REEVALUATION OF ECT
(Tilak Venkoba Rao Oration 1985)
Ravi Abhyankar

Electroconvulsive therapy has become controversial in recent times and its use is becoming restricted especially in western countries. Post ECT memory deficiency is one of the important scientific reasons for the non-acceptance of ECT. However political, emotional, medicolegal factors and mass media have played a more important role in the decline of ECT than the scientific evidence. But in India and other developing countries ECT is a common therapeutic modality. Moreover, it is used not only to treat depression, which is regarded as the primary indication in the western world, but also to treat schizophrenia and mania.

The diminished use of ECT may have been because of poor scientific quality of ECT studies. As late as 1980, Salzman observed that there have been no completely acceptable prospective studies on the use of ECT in schizophrenia, even though ECT had been in use for 40 years. Thus a project was undertaken at the WHO Collaborating Centre for Psycho-pharmacology, Department of Psychiatry, K.E.M. Hospital, Bombay under the guidance of Prof. V. N. Bagadia to study various aspects of ECT in schizophrenia and in depression, with emphasis on cognitive function evaluation, following contemporary standard of clinical research i.e. prospective design, specific diagnostic criteria, use of control groups, random assignment, blind rater and objective outcome measures to resolve the dissonance in the attitude towards ECT.

Manfred Sakel introduced Insulin therapy for schizophrenia in 1933, Von Meduna used leptazol and campher in oil to produce convulsions in 1935, Moniz and Lima developed frontal leucotomy in 1936 and in 1938 Cerletti and Bini used electrical current to induce convulsions. Like Washington and his axe these treatments were used freely and tried in almost all the psychiatric conditions. These treatments appealed to people because they were biological interventions as in other branches of medicine and surgery. The memories of dramatic results produced by Fever therapy developed by Wagner-Jouregg were still present and it was tempting to try other biological treatments. Wagner-Jouregg and Moniz are the only two people related to the field of Psychiatry who have received the Nobel Prize for medicine and physiology.

Out of all the biological treatments developed in the 30s, Insulin therapy, Leptazol induced convulsions and frontal leucotomy as practiced by Moniz are more or less obsolete and are hardly used today. Only Electroconvulsive therapy has survived to date but its status is again controversial. The decline started in 60s, after psychopharmacologic agents were developed, tested and found effective and were firmly established.

Delay and Denikar developed chlorpromazine in 1951 and Kuntz developed imipramine in 1953 which still remain two of
the most frequently used drugs in psychiatry. Though all these psychotropic drugs are firmly in saddle today and are largely responsible for displacing the biological treatments; growing awareness of the limitations and risks of long term neuroleptic and antidepressant drug treatment has stimulated interest in the Electroconvulsive therapy.

**Stimulus Waveform**

The most commonly used waveform to induce convulsion is sine wave stimulus (Figure 1). It is an oscillating pattern of sinusoidal wave with a frequency of 50 Hertz i.e. it alternates its polarity 50 times in a second. As it is the same type of waveform used in domestic electricity, not only was it first to be used but also remains most popular today. Its adjustable parameters are voltage or current and the duration of current. Generally about 110 volts stimulus needs to be applied for about 0.5 second to induce a convulsion.

![Wave Forms](image)

Fig. 1: Wave Forms

There are some modifications of sine-wave stimulus. In monophasic alternating stimulus, also known as pulsating direct stimulus, which was developed by Delmucs and Marsalet, the current is released only partially, blocking out half phase in every cycle, so that current does not alternate its positive and negative poles. It did not have any significant advantages over the biphasic alternating sinewave stimulus and is hardly used today. In ectonus or glissando stimulus, voltage of a typical sinewave stimulus is gradually increased to induce the convolution and is brought down gradually. Again small amount of current is applied during the clonic phase to minimise the violent muscular movements. The ectonus or glissando stimulus avoids the sudden jerk and loud cry, a characteristic feature of ECT administered without anesthesia and which is frightening to the lay observer. It also reduced compression fractures of spine because of smooth induction of the tonic phase. But it required the current to be administered for a longer period, which may produce more impairment of memory. However, now that ECT is administered under general anesthesia with muscle relaxants, use of glissando current is not necessary. Friedman and Wilcox had used unidirectional direct current to induce ECT but it was not found suitable.

Liberson (1948) was first to use the low energy brief pulse stimulus in early forties to produce a seizure with a smaller amount of electrical energy and thereby less adverse cognitive side effects. The pulse stimulus can be adjusted for voltage or current, duration, pulse width and pulses per second. The energy per phase is considerably lower with the pulse stimulus and a large stimulus duration is necessary in order to provide the extent of neuronal depolarization necessary to initiate the seizure. Typically a pulse stimulus of 800 ma, with a pulse width of 0.75 millisecond and 50
Pulses per second may need to be applied for 1.5 seconds to induce a convulsion. Shortening of pulse width helps more efficient seizure induction, but ultrabrief pulses (less than 0.5 millisecond duration) may cause incomplete and ineffective seizures (Cronholm and Ottosson, 1963).

Various studies have demonstrated that there is no significant difference in the efficacy of sine wave and pulse stimulus (Weaver et al 1977, Welch et al 1983). However, there is a small group of patients which is resistant to a combination of pulse stimulus and unilateral electrode placement, but which responds well to bilateral sinewave stimulus (Lambourn and Gill 1978, Price 1981). As regards the adverse effects of pulse stimulus, Liberson (1984) observed that patients woke up earlier and there was less confusion and amnesia. Valentine et al (1968) found less amnesia after a pulse stimulus in the immediate post ictal period, but did not study long term effects. Goldstein et al (1977) found no difference in the pulse ECT and sinewave ECT 24 hours after a course. Similar findings were noted by Weiner et al (1982) 48 hours after last ECT. On EEG, the less intense seizure produced by the pulse stimulus is associated with less slowing 2 days after a course of ECT.

Spanis and Squire (1981) studied the effects of pulse and sinewave stimulus in mice. They observed that when equated for ability to produce a seizure, low energy brief pulse stimulus causes as much amnesia as a sinewave stimulus. Thus it appears that no clear cut differences in the efficacy and adverse effects of sinewave and pulse stimulus have been established.

**Electrode Placement**

The most common placement of bilateral electrodes is in bitemporal position. In bilateral bifrontal application, the electrodes are placed more anteriorly in the frontal region, but this placement is not used by and large because it causes more confusion and memory impairment.

Unilateral ECT was first used by Thénon in 1956 and by Lancaster in 1958 with the aim of reducing area of electrical impact. It was also based on the observation that focal fits with or without unilateral application lead to less confusion. They preferred nondominant hemisphere assuming that brain damage would be less. Another reason for using unilateral application was an unsubstantiated fear of eye damage with the bilateral application. Two methods of unilateral electrode placement are commonly used (Figure 2). In Muller's method reference electrode is placed above the mid point of a line between lateral angle of orbit and the external auditory meatus. The secondary electrode is placed on the middle of forehead. In d'Elia's method, reference electrode is placed about 9 cms above and behind in parietal area lateral to the vortex. D'Elia's method requires only 1/4 electrical energy than Mullar's.
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method to induce a convulsion and produces less confusion and memory difficulties (D'Elia 1970, d'Elia and Wideplam 1974 and Erman et al 1979). Incomplete seizures occur more commonly with unilateral than bilateral stimulation, probably because of failure to recruit diencephalic centres, which cannot be reliably identified when general anaesthesia and muscle relaxants are used. Presence of such ineffective seizures may be responsible for the general feeling that unilateral stimulation is less effective. It is necessary to monitor seizure either by means of an EEG monitor or by occluding circulation in the ipsilateral limb to observe generalized tonic and clonic convulsion. (Halliday et al, 1968).

In multiple monitored electroconvulsive therapy (MM ECT), from 3 to 8 seizures are induced at the interval of few minutes on a single day. The rationale is to reduce the risk of giving general anaesthesia repeatedly and finish all the seizures under a single general anaesthesia. Patient is hyperoxygenated inbetween the seizures with the help of artificial ventilation. This technique differs from regressive ECT. In regressive ECT seizures are induced repeatedly to produce confusion and dysorientation, while in multiple monitored ECT the aim is to avoid confusion and dysorientation. The vital signs as well as ECG and EEG are continuously monitored to ascertain patients general condition, cardiac functions and to confirm the occurrence of a seizure. The confusion and memory impairment which result from a session of multiple monitored ECT are supposed to be comparable to that observed after a single ECT. However some authors have also reported acute organic brain syndrome, and confusional states after such multiple monitored ECT. Kalinowsky (1981) concluded that in conventional ECT even without oxygenation, prolonged seizure and neurological dysfunction is very rare. The frequency of such side effects with multiple monitored ECT is striking in view of its limited use and that the technique may not be safe. Fink (1979a) also observed that there is no advantage of multiple monitored ECT over conventional ECT.

Role of ECT in Depression

Depressed patients were divided into two groups. Group A received bilateral ECT and placebo. Group B received simulated ECT and imipramine. Highly significant improvement was observed in both the groups. Patients in group A, who received ECT and placebo had significantly more improvement than patients in group B, who received simulated ECT and imipramine, both after 7 and 20 days of treatment. (Bagadia et al 1982, 1983d).

The results obtained in our study confirmed earlier observations of Avery and Lubrano (1979), Greenblatt (1977), Klicpera et al (1979) and also our own observations (Bagadia and Shah 1962, Bagadia et al 1979) that ECT produces superior improvement in depression compared with the use of antidepressant drugs. Gangadhar et al (1982) commented that ECT produced quicker improvement in depression. Davidson et al (1978) demonstrated that even in refractory depressions, ECT was superior to the antidepressant drugs. Avery and Winokur (1978) commented that relapse rate in depression associated with attempted suicide decreased more after ECT treatment than after treatment with antidepressant drugs. Price et al (1978) studied dose response ratio in ECT. They observed that progressive improvement was observed on an average upto five ECT and the dose response ratio was more favourable for earlier treatments. Johnstone (1980) commented...
that ECT produces only as much improvement as antidepressant drugs at the end of three months, but he has overlooked earlier onset of improvement produced by ECT. Thus ECT is superior to antidepressant drugs in the treatment of depression both in terms of speed and degree of recovery.

Role of ECT in Schizophrenia

We observed highly significant and similar improvement in both the groups, group A which received ECT and placebo and group B which received simulated ECT and chlorpromazine and there was no statistically significant difference between them. (Bagadia et al 1983a, c).

The improvement as judged by Clinical Global Impression was also similar. In the group A, one patient suffering from chronic undifferentiated schizophrenia did not improve with ECT and placebo but subsequently and after the study period, improved with chlorpromazine. In the group B, two patients, both withdrawn catatonic schizophrenics did not improve with simulated ECT and chlorpromazine but later improved with ECT.

Thus according to our results, both ECT and chlorpromazine produce a similar degree of improvement in schizophrenia. While evaluating five treatment modalities for schizophrenia, May (1976) observed that drugs with or without psychotherapy were superior to ECT. But even in his study more than 75 per cent of the patients given ECT did respond to it. On the other hand Langsley et al (1959), King (1960) and Childers (1964) observed that there was equal improvement in both ECT and drug groups. However, our earlier open study (Bagadia et al 1970) had shown that greater and faster improvement is achieved with ECT than with neuroleptics when psychiatric evaluation was done by clinical global assessment. The claims regarding duration of hospital stay are also controversial, although Childers (1964) observed that drug treated patients have a shorter stay in the hospital, Shader (1976) remarked that ECT treated patients have a shorter hospitalisation. Janakiramaiah et al (1982) observed that concurrent use of ECT with chlorpromazine compensates for the lower doses of drugs and helps rapid resolution of schizophrenia.

It would appear that both ECT and neuroleptic drugs such as chlorpromazine produce a similar degree of improvement in schizophrenia. However, there are few patients in either group who are resistant to one but respond to the other therapeutic modality (Greenblatt 1977).

Bilateral vs Unilateral Nondominant ECT

There was no difference in the improvement observed with bilateral ECT and unilateral nondominant ECT in schizophrenia in our study (Bagadia et al 1983b). However, the improvement was highly significant in both the groups. American Psychiatric Association Task Force report on ECT (1978) and other workers (e.g. Fraser and Glass 1980) have also concluded that unilateral nondominant ECT is as efficacious as bilateral ECT. Abrams and Taylor (1976) observed that unilateral ECT produced less improvement than bilateral ECT. One of the reasons of such impression about unilateral ECT is presence of incomplete seizures which go unnoticed.

Side Effects of ECT

The principal side effects and risks of convulsive therapy are fractures, memory impairment, prolonged or spontaneous seizures and death. With modern treatment
methods which include anesthesia, oxygenation, forced ventilation and muscle relaxants, many of the complications like fracture and prolonged seizure are reduced considerably. The incidence of death is about 4 per 100,000 treatments with the modern technique. The major cause of death is the risk associated with anesthesia, though the death rate for ECT and its anesthesia is less than that for anesthesia alone.

Thus the main side effect which remains is forgetfulness, largely responsible for the negative image of ECT. Every patient who undergoes an ECT experiences amnesia for the event and he is also confused for a varying period. Usually patients do not complain about this type of amnesia. When there is an irritating inability to recall events which occurred out of treatment setting and when the patient forgets things that he does complain about it. ECT impairs retention and recall and improves registration. While registration is impaired because of any psychopathology like schizophrenia or depression, ECT causes anterograde amnesia wherein material learned after a course of ECT is forgotten. The difference between immediate learning and recall after an interval is known as forgetting score. In retrograde amnesia, patient is not able to recall events which took place before the course of ECT.

In our depression study group A patients which received ECT and placebo, had improvement in the post-treatment score on all the tests of cognitive battery except arithmetic test. The improvement in Koh's block design test was significant (p = 0.04) (Figure 3). Two patients complained of subjective forgetfulness. (Bagadia et al 1981a, 1983d). In group B which received simulated ECT and imipramine, there was improvement in the post-treatment scores on all the tests of cognitive battery except arithmetic test. Both the improvement in the Koh's block design test and the deterioration in the arithmetic test were significant (p = 0.05). There was no significant difference in the cognitive performance either at pretreatment or at post-treatment evaluation between the two groups. (Figure 4).

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In schizophrenia group, improvement was observed on the post-treatment evaluation on all the tests of cognitive battery except on the sentence repetition tests of in group A. The improved performance on Koh's Block Design test was significant at P = 0.05 in both the groups. (Figures 5 and 6) The difference in the cognitive functions in the two groups either at pre-treatment or post-treatment evaluation was not significant. Subjective forgetfulness was complained by 8 patients who received ECT and 3 patients who received simulated ECT (Bagadia et al 1983 a, c).

In the above study no cognitive deficit in the tests administered was seen after bilateral bitemporal ECT. Moreover there was significant improvement in the scores.
on Koh's Block Design test. Fink (1977), Hamilton et al (1979) and Weeks et al (1980) have also reported lack of cognitive deficit after ECT. Weeks et al have suggested a bidirectional response to explain this observation. Impaired cognitive functions in depression and schizophrenia, improve subsequent to the clinical improvement produced by ECT. This effect may mask the deterioration produced by the effect of ECT per se. The improvement is more marked on performance tests, which reveal greater initial impairment. Subjective forgetfulness was complained by 15 percent schizophrenics on chlorpromazine and 40 percent schizophrenics and 10 percent depressive who received ECT, in spite of lack of memory impairment on the test battery. Similar effect was noted by Fink (1979) who observed that learning is improved after ECT and retention is impaired. Squire (1977) demonstrated that recognition is least affected and recall after a delay is worst affected. The subjective forgetfulness was regarded inability to recall material learned in the past few days, which generally did not interfere in interpersonal, social or vocational functions. Further work needs to be done to find out objective parameters of subjective forgetfulness.

Subjective forgetfulness was complained by only 10 percent depressives who received ECT as against 40 percent schizophrenics. This may be related to psychopathology. Primary thought disorder, the hallmark of schizophrenia, is last and least to improve after any treatment including ECT. The complaint of forgetfulness by schizophrenics may be an attempt to explain the residual thought disturbance. Psychomotor retardation and slowness of thinking observed in depression, a primarily affective disorder, is likely to disappear completely after treatment. Thus forgetfulness is less likely to be a complaint.

In one of our earlier studies (Bagadia et al 1980 a), 60 per cent of depressed patients had complained of forgetfulness when six direct ECT were administered every alternate day without any artificial ventilation and oxygenation. In a later study (Bagadia et al 1980 b), where artificial ventilation and oxygenation was not used but ECT was spaced adequately, 20 per cent of the depressed patients complained of forgetfulness after six direct and unmodified ECT.
In the present study, (Bagadia et al. 1981, 1983 d) where adequate spacing of ECT as well as artificial ventilation and oxygenation were used, 10 per cent of depressed patients complained of forgetfulness after six ECT. It appears that spacing of ECT and oxygenation reduces the complaint of forgetfulness.

As the cognitive test battery failed to tap any impairment after ECT a new cognitive test profile was developed in our subsequent study of bilateral and nondominant unilateral ECT in schizophrenia to specifically study learning, unaided recall and recognition. It consisted of a set of pictures of 10 objects of common use in every day life. It demonstrated improved cognitive functions in about 40 per cent patients and worsening in about 30 per cent patients from both the bilateral and unilateral ECT groups. Confabulation i.e. patient recalled a picture which was never shown to him was observed in about 20 per cent patients from both the groups, before and after treatment. Subjective forgetfulness was complained by 20 per cent patients from both the groups, before and after treatment. Subjective forgetfulness was complained by 20 per cent patients who received bilateral ECT and 5 per cent patients who received unilateral ECT (Table 1). There was no significant difference in the two groups on objective testing, but subjective forgetfulness was more common in bilateral ECT group (Bagadia et al. 1983 b). Squire (1977) has commented that there is a possibility that some of the failures of recall that persist after ECT are not detected by the conventional tests. However he also mentions the possibility that patients may have an illusion of memory impairment, it being no more than normal forgetfulness. Fraser and Glass (1980) observed that in both unilateral and bilateral groups there was impairment on memory function tests before treatment and improvement after treatment.

Thus there is confusing and often contradictory data on the effect of ECT on cognitive functions. One of the reason for this may be that patients were tested after last ECT. Another reason is that there was no uniform instrument to test cognitive functions, various and often non-standardized instruments have been used by various workers.

One may conclude that though subjective forgetfulness is complained after ECT, it may not always be reflected in objective memory tests. Such forgetfulness is more after bilateral ECT, more in schizophrenics than in depressives and usually it does not interfere with day-to-day interpersonal, social and vocational functions. Proper spacing of ECT, oxygenation and ventilatory support help to reduce forgetfulness.

### Determinants of Prognosis

The clinical diagnosis, type and severity of psychopathology and history are most widely used predictors of outcome which are the best so far. Patients who are severely
ill, having syndromes of melancholia i.e. endogenous depression, catatonia and mania, have the best prognosis with ECT (APA 1978, Fink 1979 b, Kendell 1981). ECT is the preferred treatment in those having recurrent depression and a history of poor response to anti-depressant drugs and good response to ECT in the earlier episodes. According to Ottosson (1981), a typical depression e.g. with confusional states and delirium respond favourably to ECT and often require only a few treatments.

Many authors have proposed prognostic indices, based primarily on symptoms and observable clinical signs, but their use is not found to be superior to the use of clinical diagnosis alone.

In schizophrenia, good results with ECT are associated with those clinical features which characterise good prognosis in general i.e. short duration of illness, acute mode of onset, good premorbid personality, presence of delusions, hallucinations, catatonic and affective symptoms. ECT is not useful in chronic schizophrenia especially those with negative symptoms i.e. loss of initiative, lack of motivation, anergia etc. Simple and hebephrenic subtypes have poor prognosis. While acute paranoid schizophrenia has good prognosis, those with paranoid personality are resistant to ECT. Such patients are mainly responsible for litigation against psychiatrists and exaggerated accounts in the mass media.

**Psychometric and personality criteria as predictors of outcome.**

Many clinicians note that normal premorbid personality is a good prognostic factor. A denial personality (Kahn & Fink 1959), high acquiescence score on social attitude scales (Kahn et al 1960 b), errors on figure ground tests (Kahn et al 1960 a) and restricted performance on the Rorschach test (Kahn & Fink 1960) were associated with a good clinical response to ECT. But such studies never achieved even a little general acceptance.

**When to stop ECT.**

There are no objective criteria about the number of ECT to be administered and when to stop ECT. ECT is administered in decreasing frequency until clinical remission is achieved. Some workers prefer to administer few more treatments to consolidate the improvement. Generally depressed patients require 4 to 8 and schizophrenic and manic patients 6 to 12 ECT. In the earlier days more number of treatments were administered. If a patient has proved resistant even after upto 12 ECT, further treatments are not warranted. ECT does not prevent relapse, though maintenance ECT has been tried, it is not popular. It is advisable to maintain the patient on appropriate psychotropic drug to prevent relapse. Some patients with recurrent affective disorder, when faced with the choice of continuing lithium for a number of years, with its possible side effects and those who have responded well to ECT, may prefer to make a course of ECT when they relapse, instead of continuing lithium.

**ELECTROPHYSIOLOGICAL STUDIES OF ECT**

Good alpha activity and alpha index of more than 67% in the pretreatment EEG was associated with good response and low voltage fast activity with poor response to ECT. But this finding is not consistent. In Shagass’ sedation threshold test, (1957) EEG is monitored while short acting barbiturate like amylobarbital is administered by the intravenous route. The inflection point at which low voltage fast activity appears is known as sedation threshold.
Low threshold i.e. earlier change brought about by a lesser quantity of barbiturate is associated with endogenous depression and hence better prognosis with ECT.

Roth (1951) reported better prognosis with ECT when the resting EEG delta activity was enhanced by intravenous thiopental given a few hours after the first to third seizures.

A prominent feature of depressive disorder is a shortened time from onset of sleep to the first REM period and greater amount of REM activity. These changes in the sleep characteristics are reversed by ECT.

BIOCHEMICAL STUDIES

Funkenstein test was an early attempt to identify a good prognosis predictor to ECT. When the rise in blood pressure after intravenous epinephrine was greater than 50 mm of Hg and when the return to baseline was delayed by more than 25 minutes after intramuscular methocholine, it was supposed to be a good prognosis indicator for ECT (Funkenstein et al. 1952).

There have been extensive biochemical studies of ECT and its outcome and many changes have been noted. But any of these biochemical changes is not related to the clinical course and none is useful as a predictor of outcome. Urinary MHPG (3 methoxy 4 hydroxy phenyl glycol) has proved to be a useful indicator to determine whether a patient is responding or otherwise to a particular antidepressant drug, but the MHPG levels do not have any relationship with ECT (Steiner et al. 1979). Studies of urinary cyclic AMP (Moyes 1972) and calcium ATPase (Choi et al. 1977) showed an increase with ECT. But its relationship to outcome was not clear. Some authors have observed decreased urinary, plasma and CSF levels of calcium during a course of ECT, at a time clinical improvement is imminent. Thus it has been postulated that the transfer of calcium in brain tissues may be a feature of therapeutic process; and monitoring plasma or urinary calcium may be an useful measure to predict the outcome of ECT (Flach 1964, Carman & Wyatt 1977).

Neuroendocrine Studies

An overactivity of the hypothalamic pituitary adrenal (HPA) axis in depression is reflected in elevated plasma cortisol, loss of its diurnal rhythmicity and its resistance to suppression or early escape from suppression after oral dexamethasone. The Dexamethasone suppression test (DST) is regarded as having diagnostic significance and its normalisation after clinical recovery is also well documented. Thus it can also be used to determine the end point of a course of ECT i.e. those who continue to have abnormal DST may need further ECT.

Hypoactivity of the hypothalamic - pituitary - thyroid (HPT) axis is present in about 25% of patients with endogenous depression; but it is not correlated with a course of ECT or the outcome of illness. The release of growth hormone by hypoglycemia, L-dopa or TSH which is either reduced, or lacking in depression returns to normal after ECT.

Mechanism of Action of ECT

ECT acts on hypothalamus, as demonstrated by changes in hypothalamic pituitary adrenal and hypothalamic pituitary thyroid axes. EEG slow waves activity seen after ECT is supposed to come from midline structures like thalamus and hypothalamus. Thus ECT may act by normalizing neuroendocrine functions (Fink, 1980). Snyder (1980) has postulated that effects of ECT are mediated through endorphins. Grahame
Smith et al (1978) propose that ECT may increase the sensitivity of postsynaptic receptors to brain 5-HT. Modigli (1976) has demonstrated enhanced postsynaptic responses mediated by noradrenaline after ECT. Beta adrenergic receptor sensitivity is reduced following a course of ECT and following treatment with antidepressant drugs (Pandey et al 1979), which correlates well with the time course of clinical improvement. There is also a progressive dopamine autoreceptor subsensitivity both after ECT and antidepressant drugs (Chiodo and Antelman 1980). Some authors have studied increased cerebral blood flow after ECT and its localization.

Kalinowsky has commented that we are successfully using a treatment without knowing how it works. Though the definitive mechanism is not known yet, some pieces in the jigsaw puzzle are being understood. The theory of mechanism of ECT should be able to explain how it works in etiologically and phenomenologically diverse conditions such as depression, mania and schizophrenia.

Medicolegal Aspects of ECT
In our country, medicolegal problems about ECT are conspicuous by their absence and are exception rather than rule. Indian patients have greater faith in their physicians than their western counterparts, and Indian doctors take more interest in their patients and go out of their way to help them than their western counterparts. It makes a lot of difference whether facts about ECT are mentioned in a mechanised, impersonal statistics or whether the patient and relative are actively encouraged to take a decision giving them a realistic expectation without frightening them. Patients and relatives often leave the decision making about ECT to the psychiatrist himself. A healthy, active doctor patient relationship helps to prevent medico-legal complications.

At present, except for patients detained under the Indian Lunacy Act, ECT is administered with the fully informed consent of the patients and relatives. When the new Mental Health Bill becomes a law, it will be possible legally to administer treatment to a violent, unco-operative and disturbed patient with the concurrence of another physician or relatives, even if patient himself is not in a position to give consent. Salzman (1977) comments that it is not often realized that it is as much illegal not to administer ECT and deny it to a patient who needs or demands it for genuine indication as much as administering ECT against patient's wish.

**Wither ECT**
Ultimately it is the personal decision of the treating psychiatrist in administering any treatment to a patient under his care. His decision may be influenced by the scientific evidence about the advantages and disadvantages as well as his likes, dislikes, personal experience and also current status of the treatment.

While selecting or discarding ECT, one must weigh expected improvement, likely side effects, probable consequence of not receiving ECT and potential side effects of other alternative treatments. The psychotropic drugs also have certain risks, though not often clearly defined. Tricyclic antidepressants have a latency of 1-2 weeks, have anticholinergic side effects which may be troublesome in the elderly and may precipitate cardiac complications. The use of monoamine oxidase inhibitors is also restricted by hypertensive crises, toxicity and interaction with another substances.
Lithium has the risk of blood dyscrasia, endocrine, renal and neurological side effects on long term treatment. Neuroleptic drugs may lead to tardive dyskinesia, hepatic dysfunction, lenticular opacities and blood dyscrasias.

ECT is superior to antidepressant drugs in the treatment of depression, is as effective as neuroleptics in the treatment of schizophrenia and mania. Most of the patients are free from any significant side effects. Forgetfulness, when present in some patients, is usually mild and transient and ordinarily does not interfere with day to day functioning. That ECT is cheap and reduces or avoids hospitalization weigh in favour of ECT in our country. Electroconvulsive therapy is a potent tool in psychiatry, with its desirable and undesirable effects. It should be used for rightful indications, following the proper procedure and precautions to avoid misuse and improper use.

In the popular press and lay people ECT has a negative impression which is not helped either by the colloquial term 'Electric Shock Treatment' or by the connotation of frightening jerks associated with ECT. But in clinical practice, patients and relatives readily agree to ECT when explained and as a matter of fact, many patients demand ECT. The pursuit of knowledge regarding ECT needs to be continued for better understanding of its effects, mechanism and site of action.

Let me conclude this oration by reciting a prayer from Rigveda -

जसतो मा सद्भय
tāmāto mā śatyānām
युत्योयमा अभृतं गमव

Lead me to truth, not to untruth. Lead me to light, not to darkness, and to eternity not to oblivion.

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