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Analysis of the efficacy and safety of electroconvulsive therapy in elderly patients: a retrospective study in the Polish population

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Summary

Aim. The aim of the study was to assess the efficacy and safety of electroconvulsive therapy in a population ≥ 65 years old.

Method. The study was naturalistic, retrospective. The study group included 65 patients, women and men, hospitalized in the departments of the Institute of Psychiatry and Neurology and undergoing ECT treatment. The authors analyzed the course of 615 ECT procedures performed in 2015–2019. The effectiveness of ECT was assessed using the CGI-S scale. Safety was assessed by analyzing side effects of the therapy, taking into account the somatic diseases in the study group.

Results. As many as 94% of patients initially met the drug resistance criteria. In the study group, no serious complications such as death, life-threatening condition, necessity to be hospitalized in another ward or permanent health impairment were reported. In total, in the whole group, adverse effects were reported in 47.7% of older patients; in the majority of cases (88%) they were of slight intensity and resolved without any particular intervention. The most frequently observed side effect of ECT was an increase in blood pressure (55.4% of patients). Four patients did not complete ECT therapy due to side effects. In the majority of patients (86.2%) at least 8 ECT treatments were performed. ECT turned out to be an effective method of treatment in the population of patients over 65 years of age – response to treatment was found in 76.92% and remission in 49.23% of the study group. The severity

of the disease according to the CGI-S scale was on average 5.54 before and 2.67 after the ECT treatment.

Conclusions. Tolerance of ECT is worse after 65 years than in younger age groups. Most of the side effects are associated with underlying somatic diseases, mainly cardiovascular problems. This does not change the fact that ECT therapy is highly effective in this population and can be a very good alternative to pharmacotherapy, which, in this age group, is often ineffective or causes side-effects.

Key words: electroconvulsive therapy, ECT, elderly patients

Introduction

Despite advances in pharmacotherapy, the treatment of mental disorders in the elderly population remains an extremely difficult challenge for clinicians [1]. The coexistence of somatic diseases, interactions with various medications and pharmacokinetic changes occurring in the aging body are related to both worse tolerance of psychotropic drugs and their lower effectiveness. Often, pharmacological treatment, even with repeated modifications, does not bring the expected results or causes increased side effects. Depression is a particularly common and very serious health problem in this population. Due to the aging of the society, it is becoming a growing problem both in individual and socio-economic terms [2]. The prevalence of depressive symptoms in people over 65 reaches 25% and increases with age [3 ,4]. Most cases of depression in the elderly are relapses of affective disorders that started earlier in life, although a first episode of depression occurring in the elderly is not uncommon (late onset depression) [5].

Depression in the elderly is usually chronic, and relapses occur more often and earlier than in younger patients, probably due to a weaker response to the medication [5]. Improvement periods get shorter with subsequent relapses, and remissions are usually partial. Depression in the elderly very often coincides with other somatic diseases. The most frequent comorbidities are: cardiovascular diseases (20-30%), cancer (40%), Parkinson's disease (20-50%) and dementia (20-30%). Depression is also often a complication of the pharmacotherapy of somatic diseases. Studies show that depression occurring in old age is associated with a higher risk of disability, deterioration of somatic health and generally higher mortality than in younger age groups [6-8].

Pharmacotherapy, which is the basic method of depression treatment, in the elderly population is often insufficient. It is estimated that about 15-30% of patients are drug-resistant [9, 10]. There are various attempts in the literature to define the concept of drug resistance in depression. In relation to patients with recurrent depression, drug resistance is usually defined as a lack of improvement after two consecutive treatments with antidepressants from different therapeutic classes used at a therapeutic dose for the appropriate period of time [11-13]. Regarding bipolar depression, the definition of drug resistance is more complex. It is usually defined as the lack of response to two attempts of antidepressant treatment with the simultaneous use of a mood-stabilizer [14]. In the case of schizophrenia, the most common definition of drug resistance is

the lack of remission, recurrence or symptoms of intolerance when using two different antipsychotics or clozapine at appropriate doses for a sufficiently long period of time (according to some authors, minimum 2 years) [15, 16]. However, the literature does not cease to discuss how many treatment attempts and what therapies should be undertaken before drug resistance is diagnosed in a given patient and what should be properly understood under this term [17, 18].

Additional therapeutic difficulties are also created by more frequent coexistence of depressive symptoms and psychotic symptoms, cognitive impairment or severity of the disease causing life-threatening conditions (cachexia, not taking meals and liquids, worsening of somatic diseases, suicidal thoughts and intentions) [19, 20]. The most common psychotic symptoms are nihilistic or hypochondrial delusions regarding somatic dysfunction, persecutory or poverty [21].

These factors are the reason why in the elderly population the use of methods alternative to pharmacotherapy should be more often considered, i.e., non-pharmacological, biological methods of treatment. Among them, electroconvulsive therapy (ECT) remains unquestionably the most effective method of treatment, also in the elderly population [22]. Response and remission occur in the course of ECT treatment more frequently than with the use of any other method [23]. As studies show, the effectiveness of electroconvulsive therapy in drug-resistant depression is definitely higher than pharmacotherapy – clinical improvement is found in 70-90% of patients in the general population, and remission in 40-50% [24-27]. In schizophrenia, the effectiveness of ECT is lower than in depression and is about 50-60% [28]. On the other hand, it is worth noticing that, according to some researchers, the presence of psychotic symptoms in the course of depression is a favorable prognostic factor; in this population, improvement is observed after the first few ECT procedures.

Some studies indicate that older age is associated with greater ECT effectiveness than in younger patients [29-33] – improvement rates are estimated at 61%-90%. It is worth emphasizing, however, that this issue still remains contentious. Attention has been drawn to the fact that it is not the age itself, but rather the different clinical picture of depression in the elderly (more frequent occurrence of suicidal thoughts, longer duration of the depressive episode, the presence of psychotic symptoms or very significant psychomotor retardation) can be factors responsible for higher ECT efficacy in this population [34]. At the same time, numerous authors point to the need to expand the research conducted in the elderly population treated with ECT, because in many studies, the studied group is so small that it is difficult to draw any binding conclusions on their basis [35-40].

However, regarding ECT use in the elderly patient, not the effectiveness but the safety of the method is questionable. Research conducted over the past few decades provides a lot of evidence that ECT therapy is a safe method of treatment, and serious side effects are extremely rare [36, 41, 42]. However, a significant percentage of these publications come from the period when the standard was the use of ECT devices generating sinusoidal current. The dissemination of devices generating cur-

rent with spike pulses and changes related to the ECT anesthesia itself translated into greater safety of these procedures [43]. Changing the type of ECT devices used, and the type of anesthesia, different energy dosing methods (age/titration based), as well as the different pulse widths used, make it difficult to compare these data with each other. However, the issue of performing procedures in patients with numerous somatic diseases, cardiological and hemodynamic safety of ECT anesthesia alone [43] and the impact of ECT procedures on cognitive functions are still of concern. Although many studies indicate that this latter complication is usually mild and transient [44, 45], and even that it improves some cognitive functions [46], some patients report memory problems that persist for a long time after ECT treatment.

The scope of the analysis and the purpose of the study

This was a retrospective study. In the analysis, medical data of patients aged 65 and above (electronic medical history, documentation of ECT procedures, printed reports of Thymatron System IV for each of the ECT procedures, anesthetic documentation) hospitalized in clinical departments of the Institute of Psychiatry and Neurology (IPiN) in Warsaw and subjected to electroconvulsive therapy in 2015-2019 were included. During this period, 65 patients aged 65 or over were treated with ECT in the IPiN. In 2015 in the IPiN the change of the electronic patient documentation system took place (change from the Solmed system to the AMMS system); therefore, the above time frames were adopted in order to obtain uniform patient data. In the presented study, the age criterion was at least 65 years old, as in most previous publications on ECT such age limit was adopted.

The aim of the study was to assess the efficacy and safety of electroconvulsive therapy in a population ≥ 65 years old. The study was naturalistic; observations refer to patients hospitalized and treated with ECT due to a single episode of depression, depressive episode in the course of bipolar disorder or recurrent depression, schizoaffective disorder and schizophrenia.

Qualification for ECT treatment and method of treatment

All patients were qualified for ECT treatment by a psychiatrist after internist, neurological, ophthalmological, anesthesiological consultation; in all cases the necessary laboratory tests, imaging and other additional tests ordered by consulting physicians were performed. In 4 cases, ECT procedures were performed despite somatic contraindications due to the direct threat to the patient's life. Treatments were performed using the Somatics Thymatron System IV. The analyzed procedures were performed in bilateral and unilateral technique. A detailed distribution of bilateral and unilateral procedures is presented in the further part of the work. The electrical impulse used in the Thymatron apparatus is characterized by a constant flow 0.9 A; each pulse width is 0.5-1 ms. The overall electrical charge administered to the patient during the first

ECT procedure was determined according to the method recommended by the device's manufacturer, i.e., according to pre-set doses based on the patient's age – in the case of unilateral procedures [47] or half of the patient's age – in the case of bilateral procedures [48]. Doses of energy in subsequent treatments were determined based on the assessment of the effectiveness of the previous procedure – assessment of seizure activity (EEG recording) and duration of the seizure. Effective treatment was defined as seizure activity lasting at least 20 seconds. If no epileptic seizure was observed, restimulation with 50-100% higher dose of energy was applied [49]. If the duration of the seizure did not exceed 20 seconds, the dose of the energy applied in the next ECT treatment was increased by about half.

All procedures were performed under general anesthesia, with the use of muscle relaxants (in IPiN atropine, thiopental or propofol and succinylcholine are normally used for anesthesia).

As an increased risk procedure, ECTs are a therapeutic method requiring separate consent. Consent must be preceded by full medical information concerning ECT treatment, the course of the procedure, the associated risks, and possible side effects. In the analyzed population, all patients except 4 persons gave written consent for electroconvulsive therapy. Four people underwent ECT treatment due to life-threatening conditions (not taking meals and liquids, cachexia in the course of depression, intense suicidal thoughts, catatonic schizophrenia); the consent of a family court without the patient's consent were obtained in these cases. In two cases, electroconvulsive therapy was discontinued before achieving the improvement of the mental state, due to the patient's withdrawal of consent.

Study group analysis

In total, electroconvulsive treatments in the selected time frame (2015-2019) were performed in 65 elderly patients – 33 women (51%) and 32 men (49%) were qualified for ECT treatment. All patients were 65 years or older, of which 52 patients were in the 65-74 age group, and 13 patients were 75 and older. The oldest patient was 82 years old. The average age in the study population was 70.6 years (± 4.34).

In 45 patients, the entire series of ECT procedures was performed in bilateral technique, in 15 in unilateral technique (treatments over the non-dominant hemisphere), and in 5 people some of the procedures in the series were performed in unilateral technique, and some bilateral (change from bilateral to unilateral due to side effects, discussed in the following part).

The most common diagnoses in the study population were recurrent depression (n = 35, 54%), followed by bipolar disorder (n = 21, 32%), a single depression episode (n = 6, 9%), and schizophrenia (n = 1, 2 %), schizoaffective disorder (n = 1, 2%) and organic delusional disorder (n = 1, 2%) [Table 1].

Table 1. **Distribution of diagnoses in the study group**

Diagnosis according to ICD-10	Number of subjects (n = 65)	Percentage in the study group (%)
F33	35	53.84
F31	21	32.3
F32	6	9.23
F20	1	1.53
F06	1	1.53
F25	1	1.53

A significant proportion of older patients referred for ECT had had accompanying somatic diseases. In the studied population, 64.6% of patients (n = 42) had diagnosed at least one somatic disease and 58.4% (n = 38) of subjects had two somatic diseases. The most common diagnoses were hypertension (n = 32, 49.2%), coronary artery disease (n = 10, 15.4%) and prostatic hyperplasia (n = 7, 10.8%). Cardiovascular diseases (post-myocardial infarction, atherosclerosis, coronary artery disease, heart failure, atrial fibrillation, arrhythmias) occurred in total in 72.3% of respondents; other diseases were thyroid disease, diabetes and chronic obstructive pulmonary disease (COPD) [Table 2].

Table 2. **Somatic diseases in the study group**

Somatic diseases	Number of subjects (n=65)	Prevalence in the study group (%)
Hypertention	32	49.23
Coronary artery disease	10	15.38
Arrhythmias	2	3.08
Hypothyroidism	2	3.08
Glaucoma	1	1.54
Diabetes	2	3.08
Epilepsy	1	1.54
Hyperthyroidism	2	3.08
Kidney cancer	1	1.54
Anterior cerebral artery aneurysym	1	1.54
Anemia	1	1.54
Prostate hypertrophy	7	10.77
Post-myocardial infarction	1	1.54
Post-stroke	1	1.54
Atherosclerosis	1	1.54
Mild cognitive impairment	1	1.54

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COPD	1	1.54
Heart failure	1	1.54
Mild dementia	1	1.54
Unspecified bronchial asthma	1	1.54
Osteopenia	1	1.54
Osteoporosis	1	1.54
Hyperlipemia	1	1.54
Post-cataract surgery	1	1.54

*the table includes only fixed or paroxysmal cardiac arrhythmias, confirmed by medical documentation and requiring treatment; transient occasional arrhythmias, or arrhythmias reported by the patient without confirmation in the documentation were not included

The reasons for referring to ECT treatment were: ineffectiveness of the current treatment (61 patients) and the high intensity of symptoms / the need to achieve rapid improvement of mental state (4 patients). All patients referred for ECT treatment due to the ineffectiveness of previous therapies (n = 61, 93.8%) met the criterion of drug resistance defined as the lack of improvement after two consecutive antidepressant treatments from different therapeutic classes used at the therapeutic dose for the appropriate period of time. Regarding bipolar depression, drug resistance was defined as the lack of response to two attempts of antidepressant treatment with the simultaneous use of a mood-stabilizing drug. In order to achieve remission, it is recommended to conduct a series of 8-12 ECT procedures, but the main factor determining the length of electroconvulsive therapy is the patient's mental state.

A total of 615 ECT procedures were performed in the study group. The average number of procedures in ECT series was on average 9.76 (± 2.67) per patient. The mean energy dose used in ECT procedures in this population (65 years and more) was 508 mC ± 135. The mean duration of the seizure in the study group was 33.58 sec. ± 8.01.

In 9 patients (13.8%), ECT treatment was discontinued before 7 ECT procedures. The reasons for such early discontinuation of treatment were: remission after the first treatments (n = 2), withdrawal of consent for ECT (n = 2), recurrent disturbances in consciousness (n = 2), occurrence of ventricular arrhythmias (bigeminy) (n = 1), occurrence of life-threatening increase in blood pressure during the procedure (RR 240/120) – decision of an anesthesiologist (n = 1).

A series of ECT consiting of at least 8 procedures were performed in 56 patients (86.2%), while 33 patients (50.7%) had a series of at least 10 ECT. Data on the type of ECT treatment are provided in Table 3.

Table 3. **The type of ECT procedure**

Type of ECT	Number of subjects (n = 65)	Percentage of subjects (%)
Unilateral	15	23.07
Bilateral	45	69.23
Unilateral and bilateral	5	7.69

Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics 23 software and TIBCO Statistica 13.3. Descriptive statistics were calculated using means and standard deviations as well as median and interquartile range – for data not meeting the criteria of normal distribution. Data distribution was analyzed using the Shapiro-Wilk test and skewness analysis.

The efficacy of ECT therapy was assessed based on the result on the Clinical Global Impression Scale – Severity (CGI-S) before and after ECT therapy by analysis of variance using ANOVA-type statistic (ATS) – for non-parametric data distribution. The results were analyzed at the level of statistical significance $p < 0.05$.

Results

Efficacy of ECT treatment

The effectiveness of electroconvulsive therapy was assessed by the psychiatrist using the CGI-S scale, used routinely for years at the Second Psychiatric Clinic at IPiN. Assessment on the CGI-S scale is routinely performed in the clinic 1-2 times/week. The study analyzed the CGI-S result before ECT treatment and after the completed series of ECT treatments. The evaluation was performed each time by the same two independent evaluators and their scores were consistent except in two cases when there was a slight discrepancy and the scores were averaged. Remission was defined as the resolution of depressive symptoms or the resolution of productive symptoms corresponding to the result on the CGI-S scale 1 (healthy) or 2 (almost healthy) [50-52]. Response (significant improvement) was defined as a reduction of symptom severity corresponding to the result on the CGI-S scale ≤ 3 [53], incomplete improvement was defined as symptom reduction corresponding to CGI-S ≥ 4, and worsening was defined as the intensification of depression or psychotic symptoms corresponding with a higher CGI-S score after ECT as compared to the baseline assessment.

Baseline disease severity assessed on the CGI-S scale in the study group was on average 5.54 (± 0.82) – severely ill/markedly ill. The average CGI-S score after ECT was 2.67 (± 1.28) – mildly ill/borderline mentally ill. The assessment of the effective-

ness of ECT therapy showed that this result changes significantly after ECT treatment (ATS (1) = 21.4, $p = 0.001$).

In the study group, 76.92% (n = 50) of patients responded to treatment, and 49.23% (n = 32) of patients achieved remission. No worsening defined as deterioration in CGI-S scale was observed in any case. Considering the fact that 93.8% (n = 61) of patients in the study group met the criteria for drug resistance, this improvement would in no way be possible during pharmacotherapy.

On average, 88% of shocks were effective in the study group (percentage of treatments considered effective on the basis of the duration of the seizures in relation to all treatments performed in a given patient). Regression analysis showed that the percentage of effective treatments in a given patient was strongly correlated with the effectiveness of ECT treatments in that patient measured as a change in the mean CGI-S score ($F(1, 64) = 3964$, $p < 0.0001$, beta = 0.97, $p < 0.001$, $R^2 = 0.98$), as well as a remission ($F(1, 64) = 3907$, $p < 0.0001$, beta = 0.99, $p < 0.001$, $R^2 = 0.99$) and a response rate ($F(1, 64) = 60500$, $p < 0.0001$, beta = 0.99, $p < 0.001$, $R^2 = 0.99$).

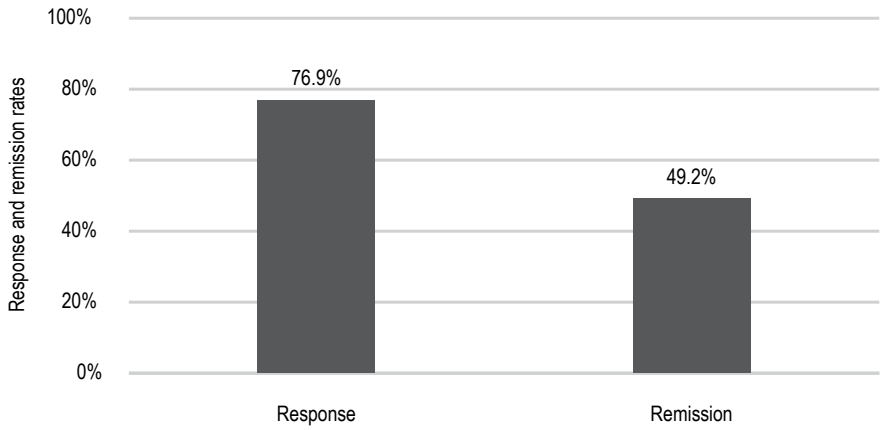

Figure 1. **Response and remission rates in the population of patients aged 65 years and older treated with electroconvulsive therapy**

Safety of ECT treatment

In the group of 65 patients undergoing ECT therapy, no serious complications such as death, life-threatening condition, necessity of hospitalization in another ward or permanent health damage were noted. Four patients did not complete the treatment due to the side effects. All complications resulting in discontinuation of treatment occurred in the group treated with bilateral procedures. The reasons for discontinuation of ECT were: arrhythmias (n = 1), disturbances of consciousness (n = 2) and increased blood pressure during the procedure (n = 1). In 5 patients, due to side effects (cardiovascular

side effects, mainly blood pressure increases), the technique of ECT procedure was switched from bilateral to unilateral and treatment was continued, with better tolerance. In 4 patients in whom ECT procedures were performed despite somatic contraindications (comorbidity of several somatic diseases, TIA one month ago, arrhythmia, unstable hypertension, features of pulmonary embolism, unstable diabetes) a series of 10-12 treatments was performed with good treatment tolerance (only transient increases in blood pressure were observed) and therapeutic effect.

Altogether, 47.7% (n = 31) of elderly patients experienced side effects. It is worth emphasizing that in most cases (88%) they were of low intensity and resolved without any specific treatment. However, in 4 patients (6.1% of the study group) they were intensified and it was decided to stop ECT. Table 4 presents the most common side effects observed in the study group.

Table 4. **Side effects of ECT in the population of patients aged 65 and older**

Side effects	Percentage of subjects (n = 65)
Increased blood pressure	55.4%(n = 36)
Memory impairment *	26.1% (n = 17)
Arrhytmias	23.1% (n = 15)
Disturbances of consciousness	18.5% (n = 12)
Headaches	10.8% (n = 7)

*Memory impairment reported by patients and/or observed by doctors (during ECT therapy and up to 2 weeks after finishing ECT).

Other side effects that occurred in this population were muscle pains and transient saturation decreases during the procedure.

Considering the type of ECT, it is worth noting that cardiac arrhythmias, disturbances of consciousness and memory impairment were more frequently observed in patients treated with bilateral vs. unilateral procedures; however, these differences did not reach statistical significance, perhaps due to too small and unequal groups of patients treated with different techniques.

Discussion

The effectiveness of electroconvulsive therapy in the elderly patient population

Electrocovulsive therapy has proved to be a highly effective treatment option in the elderly population. The response and remission rates in the elderly population were 76.92% and 49.23%, respectively. The results of the study confirm the data from the literature indicating that electroconvulsive therapy is an effective method of treatment even with the co-occurrence of somatic diseases and vascular and neurodegenerative changes in the CNS [22, 54]. A review of randomized clinical trials comparing ECT therapy and pharmacotherapy in the elderly patient population also pointed to ECT

therapy as more effective – 80-97% of patients achieved response in the course of ECT as compared to 63-73% in the group treated with pharmacotherapy [55]. According to some authors, the effectiveness of ECT in the elderly population may be even higher than in younger age groups [1, 56].

In studies in the elderly population, the rates of response were about 80%, and remission rates were estimated at 61-90% [29, 32, 33, 56]. Also in the study of Socci et al. [57] the rates of response and remission were 70% and 31%, respectively, in patients over 65 years old.

The efficacy of ECT in the population aged 65 or older in the presented study was slightly lower than expected and demonstrated in literature [58, 59]. There can be several reasons for this discrepancy – primarily the use of different research tools (different clinical assessment scales) and some discrepancies in defining remission and clinically significant improvement (response) according to these scales, retrospective assessment – used in this study or the use of different energy dosing methods (age-based method or titration methods).

In the presented study, the effectiveness of ECT procedures was not differentiated depending on the technique of performing procedures (unilateral vs. bilateral) due to the small number of patients in treatment groups. The comparison of the effectiveness and safety of unilateral and bilateral ECT procedures, along with a detailed analysis of the effects of these treatments on cognitive functions, was the subject of another study conducted at the IPiN and was discussed in another work, covering a smaller population [60]. Currently, in Europe and also in Poland, bilateral procedures are most often performed [61], although in some countries, e.g., in Germany, unilateral procedures are used as the first and standard option [62]. However, data from the last several years, as well as clinical observations, indicate that the use of ECT with the location of one-sided electrodes over the non-dominant hemisphere can be equally effective and additionally contribute to a further reduction in the incidence of memory impairment, disturbances of consciousness and cardiac arrhythmias [29, 32, 63].

Safety of electroconvulsive therapy in older patients

Electroconvulsive therapy, like every treatment method, is associated with the possibility of side effects occurrence. However, these symptoms are mostly mild, transient and do not pose a threat to life or health. Study results confirm that the percentages of complications and deaths in the population of patients undergoing ECT therapy are statistically smaller than in patients treated with antidepressants [49, 64]. Torring et al. [42] performed an analysis of studies from 32 countries and found that the total death rate associated with ECT was 2.1/100,000, which is lower than the rate referring to general anesthesia itself (3.4/100,000) [49]. In this analysis, the authors included research from both the 20th and 21st centuries, but it is worth noticing that the incidence of death estimated only for studies published in the 21st century is even

smaller and amounts to 0.2/100,000. Therefore, deaths related to ECT are an extremely rare adverse event.

Due to the fact that the cause of death and serious complications are most often cardiovascular complications, elderly patients are a population in which perioperative risk is increased. The presence of coronary artery disease, hypertension, heart failure and arrhythmias increases the risk of cardiac complications during anesthesia or during the period after the procedure. Therefore, patients over 65 years of age constitute a population that should be subjected to a more thorough somatic qualification procedure (extended e.g., by performing ECG Holter or echocardiogram). Somatic diseases, including cardiovascular disorders (post-myocardial infarction, atherosclerosis, coronary artery disease, heart failure, atrial fibrillation, arrhythmia) often occurred in as many as 72.3% of the study population above 65 years of age. Increase in blood pressure above 140/90 mmHg during at least one procedure was reported in 55.4% of patients and arrhythmias in 23% of patients. Cardiovascular side effects therefore appear to be a natural consequence of multiple underlying somatic diseases. In the presented study, the high percentage of side effects such as blood pressure increases can be partially explained by the meticulousness of the analysis. Side effect was reported if during any of the treatments RR increased above 140/90, or the increase of RR was at least 20 mmHg in the situation when baseline value was above 140/90. In other studies of this scope, no such restrictive criteria were used and only significant blood pressure increases were reported [33]. It is also worth noting that in the cited study of Grover et al. [33], as in some other studies, the population above 60 years of age, not above 65 was studied and defined as the population of elderly patients and it seems that this slightly younger population is significantly less somatically ill. In this study the average age of respondents was 70.6 years, so the studied population was older than in most of the cited studies [33, 58]. However, it should be emphasized that the presented study did not report any serious side effects or complications.

Similar percentages of side effects were shown in a retrospective study that included data on 107 patients over 60 years of age [1]. Antosik-Wójcińska and Święcicki (2016), comparing the safety of ECT in the population before and after 60 years of age, have shown that the risk of cardiac complications during ECT increased with the age of the patient. Petrides and Fink explained the increase in blood pressure caused by ECT with myotonic reflexes, epinephrine release from the adrenal medulla and direct stimulation of the sympathetic nervous system with the release of noradrenaline [48]. Concentrations of circulating catecholamines after an electric stimulus can be up to 15 times the baseline level [48]. In addition to changes in blood pressure and heart rate caused by these mechanisms, electroconvulsive therapy can potentially cause cardiac arrhythmias such as additional ventricular and supraventricular contractions, atrioventricular and intraventricular conduction disorders, and myocardial ischemia. Stern et al. have associated the incidence of ST segment depression, T wave reversal and additional ventricular contractions in patients undergoing ECT with increased myocardial oxygen demand in patients with varying degrees of coronary blood flow

restriction [65]. The incidence of cardiac arrhythmias appears to be inseparably linked to baseline cardiovascular diseases and age. For comparison, Rumi et al., when assessing the safety of ECT in a population of somatically healthy young people (mean age – 30.3 years) undergoing electroconvulsive treatments, did not report a single episode of arrhythmias in this population [66]. In this study, arrhythmias after ECT were reported in 19% of elderly patients, disturbances of consciousness occurred in approximately 3% and memory impairment in 22% of patients. Another retrospective analysis of 380 elderly patients over 70 years of age indicated a similar percentage of ECT side effects in the form of cardiovascular disorders (21%) [67]. The authors emphasized, that they were mostly mild and did not require any specific treatment. On the other hand, a significantly higher percentage of transient blood pressure increase (40%) was reported in a retrospective study involving 151 patients [33]. In yet another study, the authors also report more frequent disturbances of consciousness (37%) and memory impairment (41%) than in the presented study in older patients [68].

At this point, it is worth referring to why the presented study does not present an in-depth analysis of the impact of electroconvulsive treatments on cognitive functions in the elderly population. As noted in the introduction, the authors of the study wanted to collect as much data as possible on the effectiveness and safety of treatments, hence the adopted formula of a retrospective, naturalistic study. The problem of the impact of ECT treatments on cognitive functions was analyzed in another study, in which a detailed assessment of the battery of neuropsychological tests (including the assessment of autobiographical memory) was carried out in 29 patients [60]. The results of the neurocognitive assessment showed an improvement after ECT treatment in terms of general cognitive performance and verbal auditory memory (MMSE test and RAVLT) assessed 2-3 weeks after the end of ECT therapy, but no significant changes in the results of tests assessing visual-spatial functions, working memory and executive functions before and after ECT therapy were observed. The results of this autobiographical memory study conducted using the Autobiographical Memory Interview-Short Form (AMI-SF) questionnaire indicate a significant loss of memory coherence after ECT therapy, both in the unilateral and bilateral ECT groups. The adverse effect of ECT therapy was more pronounced in the group treated with bilateral procedures and concerned both semantic and episodic memory.

According to the authors and other researchers, the battery of tests used to accurately assess cognitive functions is not suitable for routine clinical practice [46]. The use of this type of assessment in all patients undergoing ECT is impractical, difficult and exhausting for the patient; therefore, it is not indicated in everyday practice. In addition, the assessment of autobiographical memory in patients with severe depression seems to be methodologically particularly difficult, and the use of the AMI-SF questionnaire used in clinical trials for this purpose in routine practice is, according to Verwijk et al., inadvisable [46]. However, it seems that the parameter indicating the risk of developing memory disorders in a patient after ECT is a prolonged reorientation time [69].

Conclusions

Conviction of numerous side effects of ECT therapy and perceptions of changes in the cognitive sphere in people undergoing this therapy are the main arguments opposite wider use of this method of treatment [70]. On the basis of the presented results and other studies on this subject [71], it can be unequivocally stated that ECT procedures in the population of patients without somatic burden may be safe, effective and well tolerated, and even advanced age and comorbidities should not exclude the use of this method of treatment. Electroconvulsive therapy (as confirmed in this study) is not a method without the risk of side effects; side effects can occur similar to pharmacotherapy, but ECT treatment gives a chance to achieve incomparably greater improvement than other methods. In addition, when there are premises indicating the need for rapid improvement (frequent suicidal thoughts and tendencies, psychotic symptoms, risk of deterioration of the somatic state), ECT becomes the first-choice treatment. ECT therapy is highly effective in elderly patients and can be a very good alternative to often ineffective or side-effect causing pharmacotherapy.

It is also worth considering that, in the case of patients who did not achieve a sufficient improvement of mental state in the course of ECT or in the case of somatically ill patients who do not qualify for ECT, an alternative could be to combine pharmacotherapy with cognitive-behavioral psychotherapy [72]. Looking at the results of the presented study in a broader perspective, it is worth noting that during the entire study in the IPiN only one patient over 65 years of age was treated with ECT for schizophrenia; mood disorders were by far the dominant diagnosis in the population treated with ECT. Based on the research conducted in the same Clinic in previous years, it can be concluded that this trend has continued for years [1, 71]. It would therefore be even more worthwhile to look at data from other Polish centers in order to gather a sufficiently large population, and in a multicenter study evaluate the effectiveness and safety of ECT procedures in the population of elderly patients with schizophrenia.

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