

Prognosis of Intracranial Lesions and ECG Abnormalities

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ABSTRACT

Background: Abnormalities in the electrocardiogram are very helpful in diagnosing of heart conditions, but they are also observed in extra-cardiac conditions. The present study was conducted with the aim to determine prognosis of intracranial lesions with ECG abnormalities. **Methods:** Patients presenting with signs and symptoms like vomiting, headache, impaired sensorium, tachycardia or papilloedema and cerebrospinal fluid pressure of more than 15mm were included in the study. It was studied for heart rate, P wave, PR interval, T wave, Q wave, ST segment abnormalities etc. The prognosis of all the patients with raised intracranial pressure was noted with respect to ECG changes. All the data thus obtained was arranged in a tabulated form and analyzed using SPSS software. Probability value of more than 0.05 was regarded as non significant. **Results:** The age of the patients ranged from 12-72 years, with the mean age of 42.82+/-15.28 years. The patient with minimum age was 12 years male. There were 20 patients (40%) who underwent discharge. 30% patients were referred from the department. **Conclusion:** ECG changes in patients with intracranial lesions were associated with higher mortality. 31.9% cases of CVA, 10% cases of TIH and 16.6% cases of meningitis expired during the study.

Keywords: Mortality, Ventricular, Meningitis.

INTRODUCTION

Abnormalities in the electrocardiogram are very helpful in diagnosing heart conditions, but they are also observed in extra-cardiac conditions. The electrocardiographic changes observed in neurologic diseases are amongst the most characteristics variations from normal. The first notice of ECG changes, that had a upright T waves and elongated QT intervals in a subject with subarachnoid bleeding, was in 1947.^[1] The technique by which cerebrovascular diseases lead to ECG alterations are unsettled. It has been provided that alterations in the activity of autonomic nervous system could be primarily accountable for these ischemic, repolarization and arrhythmic changes.^[2] Continued sympathetic stimulus results in structural changes in the myocardium, that may be due to a sudden elevation in intracranial pressure,^[3] hypothalamic and cardiac nerve stimulation or through arrhythmogenic center in the insular cortical area.^[4,5] Furthermore, direct injury to the cardiac innervations or imbalance between the left and right sympathetic flows to the heart due to underlying atherosclerotic or hypertensive disease, or asymptomatic primary

heart disorder are amongst the suggested etiologies.^[6,7] The present study was conducted with the aim to determine prognosis of intracranial lesions with ECG abnormalities.

MATERIALS AND METHODS

The present study was performed in a prospective manner that enrolled 50 patients that presented with raised intracranial pressure due to different etiologies and were admitted to Rajindra hospital, who either visited the OPD of medicine/ neurology department. Ethical committee clearance was obtained from the institutional ethical board and all the subjects were informed about the study with a written consent obtained from them in their vernacular language. Diagnosis of the patients was obtained by a correlation between clinical and radiological features. Patients presenting with signs and symptoms like vomiting, headache, impaired sensorium, tachycardia or papilloedema and cerebrospinal fluid pressure of more than 15 mm were included in the study. Any patient with evidence of valvular, pericardial, congenital heart disease or thyroid disease were excluded from the study. A detailed clinical examination of all the patients were carried out. A standard 12 lead ECG that consisted of three bipolar limb, three unipolar limb and 6 unipolar chest leads were taken. The ECG was first noted within 24 hours of initial hospitalization and then taken on alternate days of

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first week and after that weekly till discharge. It was studied for heart rate, P wave, PR interval, T wave, Q wave, ST segment abnormalities etc. The prognosis of all the patients with raised intracranial pressure was noted with respect to ECG changes. All the data thus obtained was arranged in a tabulated form and analyzed using SPSS software. Probability value of more than 0.05 was regarded as non-significant.

RESULTS

The age of the patients ranged from 12-72 years, with the mean age of 42.82±15.28 years. The patient with minimum age was 12 years male. Maximum patients were between age range of 51-60 years followed by those between 31-40 years. There were 21 cases of cerebrovascular accidents, 6 cases of meningitis, 11 cases of ICSOL, 2 cases of hydrocephalous and 10 cases of TIH.

[Table 1] shows the Incidence of left ventricular hypertrophy in cases. There were 20% (n=10) cases with left ventricular hypertrophy. Amongst rest cases, 80% (n=40) Left ventricular hypertrophy was not observed.

[Table 2] shows the course during the study. There were 20 patients (40%) who underwent discharge. 30% patients were referred from the department. There were 12% patients who were absconded. Around 18% (n=9) patients expired at the end of study.

Table 1: Incidence of left ventricular hypertrophy in cases

LVH	Cases	percentage
Present	10	20
Absent	40	80

Table 2: Course during the study.

Course	Frequency	Percentage
Discharge	20	40
Referred	15	30
Absconded	6	12
Expired	9	18

DISCUSSION

The etiologies for the ECG abnormalities have been controversial and always speculated. Imbalanced levels of electrolyte, especially hypokalemia has been regarded as a possible physiologic method. However there has been no consistent electrolyte pattern that was noted.^[8] ST segment and T wave alterations could be observed amongst experimental animals by stimulation or destruction of certain parts of the central nervous system.^[9-12] Stimulation of ventral hippocampus and amygdala in the cats lead to ST-T wave alterations while portion of the cervical cord prevented these alterations.^[10] In the present study, The age of the patients ranged from 12-72 years, with the mean age of 42.82±15.28 years. The patient with minimum age was 12 years male. Maximum patients were

between age range of 51-60 years followed by those between 31-40 years. There were 21 cases of cerebrovascular accidents, 6 cases of meningitis, 11 cases of ICSOL, 2 cases of hydrocephalous and 10 cases of TIH. There were 20% (n=10) cases with left ventricular hypertrophy. Amongst rest cases, 80% (n=40) Left ventricular hypertrophy was not observed. There were 20 patients (40%) who underwent discharge. 30% patients were referred from the department. There were 12% patients who were absconded. Around 18% (n=9) patients expired at the end of study. Yanowitz et al,^[9] showed in dogs that direct stimulation of cervical sympathetic nerves reduces the ventricular refractory time and ablation of these nerves increases the refractory period. Further these involvements were related with ST-T wave alterations. Another group of researchers have illustrated morphologic alterations in the myocardium that they believe could be the possible explanations the ECG abnormalities. Subendocardial petechial bleeding have been found in patients of subarachnoid bleeding and in experimental animals produced hypertension by stimulation of stellate cells.^[13,14] Anatomic aberrations in the myocardium have been formed by the intracranial injection of blood amongst mice and by experimentally produced intracranial bleeding.^[15,16] Greenhoot and Reichenback,^[17] found acute and chronic pathological alterations in the hearts of 20 subjects dying of subarachnoid bleeding. Similar cardiac pathologies were seen by Connor,^[18] who studied 231 hearts of subjects dying with intracranial lesions. 8% had focal myocytolysis, which is a form of myocardial damage.

CONCLUSION

ECG changes in patients with intracranial lesions are associated with higher mortality. In our study, 31.9% cases of CVA, 10% cases of TIH and 16.6% cases of meningitis expired during the study. ST segment depression, T wave abnormalities and left ventricular hypertrophy were significantly associated with high mortality.

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