CASE REPORT

Coronary arterial disease after electroconvulsive therapy: a case report

Doença arterial coronariana após eletroconvulsoterapia: um relato de caso

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ABSTRACT

Objectives: Unipolar depression (UPD) is a leading cause of global burden of diseases, particularly among the elderly, whose treatment may be challenging. In such cases, ECT is often recommended due to its safety and efficacy. This report presents a case of a 67-year-old male inpatient that developed a rare cardiac complication during ECT. **Methods:** Clinical case report with patient's consent and bibliographic review. **Results:** A 67-year-old male inpatient with recurrent severe psychotic depression was hospitalized and ECT was indicated after failure of the pharmacological treatment. A comprehensive clinical pre-evaluation revealed only nonspecific ST-segment changes in electrocardiogram. During the 7th ECT session, it was observed transitory ST-segment depression followed by a discrete increase of plasma troponin I. Severe tri-vessel coronary artery stenosis was found and a percutaneous coronary angioplasty was performed, with satisfactory psychiatric and cardiac outcomes. **Conclusions:** Unipolar depression (UPD) and cardiovascular disease are often coexistent conditions, especially among the elderly. In the current case, myocardial ischemia was detected lately during ECT therapy and its treatment allowed the UPD treatment to be completed adequately.

Keywords
Electroconvulsive therapy, major depressive disorder, unstable angina, coronary stenosis, aged.

RESUMO

Objetivos: Depressão unipolar é uma das principais causas de sobrecarga global de doenças, particularmente entre os idosos, cujo tratamento pode ser desafiador. Nesses casos, a eletroconvulsoterapia (ECT) é frequentemente indicada, por causa de sua segurança e eficácia. Este relato apresenta o caso de um paciente de 67 anos internado e que desenvolveu uma complicação cardíaca rara após ECT. **Métodos:** Relato de caso clínico e revisão da literatura. **Resultados:** Um homem de 67 anos com transtorno depressivo grave, com sintomas psicóticos recorrentes, foi hospitalizado, sendo indicada ECT após falha do tratamento farmacológico. Foi realizada uma pré-avaliação clínica, a qual revelou alterações não específicas do segmento ST ao eletrocardiograma. Durante a sétima sessão de ECT, foi observada depressão transitória do segmento ST seguida por discreto aumento da troponina I sérica. Foi diagnosticada estenose coronária triarterial, sendo realizada angioplastia coronária per-

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Palavras-chave
Eletroconvulsoterapia, transtorno depressivo maior, angina instável, estenose coronária, idoso.

cutânea, com boa evolução clínica e psiquiátrica. **Conclusões:** Depressão unipolar e doença cardiovascular são condições que coexistem com frequência, especialmente entre os idosos. No presente relato, isquemia miocárdica foi detectada tardiamente durante a ECT e a sua correção permitiu que a depressão unipolar fosse tratada adequadamente.

INTRODUCTION

Severe unipolar depression (UPD) is a leading cause of global burden of diseases, particularly among the elderly[1,2], whose treatment may be challenging due to antidepressants' cardiovascular side effects and poor therapeutic response[1]. In such cases, electroconvulsive therapy (ECT) is highly recommended, considering its safety and high rates of efficacy[3]. Studies reported that the immediate efficacy rate is even higher in elderly diagnosed with severe mood disorders[4-6] and the mortality associated with the procedure is low: 1-2/100.000 treatments[7]. ECT's adverse effects include blood pressure elevation and bradycardia after electric stimulation, besides tachycardia with elevation of myocardial demand during convulsion[2]. Most hemodynamic changes persist into the recovery period and resolve within 20 minutes[2]. Patients who have previous cardiac disease present higher risk of cardiac complications after the procedure[2,6,8]. Nevertheless, the majority of patients conclude their ECT sessions safely, even those who present cardiac complications afterwards[4-10].

The aim of this report is to describe a situation in which even nonspecific findings in a patients' electrocardiogram may justify the need for a thorough cardiologic assessment before the ECT sessions, in order to avoid further complications.

METHODS

A bibliographic research was made through the National Center for Biotechnology Information (NCBI/PubMed) and Scopus websites. Review articles and case reports were used as a basis for the discussion, fostered by the clinical and psychiatric patient's condition described below. After the patient's written consent, a descriptive report was made based on clinical interview and chart review.

RESULTS

A 67 year-old male who had hypertension, benign prostatic hyperplasia and chronic renal failure stage III was diagnosed with severe UPD in 2008, which was associated with delusions of ruin, anorexia (66 pounds of weight loss in three months), suicidal ideation and serious personal and socioeconomic dysfunction. It remitted only after 10 ECT sessions, carried out during hospitalization. Later on, his maintenance treatment has failed, despite the combined use of several antidepressants and antipsychotics in high doses, such as olanzapine 20 mg/day combined with mirtazapine 45 mg/day, then with venlafaxine 150 mg/day and later with mirtazapine 60 mg/day; sertraline 150 mg/day associated with amitriptyline 75 mg/day; citalopram 20 mg/day and finally aripiprazole 30 mg/day associated with sertraline 150 mg/day. He made two suicide attempts with medication and was hospitalized several times in the following years.

In 2013, he was admitted to the psychiatric emergency unit due to inanition, with malnutrition, dehydration leading to acute renal failure and severe depressive symptoms, such as those presented in 2008, which were refractory to 150 mg/day of sertraline; his initial Montgomery-Åsberg Depression Rating Scale (MADRS) score was 36 (mild: 9-17, moderate: 18-34, severe ≥ 35). He was then hospitalized in the general hospital psychiatric impatient ward and had no improvement after an increase in the dose of sertraline to 200 mg/day. ECT was again indicated, besides the antidepressant, with the consent of both the patient and his family.

He was evaluated by the cardiology team with clinical examination, laboratory tests, chest X-ray and electrocardiogram (EKG). EKG showed repolarization abnormalities in inferior and anterior leads and signs of left ventricular (LV) overload. Serum dosages were: sodium = 140 mg/dL; potassium = 4.3 mg/dL; magnesium = 0.94 mg/dL; urea = 42 mg/dL; creatinine = 1.57 mg/dL; fasting glycemia = 94 mg/dL; TSH = 3.76 mg/dL; thyroxine = 0.84 mg/dL; hemoglobin = 13.2 g/dL (6% of glycated hemoglobin); hematocrit = 38.8%; leukocytes = 8,690/mL; platelets = 227,000/mL. As the cardiologists in charge did not indicate any further measures for reducing cardiovascular risks related to the procedure, the patient was referred to anesthetic evaluation and ECT. Bilateral ECT was performed with standard anesthesia and bi-temporal placement of electrodes, using a Thymatron device (Somatics Inc.). ECT sessions were held three times a week and the seizures were verified through the "Tourniquet Technique".

Great clinical and psychiatric improvements were already observed by the seventh ECT session, with increased psychomotricity and MADRS score of 14. In this occasion, given a first trial failure, it was applied a 70% potentiation, which produced a 30 seconds seizure. After nearly 2 minutes, it was witnessed a ST segment depression on lead II EKG's monitor. A couple of hours later, the patient presented lipothymia, followed by hypotension and low cardiac output transient symptoms, without any EKG changes. The episode was considered an

angina equivalent and acute coronary syndrome's evaluation was initiated: cardiac enzymes showed discrete elevation, nonspecific for myocardial infarction. The echocardiogram revealed: LV segmental wall abnormality; preserved systolic function, with ejection fraction (Simpson) > 50%; LV diastolic dysfunction and hypertrophy; thickened mitral, aortic and tricuspid valves. The scintigraphy (I-131 MIBG) showed: wide and accentuated hypoperfusion of apex and mid-apical's portion of LV's septal, inferoseptal and inferior walls; mild ischemic component and ejection fraction of 52%. Afterwards, the cardiologists indicated cardiac catheterization, which revealed: severe coronary tri-arterial obstruction, affecting left anterior descendent artery (left ADA) and right coronary artery (80% of obstruction); circumflex artery and second marginal branch (70% and 60% of obstruction, respectively).

After the seventh session, ECT was suspended and sertraline, 200 mg/day, was maintained. Although coronary artery bypass grafting was considered the standard treatment to this patient, it was decided to perform percutaneous coronary angioplasty of ADA after multidisciplinary meeting and patient's family consent, considering the surgical risk (EuroSCORE = 10.33%) and his impaired nutritional status. He had an excellent cardiologic outcome and is clinically well.

DISCUSSION

This patient was diagnosed with severe UPD disorder, with poor response to pharmacological treatment and excellent previous response to ECT. The psychiatric disorder led to a clinical deterioration that evolved to a potentially life-threatening condition. Probably due to his limited myocardial demand, related to physical and psychiatric impairment, he was not aware of any personal history of cardiovascular disease, although having a previous tri-vessel severe and asymptomatic stenosis. The elevation of myocardial demand during ECT sessions probably caused an unstable angina episode, which is a rare complication after this procedure. Nevertheless, the patient had previously completed seven ECT sessions and had a great treatment response (his MADRS' score decreased more than 50%).

There is a rising prevalence of UPD in the elderly, commonly with poor therapeutic response to pharmacological treatment[1,2]. Also, as antidepressants and other drugs used in old-age psychiatry have potentially severe adverse effects[3], ECT becomes an important treatment option. Although cardiac complications are rare[3], the situation described in this case report countersigns that even nonspecific findings in the electrocardiogram may justify the need for a thorough cardiologic assessment before the ECT sessions, in order to assure their safety and efficacy.

Deaths due to coronary accidents during or following ECT have been repeatedly reported, with only presumptive connections[11]. A classic article, published in 1968 by Hussar and Pachter, had already described two incidents suffered by one patient: a myocardial infarction during his first ECT and a fatal coronary insufficiency during his second ECT, three months later[11]. Nevertheless, although these two incidents together strongly suggest that ECT may trigger coronary death in persons with significant coronary heart disease, to the best of our knowledge, there are no case reports, or any further studies with other designs, focusing specifically on the possible association of unstable angina and ECT in patients with asymptomatic coronary heart disease. Even among the elderly population, an age group in which more cardiac complications succeeding ECT can be expected, the statement that it does occur is still controversial, due to sparse research on this important topic[3]. There is no consensus regarding guidelines for ECT pre-evaluation[3,12], and, although there are no absolute contraindications for the procedure, some case reports describe fatal outcomes due to other ECT cardiac complications and it is known that both hypertension and preexisting cardiac diseases may increase their risk[2-7,13]. One possible complication of ECT is Takotsubo cardiomyopathy, a transient left-ventricular dysfunction that may occur after a physical stressor and which may increase the risk of myocardial infarction[14].

We believe that the clinical relevance represented by this report, with a potentially lethal prognosis if not adequately handled, indicates the need for deepening the knowledge of similar situations, aiming at an improvement in care and in the quality of future protocols. This case report illustrates the importance of careful workup of cardiovascular risk in the setting of ECT, even if electrocardiogram seems unremarkable normal. Although it is not yet an established concept, we suggest that for those individuals classified as intermediate to high risk a more detailed evaluation should be used including treadmill exercise test and echocardiogram. It has been reported that ECT induces an increase in the heart rate reaching a peak of 140 to 180 bpm with negligible differences due to age or gender[15]. By inference, it would be acceptable to verify the safety of this heart rate increase by exercise testing before ECT. Individuals who demonstrate uneventful test and normal cardiac function would be thereupon submitted to ECT and all the others would be recommended to reconsider using ECT as the last possible resource. It is our opinion that decisions in such high risk individuals must be shared by psychiatrist, cardiologist and patient's family altogether.

Although the level of evidence of a case report is not high, as the findings cannot be replicated or generalized, the situation here described highlights the need for deepening the research on this matter. Other study designs, with controlled and randomized samples, would provide more information in order to establish specific protocols for ECT pre-evaluation among the population of elderly people without apparent

risk factors. Other limitation to this study is the impossibility to complete at least 10 ECT sessions, but as the episode of unstable angina was diagnosed, it was a priority to treat this potentially lethal condition which was itself a relative contra-indication to the continuity of the ECT sessions.

CONCLUSIONS

This report aims to reinforce ECT's security and efficacy. The risk-benefit of indicating ECT for old-aged psychiatric patients with clinical comorbidities must be carefully evaluated, possibly with complementary investigations. If necessary, other specialties' evaluations shall be performed, even if there had been previously found only asymptomatic and nonspecific EKG alterations. As cardiovascular complications following ECT applications are the most common ones, we suggest that a throughout cardiovascular assessment should be performed in the elderly with previous EKG abnormalities, even if nonspecific, in order to detect possible incipient cardiovascular alterations and, thus, minimize the risk associated with the procedure.

INDIVIDUAL CONTRIBUTIONS

All authors were part of the team responsible for the patient's care and have significantly contributed to the conception of this case report. All authors carried out the literature review and the writing of the manuscript, critically reviewing its intellectual content. All authors have read the manuscript's final version and have agreed with it.

CONFLICTS OF INTEREST

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