INTRAOCULAR TENSION VARIATIONS WITH ELECTROCONVULSIVE THERAPY

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ABSTRACT

Intraocular tension variations following modified and direct ECT were studied in 40 psychiatric patients. A significant rise of intraocular pressure occurred under both conditions, but was more marked and longer lasting when succinylcholine was used.

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KEY WORDS : Intraocular tension; Electroconvulsive therapy

Introduction

Despite a steady erosion of its popularity in the West, electroconvulsive therapy (ECT) remains an effective therapeutic modality [1]. Though ECT has been in use for the past five decades, medical observations of patients undergoing ECT are surprisingly scarce. Rarely are systematic studies found and even statements on such simple observations as pulse rate and blood pressure are contradictory [2]. Moreover, only a few workers have studied the effects of ECT on intraocular tension (IOT) [3-5]. Due to paucity of work in this field we undertook a study to record the variations in IOT following modified and direct ECT.

Material and Methods

Forty consecutive male inpatients undergoing ECT for their psychiatric disorders were included in the study with appropriate consent. None of the patients was suffering from glaucoma, ischaemic heart disease, hypertension, diabetes mellitus or any other physical disease. They were examined prior to ECT and underwent routine hematological and biochemical investigations, X-ray skull and funduscopy. Pre-anaesthetic check-up was carried out by the anaesthesiologist.

All the patients were given ECT in overnight fasting condition between 8 a.m. and 10 a.m. ECT was preceded either with injection atropine 1.2 mg IV stat, injection thiopentone sodium 5 mg/kg body weight IV and injection succinylcholine chloride 1 mg/kg body weight IV (modified ECT) or without any medications (direct ECT) on alternate turns till the patient had three treatments under each method. Stimulus was administered through bitemporal electrodes. All patients were oxygenated during the procedure with a face mask. The IOT were recorded by Schiotz tonometer. The tension was noted before ECT, after thiopentone (if used), after succinylcholine (if used), immediately after the cessation of convulsions and at intervals of 1 minute thereafter for 3 minutes.

In every case, the averages of the IOT values on the three visits were calculated for all the readings. Statistical analysis was carried out using the paired 't' test of significance.

Results

All subjects of the study were male. Their ages ranged between 17 to 54 years. Maximum number of patients (n=19) were in the age group of 21-30 years. The mean age of the patients was 28.3 years. The commonest diagnosis was schizophrenia (67.5%) followed

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by depressive phase of manic-depressive psychosis (10.0%) and other non-organic psychoses (12.5%). Patients were on appropriate psychotropic medications (antipsychotics 33; antidepressants 11; anxiolytics 7) which were continued during the course of ECT but in reduced dosages.

IOT readings before and after modified and direct ECT are given in Table 1. There was a significant rise of IOT following the administration of succinylcholine. Direct ECT produced a transient rise of IOT immediately following the convulsion. On the other hand after modified ECT the IOT remained significantly raised for more than two minutes after the cessation of convulsions. The highest IOT levels were 41.4 mm of Hg after modified ECT and 24.6 mm of Hg after direct ECT.

Discussion

The normal IOT varies between 10.5 to 20.5 mm of Hg and pressures above 24 mm of Hg are definitely abnormal. Between the ages of 10 and 70 years there is no significant change in mean IOT and no difference between the sexes is found. Variations in IOT can occur due to diurnal fluctuations, respiration, state of hydration of body and endocrine disturbances. These are usually of small magnitude of 2 to 5 mm of Hg. Variations in the volume of blood in the eye can alter the IOT. Acute changes in systemic and carotid blood pressure are reflected in the IOT. Physical exercise can cause a transient rise and fall in the IOT. External pressure, traction of muscles on the globe, forceful lid closure and the valsalva manoeuvre may result in rapid and

TABLE 1
Intraocular tension variations after modified and direct ECT

Readings	Intraocular tension (mm of Hg)		Significance of difference between	
	Modified ECT (n=40)	Direct ECT (n=40)	readings after modified and direct ECT	
	Mean (SD)	Mean (SD)	t	p
I. Baseline	14.77 (2.99)	14.48 (3.37)	0.40	> 0.05
II. After thiopentone sodium	13.52 (2.57)	-	-	-
III. After succinylcholine chloride	17.84 (3.12)	-	-	-
IV. Immediately after convulsions	22.17 (6.25)	17.27 (3.09)	4.38	< 0.01
V. One minute after convulsions	18.88 (4.97)	15.29 (2.49)	4.08	< 0.01
VI. Two minutes after convulsions	17.14 (4.17)	13.79 (3.51)	3.86	< 0.01
VII. Three minutes after convulsions	14.39 (3.02)	12.96 (3.49)	1.94	> 0.05
Significance of difference Between readings	Modified ECT		Direct ECT	
	t	p	t	p
I and II	1.98	> 0.05	—	—
I and III	4.45	< 0.01	—	—
I and IV	6.67	< 0.01	3.81	< 0.01
I and V	7.96	< 0.01	1.21	> 0.05
I and VI	2.89	< 0.05	0.89	> 0.05
I and VII	0.56	> 0.05	1.95	> 0.05

large changes in IOT. Direct electrical stimulation of the central nervous system by electrodes results in alterations in IOT depending on the area stimulated. Stimulation of the medulla produces a rise in IOT. Stimulation of cerebral cortex and diencephalon produces a rise or fall in IOT depending on the area which is stimulated. However, it is obvious from the complicated systemic effects of ECT that the alterations in the IOT cannot be attributed to stimulation of any particular nervous structure. Drugs which are given in ECT also alter IOT. While atropine has no effect, thiopentone reduces the IOT while succinylcholine produced a rise in IOT [4,6].

IOT variations following ECT have not attracted much attention and there are only a few reports on the subject [3-5]. In rabbits ECT produces a fall in IOT while the usual response in man is a rise in IOT [4]. On the other hand, Kalinowsky [3] mentioned that the IOT decreased after ECT and that the procedure could therefore be safely carried out in patients with glaucoma. Contrary results were reported by Shukla *et al* [5] who studied the IOT variations following ECT with and without succinylcholine. They found that the rise was much more pronounced and significantly longer lasting when succinylcholine was used. We failed to find any study which compared the IOT variation following direct and modified ECT.

In the present study, direct ECT caused only a transient increase in IOT immediately following the convulsion. This finding is contrary to Kalinowsky [3] but is in agreement with few other studies [4,5]. On the other hand in modified ECT even before the convulsion, succinylcholine itself elevated the IOT which is a known effect of the drug [7,8]

and is in agreement with the findings of Shukla *et al* [5]. The present study showed that as compared to direct ECT the rise of IOT after modified ECT was much more pronounced and significantly longer lasting due to the effect of succinylcholine.

Since none of our patients had glaucoma or elevated baseline IOT, the response in patients with glaucoma could not be commented upon. However, the maximum IOT levels in modified ECT could be harmful. Therefore, in agreement with the earlier study [5], our findings suggest the need for caution in giving ECT to patients with glaucoma, particularly under succinylcholine. Moreover, in elderly patients the IOT must be routinely measured before starting ECT.

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