

- world data of three large mental health hospitals. PLOS ONE. 2020;15:e0243437.
13. Clark SR, Warren NS, Kim G, Jankowiak D, Schubert KO, Kisely S, et al. Elevated clozapine levels associated with infection: a systematic review. *Schizophr Res*. 2018;192:50–6.
 14. Wagner E, McMahon L, Falkai P, Hasan A, Siskind D. Impact of smoking behavior on clozapine blood levels – a systematic review and meta-analysis. *Acta Psychiatr Scand*. 2020;142:456–66.
 15. Cranshaw T, Harikumar T. COVID-19 infection may cause clozapine intoxication: case report and discussion. *Schizophr Bull*. 2020;46:751.
 16. Dotson S, Hartvigsen N, Wesner T, Carbary TJ, Fricchione G, Freudenreich O. Clozapine toxicity in the setting of COVID-19. *Psychosomatics*. 2020;61:577–8.
 17. Bonaccorso S, Ricciardi A, Ouabbou S, Theleritis C, Ross-Michaelides A, Metastasio A, et al. Clozapine, neutropenia and Covid-19: should clinicians be concerned? 3 months report. *Brain Behav Immun Health*. 2021;13:100212.
 18. Gee S, Taylor D. COVID-19 infection causes a reduction in neutrophil counts in patients taking clozapine. *J Psychiatry Neurosci*. 2021;46:E232–7.
 19. Butler M, Bano F, Calcia M, McMullen I, Sin Fai Lam CC, Smith LJ, et al. Clozapine prescribing in COVID-19 positive medical inpatients: a case series. *Ther Adv Psychopharmacol*. 2020;10, 2045125320959560.
 20. Siskind D, Honer WG, Clark S, Correll CU, Hasan A, Howes O, et al. Consensus statement on the use of clozapine during the COVID-19 pandemic. *J Psychiatry Neurosci*. 2020;45:200061.
 21. Gee S, Gaughran F, MacCabe J, Shergill S, Whiskey E, Taylor D. Management of clozapine treatment during the COVID-19 pandemic. *Ther Adv Psychopharmacol*. 2020;10, 2045125320928167.
 22. Singh N, Singh Lubana S, Dabrowski L. Isolated chronic and transient neutropenia. *Cureus*. 2019;11:e5616, <http://dx.doi.org/10.7759/cureus.5616>.
 23. Galani IE, Andreakos E. Neutrophils in viral infections: current concepts and caveats. *J Leukoc Biol*. 2015;98:557–64.
 24. Terpos E, Ntanasis-Stathopoulos I, Elalamy I, Kastiris E, Sergentanis TN, Politou M, et al. Hematological findings and complications of COVID-19. *Am J Hematol*. 2020;95:834–47.
 25. Frater JL, Zini G, d'Onofrio G, Rogers HJ. COVID-19 and the clinical hematology laboratory. *Int J Lab Hematol*. 2020;42 Suppl. 1:11–8.
 26. Ziadi A, Hachimi A, Admou B, Hazime R, Brahim I, Douirek F, et al. Lymphopenia in critically ill COVID-19 patients: a predictor factor of severity and mortality. *Int J Lab Hematol*. 2021;43:e38–40.
 27. Lin S, Mao W, Zou Q, Lu S, Zheng S. Associations between hematological parameters and disease severity in patients with SARS-CoV-2 infection. *J Clin Lab Anal*. 2021;35:e23604.
 28. Anurag A, Jha PK, Kumar A. Differential white blood cell count in the COVID-19: a cross-sectional study of 148 patients. *Diabetes Metab Syndr*. 2020;14:2099–102.
 29. Palmblad J, Nilsson CC, Höglund P, Papadaki HA. How we diagnose and treat neutropenia in adults. *Expert Rev Hematol*. 2016;9:479–87.
 30. Curtis BR. Non-chemotherapy drug-induced neutropenia: key points to manage the challenges. *Hematology Am Soc Hematol Educ Program*. 2017;2017:187–93.
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ECT: A decision to decrease risks during COVID-19 pandemic



TEC: una decisión para disminuir riesgos durante la pandemia COVID-19

Introduction

Electroconvulsive therapy (ECT) is a highly effective treatment for severe psychopharmacological resistant patients but it is also a procedure that involves open airway management and has been considered as an aerosol generating procedure.¹ The COVID-19 pandemic, has resulted in reduction in ECT services internationally.² The COVID-19 pandemic has dramatically and rapidly transformed hospitals in heavily affected areas, decreasing mental health services.³ The need to locate critical patients in spaces intended for anesthesia, as the post-anesthesia care unit (PACU) where we

usually administered ECT, has forced us to decrease the number of procedures and be highly selective. In the same way, continuation and maintenance ECT (m-ECT) have also been dramatically reduced.

Recently it has been recommended⁴ to consider for ECT only those asymptomatic for COVID-19 disease, and test each patient for SARS-CoV-2 virus close to the time of their procedure, not allowing to proceed with ECT to SARS-CoV-2-positive patients. Modified Anesthesia Protocol for ECT was not offered to patients known or suspected to be positive for the virus.⁵ Lapid et al.⁶ state that ECT is an essential treatment that should continue to be provided even during this pandemic. If a known COVID-19 positive patient, whether symptomatic or not, needs ECT as life-saving procedure for a life-threatening condition, it should be administered in an operating room (OR) set-up with negative pressure.⁶

Here we report two cases of psychopharmacological refractory patients that were treated with ECT despite having proven positive for COVID-19 disease. We decided to

apply ECT as an essential treatment to prevent high risk behaviors.

Case report 1

We admitted to our Psychiatric ward a 63-year-old male patient diagnosed with Schizoaffective Disorder. He had showed a good response to treatment with lithium salts, having remained stable for 7 years without requiring admission until March 2012. After a relapse, the poor response to several mood stabilizers and first- and second-generation antipsychotics led us to include him in our m-ECT program.

His last admission lasted from April 8th to May 6th, 2020, at the height of the first wave of the COVID-19 pandemic. The admission cause was significant behavioral disturbances with heteroaggressivity and no awareness of disease. As part of the current protocol in our hospital, screening for COVID-19 through polymerase chain reaction (PCR) testing was performed on admission before starting ECT, showing negative result. After 6 sessions of ECT, he was discharged psychopathologically stable to live on his own at his home, with structured support. He was referred to the outpatient clinic in the Mental Health Center and to our m-ECT program. 48h prior to starting m-ECT, he had to go to the Hospital to undergo COVID-19 PCR-testing. He remained asymptomatic from the psychiatric point of view but we were informed that the PCR test had resulted positive for COVID-19.

The patient was urged to come to the Emergency Room (ER) of the hospital in order to assess his mental and physical status and so he did. He underwent physical examination, electrocardiogram, chest radiographs and analytics with a COVID-19 Profile, that showed no alteration, so he was prescribed home follow-up with isolation measures. There was no evidence of psychiatric relapse, he understood the situation and he was committed to undergo home confinement. We accorded to keep daily telephonic follow up to assess his mental status. 48h after, the patient broke the home isolation not respecting the rules of social distancing and therefore constituting a public health risk due to the possibility of infecting other people. References from his family, who were in telephone contact with him, suggested that a clinical decompensation was going on. The patient was brought back to the ER with the appropriate judicial measures to make an involuntary admission.

After admission at the ER the patient was agitated, delusional, confused and disoriented, without any insight of his psychiatric disease or the need to maintain confinement because his condition of COVID-19 infected inpatient. The patient was assessed by the Internal Medicine Service and no specific treatment for COVID-19 was considered necessary. He was admitted to the Psychiatric Ward, maintaining what had been established as a protocol in the event that COVID-19 positive patients had to be admitted. Authorization was requested from the Court to carry out involuntary admission, which includes authorization for therapeutic interventions that are considered appropriate, in a similar way to how it was carried out before the pandemic. He was assigned a room with the possibility of total isolation, no contact with other patients, oxygen intake if necessary, and entry and exit protocols were established for constant monitoring and

review of his mental state, with the appropriate personal protective equipment (PPE).

In the following days, antipsychotic treatment was started, to which the patient had previously been refractory, showing little response, presenting two episodes of intense agitation that required mechanical restraint. At least 5 staff members were considered high-risk contact for COVID-19 in those episodes and required specific assessment and quarantine.

After consulting with the Preventive Medicine and Anesthesia services of the hospital, we decided to include the patient in the ECT protocol again, moving treatment from the PACU into the OR, provided with negative pressure. Circuits were established within the unit and in the areas of the hospital involved to reduce risks.

The number of persons present in the treatment room was kept to the absolute minimum required for the patient's care and appropriate PPE was used as prescribed by the World Health Organization.⁷

The anesthesia protocol was maintained in the usual terms of our hospital (sedation with propofol and muscle blockade with suxamethonium chloride). Our anesthesiologist opted to manage the airway using a standard bag-valve-mask. ECT application was also maintained as in usual practice in our service with 3 weekly sessions brief pulse stimulus and bitemporal electrode placement, according to a stimulus dosing protocol. Seizures of adequate quality and duration were achieved at each session. After 4 sessions the patient began to clearly improve, accepting the confinement in his room, recognizing his state of COVID-19 positive patient and accepting the indications of the staff. There was no delusional thoughts and he was euthymic.

Case report 2

The second case is a 61-year old patient diagnosed with Bipolar Disorder Type I. He has required 15 hospitalizations, the first of them in 1989. Most of the admissions have required judicial authorization and physical restraint, and have coursed with severe behavioral disorders. The increasingly severe course of the illness and the lack of response to antipsychotics and mood stabilizers led us to start ECT in 2010. The response was good and quick, and it was decided to treat the patient with m-ECT and antipsychotic medication.

The PCR for COVID-19 before an ECT session, established in the protocol of our hospital for m-ECT, was positive. As the patient was asymptomatic from the physical point of view, home isolation and telephonic follow up was indicated. A few days later he went to the ER complaining of digestive discomfort and diarrhea, but when he was explored a psychiatric screening was required showing dysphoric mood, inappropriate speech, threatening behavior, and irritability. Physical and chemical restraint was needed after he tried to leave the ER and the COVID-19 restricted area with high risk of spreading the virus. As in case 1, judicial authorization was requested for involuntary admission.

Due to the previous experience (high refractoriness to psychopharmacological treatment and excellent response to ECT) an admission was decided in order to start with

the ECT sessions. Since the case was so complex (Covid infection with possible gastrointestinal symptoms, COPD, Diabetes, High Blood Pressure and the isolation needed), an admission in the ICU was asked, in order to provide there the ECT.

The first ECT session was provided in the ICU without incidences with all the protective measures described in the case 1, but it took three days and two sessions until the patient got calmed and collaborator. He stayed hemodynamically steady, with respiratory and renal functions preserved and without fever or leucocytosis. After a negative result of a new PCR, the patient was referred to the Psychiatric ward and ECT was continued in the OR as described in case 1. The patient showed intermittent confusion, disorientation and pharmacological impregnation during few days, but without disruptive attitudes. Finally, after the 11th session the ECT was finished and he was discharged from the hospital. The dose of antipsychotics drugs had been decreased and the patient was euthymic and without behavioral disturbances or delusional thought

Discussion

Since the start of the COVID-19 pandemic, hospitals immediately stopped applying ECT leaving seriously ill psychiatric patients untreated. This situation creates a serious ethical dilemma to balance between the risk from an untreated disease versus the risk from COVID-19.³ A reason for closing down the ECT service is that ECT is considered an elective intervention. However, for some patients ECT will be urgently needed and life-saving because of clinical acuity or the lack of available options.⁸ Gil-Badenes et al.⁹ have proposed as prioritized indications in their protocol: (1) catatonia without pharmacological response; (2) severe persistent agitation without pharmacological response; (3) and patients in m-ECT with history of severe relapse when ECT was discontinued in the past. Our patients fulfilled criteria 2, and 3 and there are references about applying ECT successfully to COVID-19 positive patients.^{2,10}

We believe that we must add to the ethical aspects in decision-making of what services and procedures may or may not be considered essential, the necessary balance to be made between the risk of contagion in the general population and Health Care Workers in episodes of agitation, on the one hand, and infection of the personnel involved in the execution of the procedure on the other hand. This creates a serious ethical dilemma. Recommendations made to not apply ECT in infected patients⁴ must be balanced with the benefits of applying a highly effective technique in a controlled environment and with all possible protection elements. The Spanish Society of Biological Psychiatry has recommended developing a protocol to apply ECT adapted to the conditions of each unit where safety conditions are specified, among others.¹¹ This is especially necessary in the current context.

Like many urgent surgical procedures, ECT is a potentially lifesaving intervention, so ECT should not be denied to the patients who need it being COVID-19 positive.²

References

1. Tor PC, Phu AHH, Koh DSH, Mok YM. Electroconvulsive therapy in a time of coronavirus disease. *J ECT*. 2020;36:80–5, <http://dx.doi.org/10.1097/YCT.0000000000000690>.
2. Braithwaite R, McKeown HL, Lawrence VJ, Cramer O. Successful electroconvulsive therapy in a patient with confirmed, symptomatic COVID-19. *J ECT*. 2020;36:222–3.
3. Daniel HH, Begoña AE. Access barriers to electroconvulsive therapy during COVID-19 pandemic. *Psychiatry Res*. 2020;289:113057, <http://dx.doi.org/10.1016/j.psychres.2020.113057>.
4. Flexman AM, Abcejo AS, Avitsian R, De Sloovere V, Highton D, Juul N, et al. Neuroanesthesia practice during the COVID-19 pandemic: recommendations from Society for Neuroscience in Anesthesiology and Critical Care (SNACC). *J Neurosurg Anesthesiol*. 2020;32:202–9, <http://dx.doi.org/10.1097/ANA.0000000000000691>.
5. Luccarelli J, Fernandez-Robles C, Fernandez-Robles C, Horvath RJ, Berg S, McCoy TH, et al. Modified anesthesia protocol for electroconvulsive therapy permits reduction in aerosol-generating bag-mask ventilation during the COVID-19 Pandemic. *Psychother Psychosom*. 2020;89:314–9, <http://dx.doi.org/10.1159/000509113>. Epub 2020 June 18: PMID: 32554959; PMCID: PMC7483857.
6. Lapid MI, Seiner S, Heintz H, Hermida AP, Nykamp L, Sanghani SN, et al. Electroconvulsive therapy practice changes in older individuals due to COVID-19: expert consensus statement. *Am J Geriatr Psychiatry*. 2020;28:1133–45, <http://dx.doi.org/10.1016/j.jagp.2020.08.001>.
7. World Health Organization. 2020: infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected; 2020. <https://www.who.int/publications/i/item/10665-331495#>
8. Espinoza RT, Kellner CH, McCall WV. Electroconvulsive therapy during COVID-19: an essential medical procedure-maintaining service viability and accessibility. *J ECT*. 2020;36:78–9, <http://dx.doi.org/10.1097/YCT.0000000000000689>.
9. Gil-Badenes J, Valero R, Valentí M, Macau E, Bertran MJ, Claver G, et al. Electroconvulsive therapy protocol adaptation during the COVID-19 pandemic. *J Affect Disord*. 2020;276:241–8, <http://dx.doi.org/10.1016/j.jad.2020.06.051>.
10. Sienaert P, Lambrichts S, Popleu L, Van Gerven E, Buggenhout S, Bouckaert F. Electroconvulsive therapy during COVID-19-times: our patients cannot wait. *Am J Geriatr Psychiatry Off J Am Assoc Geriatr Psychiatry*. 2020;28:772–5, <http://dx.doi.org/10.1016/j.jagp.2020.04.013>.
11. Bernardo M, González-Pinto A, Urretavizcaya M. Sociedad Española de Psiquiatría Biológica. Consenso Español Sobre La Terapia Electroconvulsiva; 2018. <http://www.sepsiq.org/file/Enlaces/SEPB%20-%20Consenso%20Español%20sobre%20la%20Terapia%20Electroconvulsiva.pdf>

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