06	15.0
Pleural Effusion	04	10.0
Neoplasm/Mass	01	2.5

Cardiomegaly is predominantly seen in 92.5% patients.15% patients had features of tuberculosis such as patchy or nodular shadows in the upper zone on one or both sides, cavitations, calcified lesions and presence of pleural effusion or thickening.2.5% patients had features of malignancy.

Table 5: Electrocardiographic Findings in Pericardial Effusion

ECG Manifestations	Number of Patients	Percentage
Low Voltage	15	37.5
ST – T changes	14	35.0
Electrical Alternans	02	5.0
Normal	08	22.5
Total	40	100

Low voltage predominated with 37.5% followed by ST-T changes.

Table 6: Proportion of Pericardial Effusion on 2-D Echocardiography-

Proportion of Effusion	Number of Patients	Percentage
Mild	00	00.0
Moderate	29	72.5
Large/severe	11	27.5
Total	40	100

The severity of pericardial effusion on echocardiography. Moderate pericardial effusion predominates with 72.5% and 27.5% had severe effusion. None of the patient has mild effusion. There was no patient of cardiac tamponade.

Table 7: Pericardial fluid protein analysis

		Number of Patients	Percentage
Protein	<3 gm/dl	02	5.0
	>3 gm/dl	38	95.0
Cell Count	<100	07	17.5
	>100	33	82.5
Predominant	Lymphocytosis	26	65.0
	Neutrophils	14	35.5
ADA level	<40	26	65.0
	More than 40	14	35.0

The above table shows 95% patients had >3gm/dl of protein in pericardial effusion. Very less i. e.5% patients had <3gm/dl of protein in pericardial effusion. Almost 95% patients had features of exudative effusion. The above table shows Cell count in pericardial effusion.82.5% patients had >100 cells in their fluid and 65% patients had predominant lymphocytes. The adenosine deaminase level in pericardial effusion. Significant ADA >40 is seen in 35% patients, which is suggestive of tuberculosis.

Table 8: Microbiologic findings in patient of pericardial effusion-

Gram Stain Fluid Findings	Number of Patients	Percentage
Gram +	01	2.50
Gram-	02	5.0
Malignant Cell +	02	5.0
Culture positive for pyogenic organism	03	7.5
Smear for AFB +	03	7.5
CBNAAT +	15	37.5

The fluid findings in pericardial effusion.37.5% patients had positive CBNAAT in their fluid which is suggestive of tuberculosis and 7.5% patients had smear positive acid fast bacilli.7.5 % patients flagged culture positive for pyogenic organism. Malignant cells was seen in 5% patients.

Table 9: Fluid appearance in pericardial effusion-

Appearance	Number of Patients	Percentage
Serous	22	55.0
Sero-Fibrinous	05	12.5
Haemorrhagic	10	17.5
Purulent	03	7.5
Total	40	100

55% patients had serous fluid appearance.17.5% cases had haemorrhagic fluid appearance. Very low i. e.7.5% patients had purulent fluid appearance.

Table 10: Etiological types of Pericardial Effusion

Etiological types	Number of Patients	Percentage
Tuberculosis	15	37.5
Malignancy	02	5.0
Viral/Idiopathic	03	7.5
Collagen Vascular Diseases	05	12.5
Uraemia	08	20.0
Pyogenic Infections	03	7.5
Hypothyroidism	02	5.0
HIV	02	5.0
Total	40	100

Tuberculosis is the most common cause 37.5% of pericardial effusion followed by uraemia 20%.12.5% cases had collagen vascular disease as the cause of pericardial effusion. Malignancy, HIV, and Hypothyroidism form the least common cause.

4. Discussion

The gender distribution of patients, out of 40 studied subjects, there are 62.5% males and 37.5% females in our study. Study conducted by Banerjee [5] et al reported 60% incidence in males. Pillay [6] reported 80% incidence in males. P. Ravikaladhar Reddy et. el [7] reported 65% incidence of males.

The age incidence in pericardial effusion in our study shows the mean age is 56.41±15.6 years with 95% confidence interval.35% patients belong to 21-30 years of age group which is maximum among the age group studied. J. C. Banerjee et al [5] observed that the peak age incidence was between 21-30 years. In the study of Pillay [6] the greatest incidence was between 20-40 years.

Yaqoob et al. [8] reported age ranging from 7 to 80 years.51.6% were males and 48.4% were females. *Jamal Uddin MD et al [*9] reported, 53.03% were male and 46.96% were female. *Yogendra Singh et. al. [10]* reported 58.8% and 41.1% women diagnosed with pericardial effusion.

The symptoms in pericardial effusion in the present study shows predominant symptom 90% is dyspnoea. Ravikaladhar Reddy et. al [7] reported dyspnoea is present in 100% of cases. Berry and Banerjee [5] reported breathlessness in 65% of cases.

Ravikaladhar Reddy et. al [7] reported swelling of feet is present in 80% of cases. In the study of Berry and Banerjee [5], swelling of feet was observed in 60% cases. Hageman et al [11] reported swelling of feet in 55% of cases. Banerjee [5] reported swelling of feet in 50% of cases. In the present study 50 % patients had swelling of feet.

Yaqoob et al [8] reported most common symptom was shortness of breath (62.9% followed by chest pain 53.2%, fever 44.6% and cough 28%. *Jamal Uddin MD et al [*9] the most common clinical feature was Tachycardia 69.69%, followed by Breathlessness 60.60% and fever was 54% of patients. The least common clinical feature was Hypotension 30.30%. *Yogendra Singh et. al. [10]* reported dyspnoea was present in 74.4%, cough 28.8%, Weight loss/ night sweats 28.8% and fever 27.7%.86.67% patients had shortness of breath at presentation, 50% patients had symptoms suggestive of congestive heart failure, 60% had fever, 30% had chest pain and 40% had cough in study by M Manjusha et. al. [12].

The predominant cardiomegaly (92.5%) as the sign. Others being tachycardia, pedal oedema, pericardial rub 37.5% and raised JVP 27.5%.70% had diminished intensity of sound. Electrical alternans, lymphadenopathy and hypotension is observed in very less number of cases. The commonest sign noted by Ravikaladhar Reddy et. al [7] in their study, is raised jugular venous pressure, seen in 100% of cases. . Banerjee [5] reported raised JVP in 56% of cases. Hageman [11] reported raised JVP in 59% cases. In present study 27.5% patients had raised JVP.

Our study shows X-ray findings in cases of pericardial effusion with Cardiomegaly is predominantly seen in 92.5% patients, 15% patients had features of tuberculosis and 2.5% patients had features of malignancy. Yogendra Singh et. Al. [10] shows that normal radiographic features are seen in 41 (45.5%), cardiomegaly 28 (31.1%), calcification 8 (8.8%), pulmonary koch's 7 (7.7%) and neoplasm 6 (6.6%). M Manjusha et. Al. [12] shows cardiomegaly 27 (90%), pulmonary koch's 2 (6.7%) and pleural effusion 4 (13.3%).

In the series of Pillay, 120 52.5% cases were of tuberculous etiology. J. N Berry and Banerjee [5] reported 60% cases of tuberculous etiology in their series. Their incidence of malignant etiology was 5.56% and incidence of pyogenic etiology 2.78%. Yaqoob et al [8], the most common etiology of pericardial effusion was tuberculosis (24.5%), followed by malignancy (16.6%), uraemia (15.6%), acute idiopathic/viral (14.7%) collagen vascular disease (n=6; 5.8%) hypothyroidism (3.9%), CCF (3.9%), post MI (2.9%), pyogenic (1.9%), radiation (1.9%) and HIV (1.9%) respectively.

Present study shows ECG finding in pericardial effusion, Low voltage predominated with 37.5% followed by ST-T changes. Yaqoob et al [8] found that the most common ECG findings were sinus tachycardia, nonspecific ST-T wave changes and low voltage QRS complexes. *Yogendra Singh et. al. [*10] in his study has Non-specific ST-T changes 55 (61.1%), Sinus tachycardia 42 (46.6%), Low voltage complexes 25 (27.7%), Arrhythmias 5 (5.5%). M Manjusha et. al. [12] in his study has Low voltage complexes 27 (90%), ST /T Changes 15 (50%), Electrical alternans 6 (20%).

In present study severity of pericardial effusion on echocardiography shows, moderate pericardial effusion predominates with 72.5% and 27.5% had severe effusion. None of the patient has mild effusion. Yaqoob et al [8] reported 63.7% presented with moderate pericardial effusion and 36.3% presented with severe pericardial effusion.

Present study shows heart sounds in pericardial effusion with 70% patients had diminished intensity of heart sounds and 37.5 % patients had pericardial friction rub. Clinical examination with diminished intensity of heart sounds should also be evaluated with pericardial effusion. M Manjusha et. al [12] found that heart sounds Normal in intensity in 9 (30%), Diminished in intensity 21 (70%) and Pericardial friction rub in 2 (6.70%).

Present study shows 95% patients had >3gm/dl of protein in pericardial effusion. Very less i. e.5% patients had <3gm/dl of protein in pericardial effusion. M Manjusha et. al. [12] in their study has >3 gm/dl in 27 (90%) and <3 gm/dl in (10%).

In this study, Cell count in pericardial effusion is seen in 82.5% patients with >100 cells in their fluid and 65% patients had predominant lymphocytes. M Manjusha et. al. [12] found that <100 cells in 9 (30%), >100 cells in 21

(70%), Predominant lymphocytosis in 15 (50%) and Predominant neutrophils in 6 (20%) of cases.

In this study, adenosine deaminase level in pericardial effusion shows significant ADA >40 is seen in 35% patients, which is suggestive of tuberculosis. Whereas in study conducted by M Manjusha et. al. [12] shows >40 U/Lit in 10 (33.30%) and <40U/Lit in 20 (67%).
In our study, fluid findings in pericardial effusion shows 37.5% patients had positive CBNAAT in their fluid which is suggestive of tuberculosis and 7.5% patients had smear positive acid fast bacilli.7.5 % patients flagged culture positive for pyogenic organism. Malignant cells was seen in 5% patients. M Manjusha et. al. [12] has gram positive in 2 (6.67%), Gram negative in 1 (3.33%), culture positive and smear for AFB in 3 (10%) each.

Our study shows 55% patients had serous fluid appearance.17.5% cases had haemorrhagic fluid appearance. Very low i. e.7.5% patients had purulent fluid appearance. Gross appearance was serous in 15 patients (50 %) serofibrinous in 6 patients (20%), haemorrhagic in 6 patients (20%) and purulent in 3 patients (10%). It was predominantly serous and serofibrinous in tuberculosis; purulent in pyogenic, haemorrhagic in malignancy and chronic renal failure in a study done by M Manjusha et. al. [12].

Tuberculosis is the most common cause 37.5% of pericardial effusion followed by uraemia 20%.12.5% cases had collagen vascular disease as the cause of effusion. Malignancy, HIV, and Hypothyroidism (5%) each form the least common cause. Ravikaladhar Reddy et. Al [7] in their study, 60% of cases are of tuberculous etiology, 15% are due to uraemia and malignancy each, and 5% due to collagen vascular disease.

5. Conclusion

In present study, tuberculosis is one of the common causes of pericardial effusion with positive CBNAAT. This study may help in finding out common aetiology. Pericardial effusion cases are remain underreported in India, that is why more detailed epidemiological studies required to improve understanding of pericardial effusion.

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