ELECTRO CONVULSIVE THERAPY - 73 YEARS JOURNEY OF CONSTANT IMPROVEMENTS

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Summary
Since replacing Dr Meduna metrazol induced seizures in 1937; with more predictable and reliable electric current induced seizures by Dr Bini and Dr Cerletti, electro convulsive treatment (ECT) was in constant improvements. Trend of improvement of treatment started by introducing succinilcholine ECT modified form in 1951; which eliminated, by that time, the most common side effects of broken long bones and spinal injuries related to generalized tonic clonic seizures. Work of Dr. Blatchley in 1979 pointed light to neurophysiology and biological properties of neural refractoriness and lead to change of sine wave electricity induced convulsion to brief electric pulse induced convulsions. Bi-frontal (BF) electrode placement, bi-lateral (BL) and right unilateral RUL (d’Elia) came as search for increased efficacy with less cognitive side effects. Memory deficits connected with ECT treatments continue to be very polarized topic where patients and doctors have strong opinions; which often are not based on scientific results.

Key words: electro convulsive therapy, history

INTRODUCTION
In 1926 Constance Pascal introduces world shock to psychiatry. She argued that mental illnesses are "mental anaphylactic reaction" and cure will be to shock the brain and the autonomic nervous system back into equilibrium [1]. Insulin shock therapy was introduced in 1933 by Austrian-American psychiatrist Manfred Sakel [2] and was used extensively in the 1940s and 1950s. Insulin coma therapy was a form of treatment in which patients were repeatedly injected with large doses of insulin in order to produce daily comas over several weeks. Convulsive therapy was introduced in 1934 by Hungarian neuropsychiatrist Ladislas Meduna. He believed that schizophrenia and epilepsy were antagonistic disorders. He induced seizures with camphor at first and later with me-
trazol (cardiazol) with intention to treat schizophrenia. Hypothesis was postulated by observation of autopsy of smaller brains than usual in schizophrenia (dementia praecox) versus increased brain size in epilepsy. In 1937, the first international meeting on convulsive therapy was held in Switzerland by the Swiss psychiatrist Muller. The proceedings were published in the American Journal of Psychiatry and, within three years, cardiazol convulsive therapy was being used worldwide. The Italian Professor of Neuropsychiatry Ugo Cerletti, who had been using electric shocks to produce seizures in animal experiments, and his colleague Lucio Bini developed the idea of using electricity as a substitute for metrazol convulsive therapy and in 1937, experimented for the first time on a person [3, 4].

Electroconvulsive therapy soon replaced metrazol therapy all over the world because it was cheaper, less frightening, more relievable and more convenient. New treatment for mood disorders was born, more effective than anything before, and after. But in years to come, some serious side effects started to emerge.

**IMPROVEMENTS**

"Unmodified" electroconvulsive therapy produced excruciating muscle pains, dislocations of long bones, broken clavicles and spinal vertebrae as side effects of tonic clonic seizure activities. Following *Primum non nocere*, prompted psychiatrist in the 1940s, to begin to experiment with curare, the muscle-paralyzing South American poison, in order to modify the convulsions. In 1952, Drs Holmberg and Thesleff modified ECT, by using it in combination with succinylcholine and barbiturates [5]. The introduction of succinylcholine, a safer synthetic alternative to curare, led to the more widespread use of "modified" Electroconvulsive therapy. Originally, ECT was delivered with sine waves at the power-line frequency (50 Hz in Europe, 60 Hz in the United States). The sine wave has both positive and negative phases. After it was recognized that the long duration and the slow rise and fall times of the line-frequency sine wave are physiologically inefficient and cause adverse effects, the pulses were made shorter by substituting brief rectangular pulses where the peaks of the sine wave would have been. In later year’s the invention of brief and ultra-brief pulses made significant changes in ECT practice.

As stated by Abrams [6], from the very outset (of ECT), the pronounced amnestic effects of bi-temporal sine-wave ECT drove a substantial portion of the ECT research conducted, leading first to the introduction of the brief-pulse stimulus in the early 1940s, and to unilateral treatment electrode placement a few years later. Dissatisfaction with the efficacy of unilateral ECT led, in turn, to the introduction of Bi Frontal placement. Goldman is credited with the invention of modern RUL ECT and the concept of avoiding placing the stimulus electrodes over the speech areas of the cerebral cortex. Dr Thenon, [7] from Argentina, re-
porting his experience with “monolateral electroshock” was the first investigator to associate decreased cognitive impairment with RUL electrode placement. In 1958, Lancaster [8] coined the term, “unilateral electroconvulsive therapy”. His unilateral electrode placement involved only a 10 cm distance between electrodes, and it was not until the work of d’Elia [9] in the 1970s, after his classification the standardized placement that we know today as the “Right UniLateral or d’Elia placement” came into widespread use. Abrams and Fink invented BF electrode placement in 1972 [10].

Literature supports the efficacy of the 3 commonly used electrode placements, BT, RUL, and BF. Differences in efficacy are modest, when each placement is optimized with proper technique. Speed of antidepressant effect, an important consideration for a subset of patients with the most clinically urgent illness, is reported to be faster with BT electrode placement. Cognitive effects, more complex to assess than clinical efficacy, are reported to be more extensive with BT than with RUL placement. The 2 most commonly used ECT electrode configurations are the conventional bifrontotemporal BL placement in which the electrodes are positioned at the midpoint between the canthus and the tragus, and the d’Elia RUL placement in which 1 electrode is located frontotemporally and the other is located parietally, lateral to the vertex.

CONCLUSION

From fairly well utilized ECT in 1950’s and 60’s (50,000 procedures per year in USA) in 1970’s and 80’s Electroconvulsive therapy had big reductions in numbers of procedures (20-30,000 procedures per year). (11) At that time, 30 years ago, our confidence in new antidepressants medication was immense, and the perspective for ECT was grim. ECT was qualified as barbaric and absolute, and was seen as part of psychiatric history ready to disappear. But due to medication resistance and refractoriness of mental illness Electroconvulsive therapy in 1990’s and in first decade of 21st century has seen increase in number of procedures to 40,000 per year.

In 1978 The American Psychiatric Association released its first task force report in which new standards for informed consent were introduced and the use of unilateral electrode placement was recommended. The 1985 NIMH Consensus Conference confirmed the therapeutic role of ECT in certain circumstances. The American Psychiatric Association released its second task force report in 1990 where specific details on the delivery, education, and training of ECT were documented. In 2001 the American Psychiatric Association released its latest task force report. This report emphasizes the importance of informed consent, and the expanded role that the procedure has in modern medicine [11]. Constant improvements of therapy per se, informed consent for treatments, and unparallel efficacy brought back Electroconvulsive Therapy once again to public eye as most powerful treatment ever for mood disorders.
ELEKTROKONVULZIVNA TERAPIJA – 73 GODINE DUGO PUTOVANJE KONSTANTNIH POBOLJŠANJA

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Literatura:

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Kratak sadržaj

Od kada su indukovani iktalni napadi koje je dr Meduna 1937. god. izazivao metrazolom zamenjeni sa predvidljivijim i pouzdanijim iktalnim pražnjenjima izazvanim električnom strujom koje su primenili dr Bini dr Ćerleti, elektrokonvulzivna terapija (EKT) se neprekidno usavršava. Trend unapređenja koji je počeo primenom sukcinil holina pri EKT (1951.) i koji je eliminisao najčešće neželjene efekte u vidu preloma dugim kostijama i povreda kičme izazvani tonično kloničnim napadima. Rad dr Bletčlija (1979) unapredio je neurofiziološke i biološke aspekte neuralne refrakcije, što je dovelo do smanjenja neželjenih djstva u kognitivnoj sferi. Izažvani memorijski deficit ostaju da budu polje oko koga se mišljenja lekara i pacijenata ne slažu i oko koga se i dalje vode polemike.

Ključne reči: elektrokonvulzivna terapija, istorija