new file: memory loss.

Maletzky

(13)

Multiple-Monitored Electroconvulsive Therapy

Author

Barry M. Maletzky, M.D.
Assistant Professor of Psychiatry
University of Oregon Health Sciences Center
Portland, Oregon

With the Assistance of:

C. Conrad Carter, M.D.
Clinical Professor
Department of Neurology
University of Oregon
Health Sciences Center
Portland, Oregon

James L. Fling
Bioengineer and Consultant
Portland, Oregon

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prolonged confusional episodes is rare. Abrams and Fink reported two cases of prolonged confusion after MMECT,[77] while Strain and Bidder noted another case as well.[263] In our series of 350 patients, we have seen five cases in which significant memory loss and decline in intellectual functions continued for more than 24 hr. These states have remitted within 72 to 96 hr after the last session except in one case, which lasted for 1 week after MMECT. Memory testing 6 weeks later in all five cases revealed no long-term memory impairment aside from the usual sequence disordering and amnesia for minor events during MMECT.

We have seen no severe memory loss or intellectual dysfunction with MMECT, despite our treatment of many individuals involved in complicated and technical work, including several physicists, two pharmacologists, seven physicians, three attorneys, five ministers, and scores of teachers at all educational levels. Since severe depression is often debilitating enough to prevent occupational function, and since it also induces some measure of memory interference itself (possibly secondary to attentional deficits), the improvement offered by MMECT is often quite dramatic. The experimental evidence is also compelling: Squire and Chace, testing memory functions 6 to 9 months after ECT, and using a battery of delayed and remote memory tests, concluded that no "objective" impairment of memory existed at that point in time.[366] Similarly, Squire and Slater have demonstrated the absence of any long-term memory deficit secondary to ECT.[437] These objective results may either indicate no actual interference with CNS function long-term, [illegible]n insensitivity of present assessment methods to probe for and detect such inter[illegible]ence. Thus Squires' patients complained of subtle cognitive dysfunctions long after completion of ECT,[366] as did patients in a similar study by Gomez.[438] Our patients have often performed well 1 week to 6 months post-MMECT in such tests as serial subtractions, digit reversals, proverb interpretations, analogies, similarities, concept formation, and the Wechsler Memory Scale. Indeed, in seven patients given IQ testing pre- and post-MMECT, IQ was actually higher 6 months after treatment, a finding reported elsewhere.[82] In our series, we had the good fortune to administer the neurologically sophisticated Halstead-Reitan Battery to 10 MMECT patients 1 to 2 weeks before treatment and then 6 months thereafter. No deterioration was seen on any scales, and improvement (though statistically insignificant) was seen on several memory scales, possibly a reflection of improved affective state.

However, if one listens to what patients say who are treated with either conventional ECT or MMECT, subtle cognitive deficits, not easily tested, are discussed. Some patients will mention deficits only if careful inquiry is pursued. Most will not identify these problems even if asked, thus indicating that either they are absent or so subtle as to be imperceivable to the patient. In a series of 47 patients recently treated and asked, 3 to 6 months later, about any cognitive deficits, 17 or 36%, identified at least one of the following: an inability to recall events specifically in sequence, even events occurring after MMECT; a difficulty in giving and receiving street and location directions; and some trouble in finding one's way, even in areas previously familiar. Typical comments include: "I have been following this soap opera for five years on TV but now I get confused about who is doing what to whom;" "I couldn't tell my neighbor how to get over to my uncle's house when she was driving me there the other day, but I have been going over there for years." If such changes are really occurring, one would expect that they would be manifest on certain subtests of the Halstead-Reitan Battery, such as those concerning visuospatial perceptions, for example, but they evidently are not. In addition, students who have been treated do not appear to forget complicated material previously

learned nor lose the ability to learn; similarly, attorneys do not lose the intricacies of how to proceed on difficult cases, nor do physicians. Clinically, if conventional ECT or MMECT had been producing permanent CNS changes, they are doing so in very subtle ways that do not usually render an individual dysfunctional in the common sense.

Brain damage, however, has been implicated after conventional ECT.[89] No studies of such changes have occurred after MMECT. It might be thought that the greater number of seizures per session renders MMECT patients more susceptible to pathologic CNS changes or, conversely, that the hyperoxygenation associated with the procedure makes it safer — both views are as yet speculative.

Following conventional ECT, CNS changes reported include fat embolism and petechial hemorrhages,[439] subarachnoid hemorrhages and edema,[440] and gliosis.[441] Experimental animals in which seizures are induced show similar changes, especially intracerebral hemorrhages and gliosis, but also include vacuolization of neurons with eventual neuronal loss.[442,443]

On the other hand, a number of workers have failed to find such changes in experimentally induced seizures in animals.[444-446] In fact, the pathologic findings on autopsy after a patient has received ECT may be related to factors other than electrically induced seizures, including the various causes of death. Thus many patients described in these studies had been treated with ECT years before their death; pathologic procedures were not standardized; and some of these studies were performed years ago, before adequate tissue handling procedures were introduced — hence some of the changes observed might have occurred after death.

It would be of extreme importance to know whether some of the changes associated with ECT were secondary to reversible causes such as anorexia or cerebrovascular hypertension. Modern methods of oxygenation might well be reducing the morbidity secondary to anoxia, especially with MMECT. This possibility exists for hypertensive changes as well; in two recent cases we have pretreated a hypertensive patient with a diuretic to decrease the chance of elevated blood pressure during treatment. In both cases, blood pressure elevations were reduced below usual. If recent evidence continues to mount that convulsive hypertension, rather than direct brain stimulation,[317,318] is the chief cause of CNS pathologic changes, similar premedications may become commonplace in the future.

New assessment techniques in the neurosciences promise sharper definition of these issues in the future. Computerized tomography (CT) has frequently been employed to study the relationship between post — MMECT memory loss and morphologic changes in the brain. Menken and associates treated a 30-year-old depressed woman with 10 unilateral seizure inductions over a single 45-min session.[446a] Just prior to ECT, a CT scan was normal. A repeat scan 3 hr after MECT showed no changes, although at that point the patient showed considerable disorientation and amnesia which cleared over the remainder of her hospital stay. Her depression was markedly improved. Since findings demonstrate that when unilateral spontaneous seizures occur, CT changes are localized within that hemisphere,[446b] the absence of such changes in this case indicates that both the improvement seen in this patient and her transient amnesia were independent of structural CNS changes. Despite this reassuring finding, more extensive studies of morphologic and histologic alterations, or their absence, will be necessary before any firm conclusions can be drawn.

In summary, very subtle clinical and pathologic signs of CNS damage may occur after conventional ECT or MMECT, though risks in the latter may be reduced

because of hyperoxygenation. The clinical consequences evident thus far, however, seem insignificant, especially in the face of the vast improvement in dysfunction and dysphoria which the treatment usually produces.

B. "Kindling"

Several recent studies have demonstrated that, at least in some animal species, electrically induced seizures may lower the threshold for further seizures, regardless of induction technique.[287,288] "Spontaneous" seizures (a misnomer, as probably all seizures have some stimulus) have been observed.[447,448] "Kindling" implies a permanent change in CNS functioning, theoretically linked to the activation of the anterior cortical system; certain parts of the brain apparently cannot kindle, such as the cerebellum, red nucleus, and optic nerve tracks.

From a clinical viewpoint, reports have occurred regarding conv[illegible]ons occurring spontaneously after ECT.[449–452] We are aware of no such report [illegible]MECT, nor have we seen any seizure develop after MMECT. However, the opposite also has been reported: conventional ECT has been reported to occasionally reduce the incidence of seizures.[31,176,453] Essig has demonstrated that the spontaneous seizures developing upon abrupt discontinuance of barbiturates can be prevented by ECT;[454,455] this has also been reported by Blachly for alcohol withdrawal.[456] Moreover, conventional ECT has been reported to slow the development of tardive seizures in rats.[178] Brockman et al.[457] and Green[178] both report an increase in the threshold necessary for seizure induction during ECT, while the former have duplicated that result in drug-induced seizures as well.[457]

A review of our data indicates four findings relative to this issue:

1. Total seizure duration increases within any given MMECT session. (Data relating to this finding have been presented in Chapter 8.) A re-evaluation of all 350 MMECT patients shows an average seizure duration of 82.9 sec for the first seizure in the first MMECT session, 85.4 sec for the second seizure, and 93.1 sec for seizures three through five. While these differences are significant at the $p < .05$ level, there were no significant differences for durations among the third to fifth seizures.
2. There are no statistically significant differences between like-numbered seizures when compared among different sessions. Thus, seizures number 1, 3, 5, etc. in any given session are equivalent to seizures number 1, 3, 5, etc. in any other given session; therefore seizures do not routinely increase in duration from session to session.
3. The incidence of very long seizures is much greater during seizures three through five in any given session (a probability of approximately 1 in 1000 for seizures one and two, as compared to a probability of approximately 1 in 500 for seizures three through five).
4. The incidence of very long seizures is no greater as sessions progress. Thus the probability of a lengthy seizure is the same in session one as in session two or three.

It thus appears that very lengthy seizures are not stimulated by having more MMECT. However, within a given time period they may be, as seizures do lengthen with each stimulus. The time between treatments, whether 24 or 48 hr, may allow a "restitution" back to baseline such that an increasing sensitivity between sessions is prevented. It is thus far speculative whether increasing the frequency of treat-

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NB: Memory loss confirmed

Table 2

QUESTIONNAIRE FOR PATIENTS AND RELATIVES REGARDING MMECT

To our patients:

We are interested in your perceptions and feelings about having received multiple-monitored electroconvulsive therapy (MMECT) and in the observations a significant other person can contribute about you. Please help by completing this questionnaire and sending it back to us. There is no need to sign if you'd rather not. Thank you in advance for your cooperation.

	(Not at all)	(Slightly)	(Moderately)	(Extremely)
1. Was MMECT helpful for you?	( )	( )	( )	( )
2. Has any other treatment helped you more?	( )	( )	( )	( )
3. Would you be willing to have MMECT again, if other treatments failed?	( )	( )	( )	( )
4. Do you believe you were rushed or forced into having MMECT?	( )	( )	( )	( )
5. Are there still any side effects for MMECT?	( )	( )	( )	( )
6. Do you believe your memory is impaired since receiving MMECT?	( )	( )	( )	( )
7. If so, to what extent does this interfere with your present day-to-day activities?	( )	( )	( )	( )
To a significant other person (relative or friend)				
1. Was MMECT helpful?	( )	( )	( )	( )
2. Has any other treatment helped more?	( )	( )	( )	( )
3. Do you believe MMECT was rushed or forced in this instance?	( )	( )	( )	( )
4. Are there still side effects from MMECT?	( )	( )	( )	( )
5. Has there been any memory impairment with MMECT?	( )	( )	( )	( )
6. If so, to what extent does this interfere with day-to-day activities?	( )	( )	( )	( )

Comments:

The patients generally believed that MMECT was very helpful for their psychiatric condition. Fully 87% of the depressed patients and 57% of the schizophrenic patients believed the treatment had helped them to some extent. However, few had enjoyed the experience; only 26% said they would be very willing to have MMECT again if recommended yet most agreed they would consent to the procedure if needed; 72% agreed they would sign a consent if depression recurred yet drugs and psychotherapy were ineffective. Most of the patients recalled acute adverse effects, such as headache and sore muscles, but rated these as insignificant compared to their ultimate improvement. Similarly, 62% had some memory loss for events occurring during the time of MMECT, but did not believe that this was significant or that it interfered with their day to day functioning. However, a disturbing 23% believed long-term memory deficits had occurred, although their descriptions were at time vague. For example, a college student believed he had more difficulty with mathematical computations in his head but not on paper, though his grades remained the same; a teacher described trouble finding and giving directions when driving; and a housewife believed her mind went blank from time to time when talking. Most of these patients felt these side effects were relatively inconsequential given their vast improvement. For example, of the patients reporting some long-term memory disturbance, only 15% believed this impairment would hamper them in their day to

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5. Are there still any side effects for MMECT?	( )	( )	( )	( )
6. Do you believe your memory is impaired since receiving MMECT?	( )	( )	( )	( )
7. If so, to what extent does this interfere with your present day-to-day activities?	( )	( )	( )	( )
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A CONSENT FORM FOR MULTIPLE-MONITORED ELECTROCONVULSIVE THERAPY

INFORMED CONSENT: ELECTROCONVULSIVE THERAPY

I have been advised by my physician, Dr. _____, that monitored or multiple-monitored electroconvulsive therapy may improve my mental health. I understand that electroconvulsive therapy means the production of an epileptic convulsion by a brief electrical stimulus applied to the head after I am put to sleep (anesthetized). I understand that monitored electroconvulsive therapy is electroconvulsive therapy in which my electrocardiogram (EKG) and electroencephalograph (EEG, brain waves) are recorded for safety, therapeutic, and scientific reasons. I understand that the term, "multiple" means I may receive more than one convulsive electrical stimulus during a period of anesthesia, the number depending on the judgment of my psychiatrist.

I understand that my psychiatrist may use a number of medications before, during, and after electroconvulsive therapy and that the purpose and side effects of these medications have been explained.

I understand that there are both uncommon hazards of the treatment and common side effects. I have been advised that the following rare or uncommon side effects may occur and that the following list may not be all-inclusive: death, broken bones, chipped teeth, skin burns, and persistent memory loss. I understand that the more common side effects include: muscle aches and pains for one or two days, headaches for one or two days, nausea for a few hours, and decreased memory for a few days.

I have further been advised that should I refuse to accept monitored or multiple-monitored electroconvulsive therapy, every effort will be made to provide me with alternative treatment methods.

With these considerations in mind, I voluntarily give my informed consent to the administration of as many sessions of monitored or multiple-monitored electroconvulsive therapy as my physician deems necessary. However, I reserve the right to discontinue further sessions of monitored or multiple-monitored electroconvulsive therapy at any time, and will request this in writing.

_____
Patient Signature Date

_____
*Signature of Relative/Guardian Date

_____
Physician Signature Date

* If patient is under the age of 18 or is unable to comprehend the meaning of this informed consent, signature of relative or guardian legally permitted to sign consent.