

A study of interictal cardiac autonomic functions in patients with refractory complex partial epilepsy secondary to medial temporal lobe pathology: Before and after surgery

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Background: Ictal changes in heart rate, blood pressure and other autonomic functions have been described in patients with epilepsy. Autonomic cardiovascular regulatory dysfunction has been detected in patients with epilepsy by measuring cardiovascular reflex tests.¹ The resection of the anterior amygdala and hippocampal areas influences the autonomic modulation of blood pressure and heart rate as well as the baroreflex.² There are only a few studies about the possible interictal alterations of cardiovascular autonomic regulation and the impact of temporal lobectomy in patients with refractory medial temporal lobe epilepsy.

Objectives: 1. To compare cardiac autonomic functions in patients with refractory seizures secondary to medial temporal lobe lesions, prior to epilepsy surgery and to compare them with age and sex matched controls. 2. To repeat the cardiac autonomic functions three to six months after surgery and to compare with pre operative functions. 3. Measurement of spectral analysis of heart rate variability before and after surgery

Methods: Fourteen patients diagnosed to have mesial temporal lobe pathology with refractory complex partial seizures underwent cardiac autonomic function tests: deep breathing test, valsalva maneuver, orthostatic test, isometric work and spectral analysis of heart rate variability before epilepsy surgery. The results were compared with healthy age and sex matched controls. The tests were repeated 3-6 months after surgery and were compared with the pre operative values

Results: Fourteen patients with refractory seizures were studied, out of which 4 belonged to Pediatric age group. The cardiovascular reflex tests showed significantly elevated systolic blood pressures (116.3±9.83 patient group versus 90.3±21.82 control group). In the orthostatic test, there was a less rise of systolic and diastolic blood pressures in patients (p=0.01) (orthostatic test 2 min diastolic pressure () 3.24±2.65 in patients versus 12.17±6.59 in controls; Orthostatic test 5 min systolic pressure () -1.46±5.36 in patients versus 5.5±4.09 in controls; Orthostatic test 5 min diastolic pressure () 3.56±2.83 in patients versus 9.5±4.46 in controls). In the isometric handgrip test, there was no significant difference between the patient and control group with regards to their diastolic blood pressures. The tests of parasympathetic system, the Valsalva ratio and the deep breathing difference, did not show any difference between patients and control subjects. Heart rate variability parameters revealed increased heart rates in patients 83.64±11.63 versus 71.90±10.79 in controls. The values of standard deviation of normal to normal (SDNN) (25.39±5.64 in patients versus 46.40±24.92 in controls), root mean square of standard deviation (RMSSD) (20.62±7.32 in patients versus 37.20±27.11 in controls) and HF (high frequency) powers of heart rate variability (178.49±82.77 in patients versus 232.40±27.19 in controls) were lower in patients denoting reduced parasympathetic modulation.

Thirteen patients underwent autonomic tests post surgically. There was increase in the pre release diastolic blood pressures in the isometric handgrip test following surgery. (Pre release diastolic 7.08±8.09 prior to surgery versus 15.22±3.12 after surgery). There was significant improvement in HF (high frequency) and LF (low frequency) nu (normalized unit) powers of heart rate (LF nu powers of heart rate 52.72±19.86 prior to surgery versus 39.57±11.32 after surgery; HF powers of heart rate 162.93±78.58 prior to surgery versus 263.23±76.56 after surgery).

Conclusion: Cardiovascular reflex tests showed evidence of sympathetic dysfunction in patients with refractory complex partial seizures. Heart rate variability analysis revealed both sympathetic and parasympathetic abnormalities in patients. There was a reduction of sympathetic modulation and increase in parasympathetic modulation of heart rate variability in patients after epilepsy surgery.

References

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