ELECTROCONVULSIVE THERAPY AND OLDER ADULTS

Learning Objectives:
- Recognize the indications for ECT.
- Beware of the risks and benefits.
- Collaborate in the care of their patients undergoing ECT.

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Electroconvulsive Therapy

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(Pre-)History of Convulsive Therapies

• 1933 – Manfred Sakel develops insulin coma therapy (Insulin-shock behandlung) – treated opioid dependent pt’s first, later schizophrenia.  
• Txs were occasionally, but not always, accompanied by seizures.  
• (Sakel later claimed to have invented convulsive therapy, but this is disputed)
History of Convulsive Therapies

• 1934 – Ladislas Meduna induces seizures using SC camphor in oil initially and later, IV Metrazol (pentylenetetrazol, pentamethylenetetrazol):

• Tx was based upon a theory of opposition between epilepsy and schizophrenia.

• 1938 – Ugo Cerletti and Lucio Bini induce seizures in Rome using electrical stimuli

• 1940 – Renato Almansi and David Impasto administer ECT at Columbus Hospital in NYC. Lothar Kalinowsky starts giving ECT at Psychiatric Institute

• 1940 – A.E. Bennett uses curare for muscle relaxation with Metrazol convulsive therapy

• 1952 – Holmberg uses succinylcholine as a muscle relaxant with ECT
Electrical Stimulus

• Brief-pulse square-wave AC
• Voltage approx. 200V (based upon 220 $\Omega$ impedance)
• Current 0.9A
• Frequency 30 - 70Hz
• Pulseeidth 0.5 - 2 msec
• Duration 0.1 - 8 sec
• Charge 25 - 504mC (5 - 99J)

How does it work?

• Seizure - 15 to 180 sec (by EEG)
• Low-dose RUL ECT - Less effective clinically despite adequate seizure duration
• Down-regulation of beta receptors
• Up-regulation of 5HT2 receptors
• GABA (anti-convulsant theory of ECT)
• BDNF (reversal of hippocampal atrophy)
Anticonvulsant theory of ECT

- Increasing seizure threshold during a course of ECT is associated with clinical response
- Hypothesis: linked anticonvulsant and antidepressant response to ECT

ECT induced seizure

- Discharge of neuronal population which is:
  - Paroxysmal
  - Synchronous
  - Repetitive
- Post-ictal suppression follows seizure
  - Inhibitory interneurons
  - GABA (as detected by MRS)
ECS (ECT) induced depolarization

NE, 5HT

cAMP

PKA

CREB

BDNF

Modern (Modified) ECT

- General anesthesia (propofol 1mg/kg, etomidate 0.15mg/kg, methohexital 1mg/kg)
- Muscle relaxant (succinylcholine 1mg/kg, mivacurium 0.15mg/kg)
- Anticholinergic (glycopyrrolate 0.2mg, atropine 0.4mg)
- Oxygen/ventilation by mask
- Continuous cardiac and EEG monitoring
- (Other pre- and post-medications as indicated – NTG, Beta-blockers, promethazine, ketorolac, midazolam, sumatriptan, sodium amytal)

Indications for ECT

- Treatment-refractory conditions
- Severe or life-threatening psychiatric illness
- Most often used for the treatment of medication-resistant depression (MDD)
Diagnostic Indications

- MDD
- BPAD
- Psychosis (Schizophrenia, SAFD)
- Catatonia
- NMS
- PD
- Delirium
Reasons to consider ECT first

- Severe suicidality
- Catatonia/NMS
- Patient preference (usually previous ECT)
- Pregnancy and severe psychiatric illness

Patient categories:

- Healthy young adults
- Pregnant
- Medical complicated - stable
- Elderly
- Adolescents
- Children
Risks/Side Effects

- Common: transient confusion, headache, nausea, myalgia, retrograde and anterograde amnesia
- Uncommon: cardiac arrest, unstable arrhythmias, ischemia, severe hypertension or hypotension, stroke, prolonged apnea, aspiration, laryngospasm, prolonged seizures (status), fractures, malignant hyperthermia
- Death: 1:80,000 Txs (1:10,000 patients)

Conditions of increased risk

- Increased ICP (mass)
- Unstable angina
- Recent MI
- Recent stroke
- Pheochromocytoma
- Retinal detachment

Medications and ECT

- Anticonvulsants - taper and d/c or reduce (except in the case of seizure disorder)
- Stimulants - taper and d/c
- D/C Lithium 36-48 hrs prior to Tx
- Trazodone -d/c
- Others (SSRI’s, TCA’s, MAOI’s, anti-PD ) - consider dose reduction or d/c
- Neuroleptics - may be synergistic
- Reserpine, chlopromazine - adverse effects
ECT and Medications, cont.

- Beneficial medications (Give before Tx)
  - Anti-HTN (other than diuretics)
  - Anti-GERD/reflux (not Carafate, Mylanta, etc.)
  - Pulmonary (brochodilators)
  - Glaucoma meds
  - Neuroleptics/Antipsychotics – Haldol, Clozapine, Risperdal – may be beneficial in combination with ECT

Consent

- Informed consent - adequate mental capacity, understand procedure, risks, side effects, benefits, alternatives
- Printed consent form
- Surrogate consent – Guardian, POA, NOK if patient is incapacitated - two licensed physicians concur (SC Adult Health Care Consent Act – SC Code of Laws Title 44, Chapter 66)

Electrode Placement

- Bilateral (BL) - most common, most effective, most cognitive dysfunction
- Right unilateral (RUL) - less cognitive effect, may be less clinically effective
- Bifrontal (BF) – may be as effective as BL with less cognitive effect
**Electrode Placement, BL vs. RUL**

- Response rates:
  - Low-dose RUL - 17%
  - High-dose RUL - 43%
  - Low-dose BL - 65%
  - High-dose BL - 63%


**Stimulus Dosing**

- Stimulus titration
- Age-based
- Fixed high dose (RUL)
Course of ECT

• Index course 6 - 8 Txs
• 2 -5 Txs per week
• Tx until improvement plateaus
• Continuation/Maintenance ECT
• Prophylactic medication

ECT Instructions/Orders

• Void on call to ECT in AM
• NPO after MN
• Hold BZ after 9pm
• Hold all current medications the morning of ECT except
  • Anti-HTN (other than diuretics)
  • Anti-GERD/reflux (not Carafate, Mylanta, etc.)
  • Pulmonary (brochodilators)
  • Glaucoma meds

Alternatives to ECT

• Pharmacologic Tx - TCA, MAOI, SSRI, venlafaxine, Atypical Neuroleptic, Lamictal
• Psychotherapy - CBT
• VNS (FDA approved)
• rTMS (experimental)
• Neurosurgery – DBS (experimental)
ECT Program staff

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References - General


References - Prophylaxis

References - Electrode Placement


References - Electrode Placement


References – Neurochemistry