

Electro-Cardiographic Changes in Patients with Pericardial Disease

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A total number of 50 patients having pericardial disease were included in this study. Out of these 50 patients, 27 (54%) had simple pericardial effusion, 11 (22%) had cardiac tamponade, 9 (18%) had constrictive pericarditis and 3 (6%) had effusion with pericardial thickening. Aetiologically 33 (66%) patients turned out to be suffering from tuberculous pericarditis. Out of the rest 17 (34%) patients, 8 (16%) had pyogenic pericarditis, 3 (6%) Dressler's syndrome and 3 (6%) uraemic pericarditis, whereas 1 (2%) was attributed each to SLE, neoplasm and rheumatic heart disease. No ECG change could be considered diagnostic of any type of pericardial syndrome. However, QRS alternans, ST-T changes and low voltage were the main patterns observed, with QRS alternans characteristically being present in cardiac tamponade and ST-T changes more frequently in simple pericardial effusion and chronic constrictive pericarditis.

Normal ECG was present in 50% (15) and 11.1% (1) of the patients in pericardial effusion and constrictive pericarditis respectively. In conclusion, ECG alone is not recommended for diagnosis of pericardial disease.

Key Words: Pericardial disease, Pericarditis, Pericardial effusion, ECG in Pericardial disease

Pericardial disease is a relatively infrequent cause of hospital admission with an overall reported incidence of less than 1%. Clinically, Pericardial Disease may be classified according to the duration of the illness. It may be either due to acute pericarditis (duration < 6 weeks), subacute pericarditis (duration 6 weeks to 6 months) or chronic pericarditis (duration > 6 months) (Eugene Braunwald; 1994). These varieties can present with clinical/haemodynamic syndromes including

- Simple Pericardial Effusion.
- Cardiac Tamponade.
- Chronic Constrictive Type.
- Effusive Constrictive Variety.

Echocardiography is the most effective diagnostic technique available. Other non-invasive diagnostic clues include changes on chest x-ray and sequential ECG changes in the form of ST-T changes, voltage disturbances and QRS alternans, depending upon the type of underlying syndrome.

This study was carried out by analyzing the ECG changes in all patients with pericardial disease.

Materials and Methods

The study was carried out in a Medical Unit with an attached Coronary care unit (C.C.U) and Echo facility. All patients with a diagnosis of Pericarditis and pericardial Effusion between March 1992 and 1996 were included in the study. Patients with pericarditis secondary to transmural myocardial infarction were excluded, however patients with Dressler's Syndrome were included. All patients referred to echo room with a demonstrable Pericardial effusion from all over the hospital including the Paediatrics Ward were enrolled in the study by filling in a standard performa for every patient. The following data were included

- Clinical presentation including brief history, presenting symptoms & signs.

- ECG
- Chest x-ray (CXR)
- Echocardiography (ECHO)
- Pericardial fluid exam
- Routine Lab Tests including ESR/Montoux's Test / Total leucocyte count (TLC)

Aims and Objectives

To see proportion of various aetiologies. Identification of ECG changes in pericardial disease.

Results

A total of 50 cases of pericardial disease were included in the study. Tuberculous pericarditis was the leading cause among these patients which was present in 66% of the patients. Other causes included purulent pericarditis, uraemic, Dressler's and systemic lupus erythematosus (SLE) (Table 1).

Table 1. Causes of pericardial involvement (n=50)

Aetiology	No.	%Age
Tuberculosis	33	66
Pyogenic	8	16
Dressler's syndrome	3	6
Uraemic	3	6
Systemic lupus erythematosus	1	2
Neoplasia	1	2
Rheumatic heart disease	1	2
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The Echo / Clinical diagnosis was simple pericardial effusion in the majority. Cardiac tamponade was seen in 11 cases, constrictive pericarditis in 9 cases and marked pericardial thickening with effusion in 3 cases (Table 2).

The E.C.G. changes: (Table 3). In those with pericardial effusion (n=30) E.C.G. was normal in 15 cases ST-T changes and low voltage E.C.G. were seen in 9 (30%) and 6 (20%) cases respectively.

In patients having cardiac tamponade, before tap QRS alternans was present in 6 out of 11 patients (54.55%), low voltage ECG changes in 3 out of 11 patients (27.27%) and ST-T changes in 2 out of 11 patients (18.18%). Whereas, after tap out of 11 patients, 2 (18.18%) had QRS alternans, 1 (9.09%) had low voltage ECG and 1(9.09%) had ST-T changes. Seven (63.64%) had normal ECG after fluid tap. In patients having chronic constrictive pericarditis,

3(33.33%) patients had low voltage ECG. 5(55.56%) had ST-T changes and 1(11.11%) patient had normal ECG.

Table. 2 Echo diagnosis (n=50)

Diagnosis	No	%Age
Simple pericardial effusion	27	54
Cardiac tamponade	11	22
Constrictive variety	9	18
Pericardial thickening/ effusion	3	6

Table 3. E.C.G. changes in different pericardial syndromes

ECG Changes	Cardiac tamponade N=11				Simple pericardial effusion N=30		Chronic constrictive pericarditis N=9	
	Pre-tap		Post-tap		No	%	No	%
	No	%	No	%				
QRS Alternans	6	54.55	2	18.18	-	-	-	-
Low voltage	3	27.27	1	9.09	6	20	3	33.33
ST-T Changes	2	18.18	1	9.09	9	30	5	55.56
Normal	-	-	7	63.64	15	50	1	11.11

Discussion

E.C.G. evolves through 4 stages in the course of Pericarditis:

- Stage 1 (concave upwards ST elevation) 1st week.
- Stage 2 (ST returns to baseline and flat T wave).
- Stage 3 (T inverted).
- Stage 4 (T wave normal) weeks to months.

In Pericardial Effusion, E.C.G. may show reduction of QRS voltage and flat T waves. Electrical alternans suggests massive effusion and possibly tamponade (Unverferth et al, 1979). Electrical alternans is considered by some as a specific indicator of tamponade and reflects pendular motion of the heart within pericardial space (Usher L. Pop, 1972). Alternans usually occur in the QRS complex but P wave alternans may also be seen. The E.C.G. changes usually disappear when effusion is aspirated. It may, however be said that none of the E.C.G. changes is diagnostic of tamponade. However, the presence of QRS alternans makes tamponade more likely. In constrictive pericarditis, E.C.G. may show low QRS voltage, T wave flattening or inversion and left atrial abnormalities suggestive of P mitrale. In 5% there may be right axis deviation and right ventricular hypertrophy (Fakudda et al, 1989).

In this study it is shown that a normal E.C.G. is seen in majority of cases of simple pericardial effusion but ST-

T changes and low voltage are also seen in a considerable proportion of patients. In cardiac tamponade QRS alternans is the dominant E.C.G. abnormality while in constrictive pericarditis ST-T changes are seen with an almost equal frequency.

Conclusion

In conclusion it may be said that QRS alternans is most likely associated with large pericardial effusion under pressure (Cardiac Tamponade). Pericardial effusion and constrictive variety may show normal E.C.G, S.T.T. changes or low voltage. No change can be considered diagnostic of pericardial effusion.

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