Electroconvulsive Therapy in Anti-NMDA Receptor Encephalitis: A Case Report and Review of the Literature

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BACKGROUND

- Anti-N-Methyl-D-Aspartate Receptor encephalitis (aNMDARe) is a neuroinflammatory disorder.[1]
  - Triggers (usually neoplasm or viral) → autoantibodies against NMDAR → NMDAR hypofunction
- Classic progression of the illness:
  -Viral prodrome → psychiatric symptoms → neurological complications → prolonged deficits
- Psychiatric symptoms have atypical manifestations and are often refractory to medications.
- Catatonia evolves in an estimated 42% of adults and 35% of children with aNMDARe and is commonly refractory to benzodiazepines.[2] When autonomic instability occurs with catatonia, this raises concern for malignant catatonia with estimated mortality rate of 10-20% in the absence of underlying organic illness.[3]
- Immunotherapy and surgery (if neoplasm present) are the 1st line treatments for aNMDARe.[1] However, no clear guidelines exist for management of the prominent psychiatric symptoms and catatonia.
- **The presented case is an addition to a small body of research detailing the use of electroconvulsive therapy (ECT) in management of aNMDARe and the efficacy of ECT in this illness.**

CASE (aNMDARe course in a 40-year-old female with an unremarkable past history)

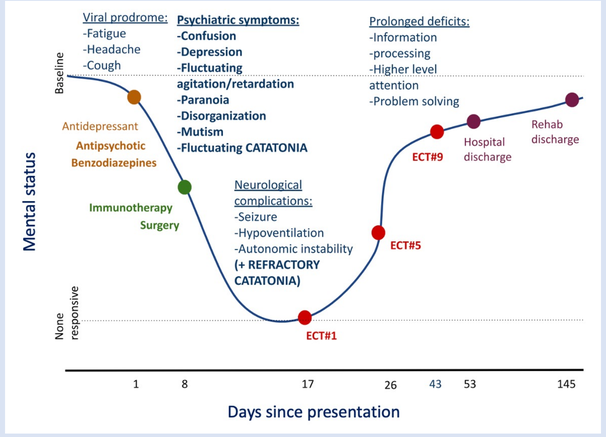

Figure 1.

- Acute onset of atypical psychiatric symptoms → medical work-up.
- Clinically deteriorated despite 1st line treatment for aNMDARe + psychiatric symptoms not responsive.
- Refractory catatonia → ECT initiated 3 times a week, total of 9 completed.
- ECT parameters: bitemporal (BT), pulse width (PW) 1.0ms, charge (Q) 576mC, frequency (F) 45Hz, duration (D) 8s, and current (C) 0.8A.
- Rapid improvement by ECT#5.
- Prolonged deficits in cognition at 145 days, although primarily independent.

DISCUSSION

- Systematic review found 15/23 cases of aNMDARe improved with ECT.[4]
  - 9/15 cases improved pre-immunotherapy + 6/15 cases improved with ECT, due to immunotherapy alone being insufficient
- Few published aNMDARe case studies are focused on ECT treatments and response. Similar to our case, the below studies included ECT parameters (as listed) and documented a positive response to ECT treatment:

	Leding *et al.*, 2020	Cooper & Afzal, 2019		Medina & Cooper, 2017	Sunwoo *et al.*, 2016	Jones *et al.*, 2015
Patient age (years)	28	2.9	6	Late 20s	27	17
Total number of ECTs	9 **	8	13	6	13 **	2
ECT parameters documented	BT, 0.5-1ms (PW), 200mC (Q), first 3 daily	BT, PW not reported, 350-504mC (Q), thrice weekly		BT, 0.5ms (PW), 75-105mC (Q), Interval not reported	BT, 1ms (PW), 192-432mC (Q), twice weekly	BT, 1ms (PW), 128-288 mC (Q), interval not reported

***Documented a robust clinical response after 3 ECT treatments*

- ECT was well tolerated in our presented case. Suspicion of aNMDARe is important so disease progression is not mistaken as a 'side effect' of ECT and prematurely terminated. Of note, prolonged cognitive deficits are characteristic of aNMDARe.
- One hypothesis of ECT's role in treatment of aNMDARe (Figure 2):[10]
  - ECT → upregulates NMDARs that have been downregulated (by autoantibody cross-linking and internalization)
  - Surgery → removes triggering teratoma
  - Immunotherapy → suppresses autoantibody production against NMDARs
- Limitations: Challenging to perform multivariant analysis due to a low incidence of disease.

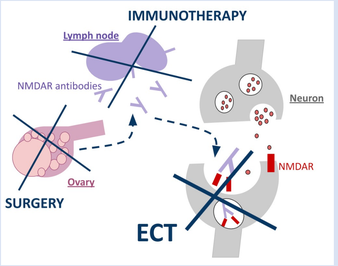

Figure 2.

CONCLUSION

1. aNMDARe should be a differential considered for atypical psychiatric presentations, as early treatment may reduce morbidity and mortality.
2. This case suggests ECT is an effective and safe management option in aNMDARe, and should be considered early in the disease course for refractory psychiatric symptoms/catatonia.
3. Given the paucity of literature detailing ECT use in aNMDARe cases, additional research is needed to guide ECT use and its role as a potential adjunctive treatment in aNMDARe.

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