

TITLE: MODIFICATION OF ELECTROCONVULSIVE THERAPY INDUCED HYPERTENSION WITH NITROGLYCERIN OINTMENT

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Introduction: Significant transient hypertension and tachycardia occur during Electroconvulsive Therapy (ECT). Patients who are hypertensive may have exaggerated responses. Nitroglycerin ointment, with its venodilatory effect, may prevent excessive hypertension and increased myocardial oxygen demand during ECT. The result may be a safer anesthetic for ECT. We therefore designed this study to determine whether nitroglycerin ointment will attenuate the adverse cardiovascular response accompanying ECT during anesthesia.

Methods: This study was approved by our institutional Human Research Committee. Seven consecutive ASA Class I and II patients who underwent ECT gave their informed consent to participate in the study. Each patient received 2 sessions of Multiple-Monitored ECT (MMECT). Each session of MMECT consisted of 3-4 ECTs under anesthesia. One session was preceded by application of 2 1/2 inches of nitroglycerin ointment 45 min before beginning the ECT. The other session was done without nitropaste. Thus, each patient served as his/her own control. The treatment sequence was done in random order. All patients were premedicated with phenergan (50 mg) and glycopyrrolate (0.004 mg/kg) intramuscularly. Radial artery catheters were inserted prior to induction with methohexital (2-3 mg/kg). Succinylcholine infusion was used for muscle relaxation and muscle-twitch response was monitored with a nerve stimulator. All patients were intubated and mechanically ventilated with 100% oxygen. Radial artery blood pressure, heart rate and seizure duration (with EEG) were recorded. Following intubation and each ECT, blood pressure and heart rate were allowed to stabilize. Data were analyzed by paired t-test. The level of significance used was $p < 0.05$.

Results: A total of 54 ECTs were performed in 14 sessions, 27 with nitroglycerin ointment and 27 without. Systolic blood pressure increased 41 ± 22 mmHg in control patients. In the same patients receiving nitroglycerin ointment, systolic blood pressure increased 17 ± 16 mmHg ($p < 0.005$). When nitroglycerin ointment was used, increases in heart rate following ECT were smaller (28 ± 26 /min without vs 16 ± 15 /min with) ($p < 0.01$). Rate-pressure product change (post ECT-pre ECT) was significantly less following nitroglycerin ointment (9330 ± 6318 without vs 4094 ± 3276 with) ($p < 0.005$).

Figure 1 shows that increases in systolic blood pressure for each ECT were significantly smaller when nitroglycerin ointment was used ($p < 0.05$ for each ECT). There were no significant differences in heart rate changes in 3 out of 4 ECTs. Heart rate increases were significantly higher in the untreated group during the 4th ECT. Comparison of PAR recovery scores showed no significant difference existed between the control patients and the patients receiving nitroglycerine ointment. Followup visits performed at 24 hours post-ECT by the author (J.L.) revealed no complaints of headache or other untoward side effects.

Discussion: Many types of antihypertensive agents and barbiturates have been used to modify the cardiovascular response to ECT. Results to date have been unsatisfactory due to prolonged and severe hypotension and prevention of the seizure itself. Our results suggest that use of nitroglycerin ointment as a premedication (2 1/2 inches, 45 minutes before the beginning of the ECT) significantly attenuates hypertension and tachycardia resulting from ECT with no adverse effects. We conclude that reduction in blood pressure and heart rate increases during ECT can be prevented effectively by application of nitroglycerin ointment. This may be especially beneficial for patients who are at risk of myocardial ischemia and stroke.

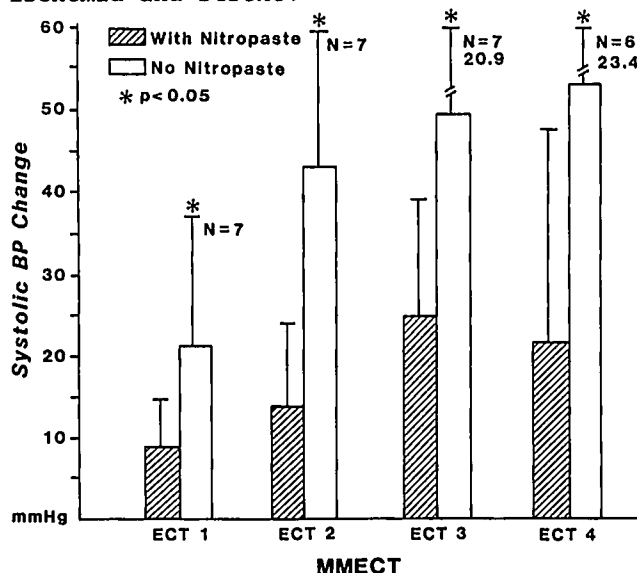


Fig 1. Systolic blood pressure change after each ECT (post ECT - pre ECT)