

The safety of electroconvulsive therapy in patients with asthma

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ABSTRACT

Background: Patients with depression and other psychiatric disorders being considered for electroconvulsive therapy (ECT) may also have asthma. Since ECT requires the administration of general anaesthesia, it is assumed that extra care should be taken with asthmatic patients before and during ECT. We sought to investigate the safety of ECT in asthmatic patients.

Methods: A retrospective review was conducted of the medical records of all of the patients with currently active and managed asthma who underwent ECT for severe depressive syndromes at Mayo Clinic, Rochester, Minnesota, between 1 January 1998, and 30 June 2006. **Results:** Thirty-four patients with asthma who also underwent ECT were identified. Of these, 27 (79%) were women. The median age was 45 years (range 23–84 years). All 34 patients were using asthma medications daily at the time of ECT. The 34 patients underwent a total of 459 ECT sessions. Four (12%) patients experienced exacerbation of their asthma on a total of five occasions. Each exacerbation was successfully treated with standard asthma medications, and all four patients completed their courses of ECT.

Conclusion: ECT in patients with asthma appears to be safe. Although exacerbation of asthma after ECT was rare in our series, a prospective study would be needed to determine the precise risk of pulmonary complications of ECT in asthmatic patients.

KEYWORDS

Asthma, electroconvulsive therapy, pulmonary complications, reactive airways disease

INTRODUCTION

Electroconvulsive therapy (ECT) is a commonly used psychiatric procedure for patients with severe depression or other syndromes.¹ Asthma is also a common condition; hence, ECT practitioners and clinicians who conduct preprocedure assessments of patients being considered for ECT should expect to encounter and manage some patients with asthma. However, only one case of an asthmatic patient treated with ECT has been reported.² ECT involves the administration of general anaesthesia; thus, one might expect more complications (e.g. bronchospasm) among asthmatic patients during and after ECT than in patients without asthma. Although ECT is a procedure with low morbidity and mortality,³ it is assumed that care (e.g. premedication with bronchodilators or continuous pulse oximetry monitoring) should be taken before and during ECT in patients with asthma. At Mayo Clinic, more than 3000 ECT sessions are conducted every year. Herein, we report our experience treating asthmatic patients with ECT. We also provide a set of recommendations for the preprocedural and intraprocedural management of asthmatic patients undergoing ECT.

METHODS

The Mayo Foundation Institutional Review Board granted permission to undertake this retrospective records review. A computerised search of the medical records of all patients who underwent ECT at our tertiary care academic medical institution between 1 January 1998 and 30 June 2006 identified any patient whose medical records also contained the term *asthma* (or a synonym such as *reactive airways disease*). Using an algorithm described previously,⁴ we further identified among these patients all of those who

had asthma. Patients were identified as having asthma if they met one or more of the following criteria in the year before having ECT: 1) a diagnosis of asthma in the hospital database; 2) the dispensing of two or more asthma-related medications (i.e. filling a prescription for one medication and refilling it within one year or filling prescriptions for two different medications); 3) an asthma-related visit to an emergency department or clinic. Asthma-related medications included β -agonist and corticosteroid inhalers, other inhaled anti-inflammatory drugs, and oral leukotriene inhibitors. Patients excluded from the current study were those who had a distant history of asthma but no symptoms of asthma and no recent (i.e. within one year) asthma-related clinic, emergency department, or hospital visits, and were not currently using asthma medications. Most of the other excluded patients did not have asthma but had another airway disease (e.g. chronic obstructive lung disease) or no airway disease at all. The medical records of the patients with asthma were then carefully reviewed, and relevant data were abstracted on the patients' demographic features, history and physical examination findings, and laboratory test results (e.g. pulmonary function tests (PFTs)). We also recorded any relevant data from the course of ECT, such as number of treatments and complications (e.g. respiratory distress). At our institution, patients for whom ECT is being considered have a preprocedure history taken and undergo a physical examination, blood tests (including a complete blood cell count and measurement of electrolytes), and an electrocardiogram. When indicated, further testing may include chest X-rays, PFTs, and cardiac stress tests. All patients take nothing by mouth after midnight the morning before each ECT session except for any necessary medications, which for asthmatics might include inhalers. The ECT technique at our institution begins with the administration of intravenous glycopyrrolate a few minutes before the treatment as an antisialagogue and to reduce the likelihood of bradyarrhythmia during and shortly after the ECT-induced seizure.⁵ General anaesthesia is usually induced with thiopental sodium but occasionally with methohexital sodium, etomidate, propofol, and, rarely, with sevoflurane in certain circumstances.⁶ Muscular paralysis is induced with succinylcholine chloride, a depolarising agent. Respiration is maintained using positive pressure ventilation with 100% oxygen and continuous-pulse oximetry. Continuous ECG and frequent blood pressure monitoring are also maintained. Patients are discharged from the postanesthesia care unit when their vital signs are stable, (airway) maintenance is unassisted, and level of consciousness is commensurate either with going back to their hospital room or to being dismissed home with an adult in attendance. Notably, patients with asthma who undergo ECT at our institution continue their asthma medications as prescribed by their primary clinician throughout the ECT course.

RESULTS

The computerised search of the medical records of all patients who had ECT between 1 January 1998 and 30 June 2006 identified 102 patients whose medical records also included the word *asthma*. Of these 102 patients, 34 were determined to have currently active and managed asthma. The demographic and clinical features of the 34 patients with asthma who underwent ECT are summarised in *table 1*. For all 34 patients, the indication for ECT was a depressive syndrome. Of the 34 patients, 27 (79%) were women. Their median age was 45 years (range 23-84 years). Nine patients (26%) were smokers. All 34 patients were using asthma medications daily at the time they had ECT. Twenty-eight patients (82%) were using inhaled corticosteroids daily. Thirty-three patients (97%) were using inhaled β -agonists regularly. Overall, the 34 patients underwent 459 ECT sessions. The median number of treatments per patient was eight (range 2-61). The reasons for such a wide range of ECT sessions included the withdrawal of some patients from ECT before completion of the series of treatments and the use of maintenance ECT in some patients because of their history of recurrent, medication-refractory depression. For all 34 patients, ECT was well tolerated and free from intraprocedural complications. Four patients (12%) experienced a total of five postprocedure exacerbations of asthma. Only one of these four patients was a smoker. An upper respiratory tract infection developed in two patients. One patient (patient 2) developed wheezing after the first ECT session. She was treated with antibiotics and an inhaled corticosteroid, and she had to use bronchodilators more often. Although her second ECT session was delayed for three days, she ultimately completed her course of ECT. The other patient (patient 34) developed dyspnoea and wheezing after the third ECT session. She improved after treatment with a nebulised β -agonist bronchodilator. After her fourth ECT session, the dyspnoea recurred. She also developed a cough with clear sputum production. Physical examination revealed clear lung fields, and a chest X-ray was unremarkable. She was treated with antibiotics and inhaled salmeterol xinafoate, and her symptoms promptly improved. She completed her course of ECT without delay or further respiratory problems. In the third patient (patient 23), wheezing developed after an ECT session. It was successfully treated with the regular administration of an inhaled β -agonist. Her symptoms resolved, and she completed the course of ECT without delay. The fourth patient (patient 24), a smoker, underwent several courses of ECT. She experienced one asthma exacerbation during each of two different courses of ECT. Both exacerbations were successfully controlled with the scheduled regular administration of an inhaled β -agonist, and she was able to complete each course of ECT without delay. Notably, when patient 17 was admitted to the inpatient psychiatry unit before undergoing ECT, she was

Table 1. *Characteristics of 34 patients with asthma who had electroconvulsive therapy*

Patient no.	Age (years)	Sex	ECT treatments, no.	Smoking status	Daily asthma medications*
1	40	F	6	Yes	Fluticasone propionate and salmeterol xinafoate
2	55	F	5	No	Fluticasone and albuterol sulphate Oral montelukast sodium
3	42	F	6	No	Fluticasone, salmeterol, and albuterol
4	23	F	9	Yes	Albuterol
5	32	F	6	Yes	Fluticasone, salmeterol, albuterol, and tiotropium bromide
6	40	F	5	Yes	Fluticasone and albuterol
7	37	F	44	No	Fluticasone and albuterol
8	67	F	15	No	Fluticasone and salmeterol Ipratropium bromide and albuterol Oral montelukast and corticosteroids
9	39	M	8	No	Salmeterol and albuterol
10	58	F	7	No	Fluticasone and albuterol
11	57	F	4	No	Triamcinolone acetonide, salmeterol, albuterol, and ipratropium
12	42	F	19	No	Fluticasone and albuterol Oral corticosteroids
13	25	F	2	No	Budesonide, salmeterol, and albuterol
14	48	M	28	Yes	Fluticasone, salmeterol, and albuterol
15	33	F	16	No	Salmeterol
16	49	F	6	No	Fluticasone and albuterol
17	35	F	7	Yes	Albuterol
18	28	M	32	No	Albuterol Oral montelukast
19	47	M	5	No	Triamcinolone, salmeterol, and albuterol
20	45	F	25	Yes	Fluticasone, salmeterol, and albuterol Oral corticosteroids
21	32	F	7	No	Flunisolide and albuterol
22	53	F	11	No	Triamcinolone and albuterol
23	61	F	61	No	Budesonide, salmeterol, and albuterol
24	41	F	22	Yes	Triamcinolone, salmeterol, and albuterol
25	60	M	3	No	Fluticasone and albuterol
26	71	F	6	No	Budesonide, salmeterol, and albuterol Oral montelukast
27	62	M	7	Yes	Fluticasone and albuterol
28	84	F	11	No	Fluticasone
29	34	F	10	No	Fluticasone and albuterol
30	45	M	8	Yes	Fluticasone, salmeterol, and albuterol
31	38	F	6	No	Fluticasone, salmeterol, and albuterol
32	64	F	8	No	Fluticasone and albuterol
33	45	F	16	No	Triamcinolone and salmeterol
34	47	F	8	No	Salmeterol and albuterol

ECT = electroconvulsive therapy; F = female; M = male. *Inhalants unless otherwise indicated.

actively wheezing. For the first several days after admission, she received scheduled inhaled β -agonist treatments more frequently than her usual regimen, resulting in prompt resolution of her symptoms. She started and completed her course of ECT without delay.

DISCUSSION

Little extant medical literature informs clinicians about the risk and management of pulmonary complications in patients with asthma who are undergoing ECT. Such

reports exist, however, for the surgical setting. In the surgical setting, risk factors for postprocedure pulmonary complications include recent asthma symptoms, recently added medications, therapy in a medical facility for asthma symptoms, and a history of endotracheal intubation for asthma.⁷ Airway instrumentation (specifically endotracheal intubation) may cause intraoperative bronchospasm in patients with asthma.⁸⁻¹⁰ The overall risk of bronchospasm and other pulmonary complications appears to be low in patients with stable asthma.¹¹ Face masks and laryngeal mask airways are associated with less airway hyperreactivity.^{12,13} Our report is the first to consider a series

of patients with asthma who have had ECT. We found ECT to be safe and well tolerated by 34 asthmatic patients who underwent 459 ECT sessions. Only four patients experienced five postprocedure asthma exacerbations, all of which were successfully treated, allowing all four patients to complete their respective courses of ECT. Our findings suggest that for patients with currently active and medically managed asthma, there is a low risk of pulmonary complications during or after ECT, which does not involve routine intubation and lasts only a few minutes. On the basis of the literature and our findings, we have several recommendations for the medical management of patients with asthma who are being considered for ECT. Before ECT, each patient should have a thorough medical history taken and undergo a complete physical examination which, in turn, should provide guidance about the need for additional testing. The patient should be asked about asthma exacerbation triggers (e.g. cold or exertion), the frequency of asthma exacerbations, and the intensity of the treatment required after exacerbation (e.g. visits to hospital emergency department). Patients should be asked about their current medication use (e.g. type, dose, and frequency) and their need for systemic corticosteroids. Patients should also be asked about their current symptoms and any recent history of upper respiratory tract infections. Many clinicians obtain PFTs in asthmatic patients before surgical and other procedures (including ECT). However, PFTs may have findings that are within the normal limits in patients who have well-controlled asymptomatic asthma, and normal findings of PFTs do not rule out bronchial hyperreactivity.¹⁴ Furthermore, PFTs do not always produce findings that correlate with the severity or frequency of asthma symptoms.¹⁵ Nevertheless, PFTs may provide useful information to clinicians who are managing patients undergoing ECT. For example, if the forced expiratory volume in one second improves more than 15% after administration of an inhaled β -agonist, the patient should receive treatment with an inhaled β -agonist before surgery; if the patient is already being treated with an inhaled β -agonist, the patient's asthma regimen should be intensified.¹⁶ However, prospective data are not available on the utility of this approach for patients with asthma undergoing ECT. The medical management of patients with persistent asthma, regardless of severity, should include inhaled corticosteroids, and evidence suggests that adding a long-acting β -agonist to an inhaled corticosteroid improves lung function, lessens asthma exacerbations, and reduces the need for rescue therapy.¹⁷ Indeed, most of our patients were taking this combination of medications. Although it seems reasonable to administer inhalers prophylactically before an ECT session, there is little published support for this practice. However, a study in adult patients with asthma who were not already using daily asthma medications found that those who were given

a combination of both oral steroids and inhaled β -agonists had a marked reduction in bronchospasm evoked by tracheal intubation, which supports the notion that such patients should receive preoperative therapy.¹⁸ Actively wheezing patients require more aggressive treatment, such as regular and more frequent administration of inhaled β -agonists.¹¹ Precipitating factors (e.g. respiratory infection) should be treated. In fact, the five asthma exacerbations that occurred in four of our patients following ECT sessions were treated successfully, allowing all four patients to ultimately complete their courses of ECT. Smokers who have moderate to severe airway obstruction on preprocedure PFTs have more bronchospasm during and after anaesthesia for surgical procedures, which suggests a low threshold for intensifying asthma regimens in these patients.⁸ However, only one smoker in our series experienced pulmonary complications after an ECT session. Our series is too small to determine whether the four patients who experienced pulmonary complications differ from those who did not experience complications. However, three of the four patients in our series were managed with three asthma medications; the other patient was a smoker managed with two asthma medications. These features suggest more active asthma. However, many other patients who were managed with three or more asthma medications or were smokers or both did not experience pulmonary complications. Special mention should be made of the methylxanthines (e.g. theophylline). These agents are no longer the first-line medication for management of asthma, and they have the potential for clinically significant toxicity.¹⁹ Theophylline has a narrow therapeutic index, and clinicians should consider discontinuing this agent 24 hours before ECT to reduce the risk of status epilepticus.²⁰⁻²³ In addition, fluorinated volatile anaesthetics can cause ventricular arrhythmia in patients receiving theophylline, so it would be best to use intravenous induction in such patients.²⁴ None of our patients were taking theophylline. Notably, there is some evidence that induction of general anaesthesia with propofol substantially reduces the incidence of wheezing after induction compared with barbiturate induction, probably because thiobarbiturates may release some histamine.^{25,26} Our study has a number of limitations. An important limitation is its retrospective design. For example, asthmatic patients with depression may not have been offered ECT because of their asthma. Also, some asthmatic patients offered ECT may have refused it out of concern about exacerbating their asthma. These patients would not be included in our analysis. Furthermore, although we used an algorithm described previously⁴ to identify patients with asthma for our study, we excluded patients with a history of asthma that had been inactive for more than one year (e.g. not using asthma medicines). Hence, these patients who might have experienced peri-ECT pulmonary complications related to their prior

histories of asthma would not be included in our analysis. If anything, however, excluding these patients from our analysis likely biases our results toward finding more pulmonary complications because our patient population had currently active and managed asthma. Yet, we found that only four of our patients (12%) experienced pulmonary complications while undergoing a large number of ECT sessions. Nevertheless, only a prospective study would be able to determine with precision the risk of pulmonary complications in patients with asthma who undergo ECT.

ACKNOWLEDGMENT

Editing, proofreading, and reference verification were provided by the Section of Scientific Publications, Mayo Clinic.

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