Association between ECG Abnormalities and Severity of Intracranial Lesions - Hospital based Study

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ABSTRACT

Introduction: Severe strokes, particularly subarachnoid blood loss is frequently seen with a variety of electrocardiographic alterations. Also, various primary cardiac conditions, like myxoma, endocarditis, mural thrombus and atrial septal defect along with deep vein thrombosis, could also lead to cerebral emboli; heart block, arrhythmias and decrease in cardiac return, that may lead to cerebral ischemia. The present study was conducted with the aim to determine association between ECG abnormalities and intracranial lesions.

Materials and methods: The present prospective study included 50 subjects with raised intracranial pressure of various intracranial lesions admitted to the Rajindra hospital and visiting OPD of medicine/ neurology department. A standard 12 lead ECG consisting of three bipolar limb leads, three unipolar limb leads and 6 unipolar chest leads was taken. ECG was first recorded within 24 hours of hospitalization and then repeated on alternate days during first week and thereafter weekly till discharge. Probability value of more than 0.05 was regarded as non significant.

Results: There were only 1 case of p wave variation amongst 21 patients of CVA. There was no case of P wave variation amongst patients of meningitis, ICSOL, TIH and hydrocephalous. There were 20% (n=10) cases with ST segment abnormality and rest 80% (n=40) did not demonstrate any ST segment abnormality. There were 3 cases of CVA out of 21 that had abnormal T wave. 1 out of 6 cases of meningitis had abnormal T wave

Conclusion: In our study, p wave, q wave showed no significant difference in intracerebral lesions. There were only 20% cases with ST segment abnormality.

Keywords: Abnormality, Hydrocephalous, Intracerebral, Lesions

INTRODUCTION

Every passing year, more than half of the majority people globally suffer from severe cerebrovascular events, like ischemic stroke, intracerebral and subarachnoid blood loss, leading to a mortality rate of approximately 20%.[1] Severe strokes, particularly subarachnoid blood loss is frequently seen with a variety of electrocardiographic alterations,[2–7] some of them could be indistinguishable from that observed in connotation with episodes of severe myocardial infarction. There is a very substantial variation in how ECG alters in stroke subjects are given in the literature.[2–7] This electrocardiographic pattern seems to be associated to the form of cerebrovascular condition and its localization. Additionally, subjects frequently have concurrent hypertension or coronary artery disease, that could lead to ECG alterations. Also, various primary cardiac conditions, like myxoma, endocarditis, mural thrombus and atrial septal defect along with deep vein thrombosis, could also lead to cerebral emboli; heart block, arrhythmias and decrease in cardiac return, that may lead to cerebral ischemia. The present study was conducted with the aim to determine association between ECG abnormalities and intracranial lesions.

MATERIAL AND METHODS

The present prospective study included 50 subjects with raised intracranial pressure of various intracranial lesions admitted to the Rajindra hospital and visiting OPD of medicine/ neurology department. The study was approved by the institutional ethical board and all the subjects were informed about the study and a written consent was obtained from them in their vernacular language. Patients were diagnosed by the presence of signs and symptoms or CT scan or increased intracranial pressure. Any patient with evidence of ischemia or myocardial disease was excluded from the study. A detailed clinical history, local or physical examination of all the subjects was carried out. A standard 12 lead ECG consisting of three bipolar limb leads, three unipolar limb leads and 6 unipolar chest leads was taken. ECG was first recorded within 24 hours of hospitalization and then repeated on alternate days during first week and thereafter weekly till discharge. It was studied for heart rate, P wave, PR interval, T wave, Q wave, ST segment abnormalities etc. 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.

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Type of disorder	Total cases	Showing p wave amplitude	Percentage
CVA	21	1	4.76
meningitis	6	0	0
ICSOL	11	0	0
TIH	10	0	0
hydrocephalous	2	0	0
p value		>0.05	

Table-1: P wave amplitude in cases

Type of disorder	Total cases	Q wave alteration	Percentage
CVA	21	1	2
meningitis	6	0	0
ICSOL	11	0	0
TIH	10	0	0
hydrocephalous	2	0	0
p value		>0.05	

Table-2: Incidence of Q wave in different causes of raised intracranial tension

ST segment abnormalities	Cases	Percentage
Present	10	20
Absent	40	80
P value	<0.001	

Table-3: Cases showing ST segment abnormality

Type of disorder	Total cases	T wave	Percentage
CVA	21	3	14.48
meningitis	6	1	16.66
ICSOL	11	0	0
TIH	10	1	10.1
hydrocephalous	2	0	0
p value		>0.05	

Table-4: Incidence of T wave in different causes of raised intracranial tension

RESULTS

The present study enrolled 50 patients with the mean age of 42.82+/-15.28 years. Table 1 shows the p wave amplitude in cases. There were only 1 case of p wave variation amongst 21 patients of CVA. There was no case of P wave variation amongst patients of meningitis, ICSOL, TIH and hydrocephalous. On applying student t test there was no significant difference as the p value was more than 0.05.

Table 2 illustrates the incidence of Q wave in different causes of raised intracranial tension. There were only 1 case of Q wave variation amongst 21 patients of CVA. There was no case of Q wave variation amongst patients of meningitis, ICSOL, TIH and hydrocephalous. On applying student t test there was no significant difference as the p value was more than 0.05.

Table 3 shows the cases with ST segment abnormality. There were 20% (n=10) cases with ST segment abnormality and rest 80% (n=40) did not demonstrate any ST segment abnormality.

Table 4 shows the incidence of T wave changes in different causes of raised intracranial tension. There were 3 cases of CVA out of 21 that had abnormal T wave. 1 out of 6 cases of meningitis had abnormal T wave. 1 out of 10 cases of TIH also demonstrated abnormality in T wave. On applying student t test there was no significant difference as the p value was more than 0.05.

DISCUSSION

Irregularities of the electrocardiogram are very useful in the acknowledgement of heart disorders, but they could also be observed in extra-cardiac diseases. The electrocardiographic alterations that have been defined in neurologic conditions are amongst the most striking changes from normal. The first incidence of ECG alterations, that contained of upright T waves and elongated QT intervals in a patient that presented with subarachnoid bleeding, was observed in 1947.[8] However till 1953, when Levine[9] found on ECG alterations attributed to myocardial ischemia amongst a patient with subarachnoid bleeding whose heart at autopsy was came out to be normal, this was regarded as significant. Furthermore, Burch and his associates[10] showed abnormally large T waves, protuberant U waves and long QT intervals amongst patients with cerebrovascular disorders. In our study, there were only 1 case of p wave variation amongst 21 patients of CVA. There was no case of P wave variation amongst patients of meningitis, ICSOL, TIH and hydrocephalous. On applying student t test there was no significant difference as the p value was more than 0.05. There were only 1 case of Q wave variation amongst 21 patients of CVA. There was no case of Q wave variation amongst patients of meningitis, ICSOL, TIH and hydrocephalous. On applying student t test there was no significant difference as the p value was more than 0.05. There were 20% (n=10) cases with ST segment abnormality and rest 80% (n=40) did not demonstrate any ST segment abnormality. That was statistically significant. There were 3 cases of CVA out of 21 that had abnormal T wave. 1 out of 6 cases of meningitis had abnormal T wave. 1 out of 10 cases of TIH also demonstrated abnormality in T wave. On applying student t test there was no significant difference as the p value was more than 0.05. These alterations have come to be seen as the typical CNS electrocardiogram. Many researches, chiefly case reports, have been published in the literature that further describes these ECG alterations.[11-15] Cropp and Manning[16] examined the electrocardiograms amongst 29 subjects with subarachnoid bleeding. Flat or negative T waves were seen in 15, a prolonged QT interval amongst 14 and ischemic ST segment alterations amongst 11. Four subjects with these ECG changes died and had normal heart finding during autopsy. Contraindicatory to most workers, Shuster[17] found that a short Q-Tc interval and bradycardia are the typical ECG observations in subarachnoid bleeding. Fentz and Gormsenli illustrated that depression of the ST portion was the most commonly seen abnormality, observed

amongst 11 of 15 subjects with intracerebral bleeding. Kreus et al[18] have also observed a high incidence of ECG alterations in central nervous system disorders. They found that 25 out of 35 subjects (71.5%) with a subarachnoid bleeding, showed ECG changes. Miller and Abildskov 3 have noted that ECG changes are frequent amongst Subjects with any form of central nervous system disorders. Most of the patients in their studies had non-specific ST wave changes. Further, they also found a high frequency of notched T waves.

CONCLUSION

These ECG alterations are primarily due to changes in autonomic tone that may alter the functional changes of ventricular recovery time by the production of anatomic cardiac conditions. Treating physician should lay emphasis on these ECG changes and arrythmias in cases of raised intracranial tension due to various intracranial lesions. In our study, p wave, q wave showed no significant difference in intracerebral lesions. There were 20% cases with ST segment abnormality.

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