

# Does a History of Surgically Repaired Intracranial Aneurysm Interfere with Electroconvulsive Therapy?

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## ABSTRACT

Does a history of surgically repaired intracranial aneurysm interfere with electroconvulsive therapy?

Electroconvulsive therapy (ECT) is a comparably safe treatment option frequently administered for treatment-refractory mental disorders. It has no absolute contraindication; however, careful attention should be given when ECT is applied to patients with comorbid conditions. Intracranial aneurysms are among the comorbidities that increase certain risks associated with ECT. Increase in cerebral blood flow during ECT may be associated with increased risk of rupture of an aneurysm and bleeding from vascular malformation. In the literature, there is a limited number of case reports on ECT administration in patients with surgically repaired cerebral aneurysm. In this case report, application of ECT in a 53-year-old female patient diagnosed with treatment-refractory major depressive disorder and with a history of surgical repair for intracranial aneurysm is presented. In addition, special considerations and precautions about ECT application for patients with repaired intracranial aneurysms are reviewed.

**Keywords:** Depression, electroconvulsive therapy, intracranial aneurysm

## Öz

Geçirilmiş intrakranial anevrizma operasyonu elektrokonvülfif tedavi için bir engel mi?

Elektrokonvülfif tedavi (EKT) tedaviye dirençli ruhsal bozukluklarda uygulanan, görece güvenli bir tedavi yöntemidir. Kesin kontrendikasyonu bulunmasa da tıbbi ek tanıları olan hastalarda EKT uygulanırken dikkatli davranılması gerekmektedir. Intrakranial anevrizma, EKT uygulanırken risk oluşturabileceği düşünülen tıbbi tanılarıdır. EKT sırasında serebral kan akımı ve kafa içi basınç artarak anevrizma rüptürü ve vasküler malformasyon kanaması riskini artırabilir. Tıbbi yazında çeşitli yöntemlerle onarılmış intrakranial anevrizması olan hastalara EKT uygulanmasıyla ilgili sınırlı sayıda olgu sunumu mevcuttur. Bu yazıda 53 yaşında, anevrizma operasyonu öyküsü olan, majör depresif bozukluk tanısı ile takip edilen, ilaç tedavisinden yarar görmemiş kadın hastada yapılan EKT uygulaması sunulmuş ve bu vaka üzerinden intrakranial anevrizması olan hastalarda EKT uygulaması sırasında dikkat edilecek hususlar tartışılmıştır.

**Anahtar kelimeler:** Depresyon, elektrokonvülfif tedavi, intrakranial anevrizma



**How to cite this article:** Karakaya I, Basar K, Erden-Aki O, Ozer S. Does a history of surgically repaired intracranial aneurysm interfere with electroconvulsive therapy? Dusunen Adam The Journal of Psychiatry and Neurological Sciences 2018;31:308-311.  
<https://doi.org/10.5350/DAJPN2018310310>

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Date of receipt / Geliş tarihi:  
October 2, 2017 / 2 Ekim 2017

Date of the first revision letter /  
İlk düzeltme öneri tarihi:  
October 20, 2017 / 20 Ekim 2017

Date of acceptance / Kabul tarihi:  
January 4, 2018 / 4 Ocak 2018

This case report was presented as a poster proceeding at the 48<sup>th</sup> National Psychiatry Congress.

## INTRODUCTION

Use of electroconvulsive therapy (ECT) is shown to be very effective and safe in the treatment of psychiatric disorders (1-3). Despite having no absolute contraindication, ECT may lead to aneurysm rupture or vascular malformation hemorrhage by increasing intracranial blood flow (4). During ECT, increase in mean

arterial blood pressure, heart rate, and levels of epinephrine and norepinephrine are seen (2). Cerebral blood flow may rise to 1.5-1.7 times its basal levels during the procedure, which increases the risk for vessel wall injury (2). The risk is even greater in patients with intracranial vascular malformation (3). In the medical literature, a limited number of case reports is available regarding administration of ECT to subjects with

intracranial aneurysm that have been repaired by a variety of methods (3,5,6). This case report presents a treatment-resistant major depression patient who had prior intracranial aneurysm surgery and was previously considered to be a high-risk patient for ECT. We evaluate the patient for ECT while also presenting measures taken against possible risks in the ECT application process.

## CASE

A 53-year-old woman presented to the psychiatric outpatient clinic with complaints of lack of energy, unwillingness, withdrawal, inability to enjoy, despair, thoughts of inadequacy, and tediousness. She was a housewife, married with two children, and her education level was primary school.

Medical history showed that the patient had been using sertraline and fluoxetine since being diagnosed with depression 15 years earlier. Her complaints had decreased to some extent, but not completely resolved. It was understood that tests performed upon complaints of headache episodes and high blood pressure 10 years before had revealed a ruptured intracranial aneurysm of the right middle cerebral artery (MCA), which was repaired by clips. After the operation, the patient's depressive complaints increased with emergence of suicide attempt and self-mutilation behavior, psychogenic episodes, and some dissociative symptoms. The patient was referred to the psychiatry clinic because of deteriorated depressive mood, upon which she received a diagnosis of major depression and was offered antidepressant therapy. Medication history also showed antiepileptic medication (levetiracetam 1500mg/day) for epileptic episodes starting after the surgical intervention.

The patient was first hospitalized 6 years ago due to relapse of depression and suicide attempt after she had discontinued the drugs because she thought them not to be useful. She was diagnosed with treatment-refractory major depression and ECT was planned. Brain imaging demonstrated a clipped aneurysm of the right MCA, diffuse laminar necrosis, and cystic encephalomalacic changes in regions supplied by the right MCA. The neurosurgery department stated that

the clipped aneurysm might re-canalize during ECT, and that the patient had an intermediate-high risk. The patient was discharged with medical treatment, using fluoxetine 20mg/day, venlafaxine 300mg/day, tianeptine 37.5mg/day, paroxetine 40mg/day, sertraline 200mg/day, mirtazapine 30mg/day, and agomelatine 50mg/day in effective durations. For reinforcement, quetiapine 300mg/day, lithium, and modafinil were added. The patient was re-hospitalized after no marked response was obtained.

Mental state examination after admission indicated that the clothing was compatible with her socioeconomic status, self-care was partially reduced, speech speed and tone were slowed, her mood was depressed, affection was consistent with her mood, her associations were regular, there was no aberrant perception, and the content of thought was predominated by depression and death-related thoughts. Agomelatine was discontinued prior to ECT and the dose of lamotrigine was reduced from 100mg/day to 50mg/day upon consulting with the neurology department due to its effect on the seizure threshold. A total of 20 ECT sessions were applied in a twice-weekly rhythm, of which the initial three were implemented in the operation room. Mecta Spectrum 5000Q (USA/Canada) was utilized for ECT procedure. Anesthesia was established with thiopental 5mg/kg, and succinylcholine 1mg/kg was used as a muscle relaxant. Continuous monitoring was performed before, during, and after the procedure. Antihypertensive medications (carvedilol, doxazosin, furosemide, and irbesartan-hydrochlorothiazide) used by the patient were administered before the procedure. The heart rate was maintained between 60-90 beats per minute and systolic blood pressure between 90-120mmHg before the session. During the first session, the patient's systolic blood pressure escalated up to 180-190mmHg, which was intervened with intravenous glyceryl trinitrate; in subsequent sessions, transdermal glyceryl trinitrate was administered as pre-medication. Short episodes of blood pressure elevations observed during ECT were resolved with intravenous esmolol and glyceryl trinitrate. The headache seen after sessions responded to paracetamol

treatment. The patient developed chest pain after one session, but biomarkers of cardiac damage and electrocardiogram were found to be normal. The patient's main complaint was forgetfulness. No other complications were observed.

Upon reduced scale scores and subjective complaints of the patient as of the sixth session, the patient was thought to have benefited from reduced ECT, which was continued with the aim of remission. A Hamilton Depression Rating Scale (HDRS) score of 30/54 and a Beck Depression Inventory (BDI) score of 50/62 before the ECT were reduced to 14/54 and 24/62, respectively, at the end of treatment. Although the patient did not become euthymic after ECT, the therapy was terminated at the end of the 20<sup>th</sup> session as the last sessions proved not to provide additional benefits for her well-being (no significant reductions in scale scores).

Though maintenance ECT is thought to be a more appropriate choice against recurrence risk, it was planned to follow the patient by medical treatment due to an increased risk of epileptic seizure by administering low-dose antiepileptic medication. Paroxetine 20mg/day was started as this was thought to be the most useful drug before ECT. The neurology department recommended 200mg/day maintenance dose of lamotrigine for epilepsy. The dose of paroxetine was increased to 40mg/day during follow-up. At the 6-month visit, the patient still had depression while showing no deteriorated symptoms; and she has continued to be under our monitoring with a diagnosis of major depressive disorder in partial remission.

## DISCUSSION

ECT is an effective treatment option used in mental disorders that are resistant to drug treatment or where medications could not be used for various reasons (4,7). Although ECT does not have an absolute contraindication, there are situations that increase the risk of complications. Intracranial aneurysms are listed among the factors that increase the risk of complication of ECT (1,4).

The literature reports cases of intracerebral aneurysm detected before and after the performance

of ECT (8,9). There are also case presentations describing the application of ECT in patients whose intracerebral aneurysms had been repaired by clipping and ventriculoperitoneal shunt (4-10). In a study of 15 patients with intracranial aneurysms, no subject was reported to develop ECT-related complications (5). In the majority of these cases, arterial blood pressure-lowering interventions were added to the treatment, and it was underlined that ECT was a safe method when the blood pressure was carefully monitored (5). Two cases whose intracranial aneurysms were repaired by clipping were administered esmolol to lower the blood pressure, and no development of ECT-related complications was reported (9). In addition, while approximately 5% of the adult population has intracranial aneurysms (varying between 0.2-9.9% in autopsy studies), no ruptured aneurysms induced by ECT have been reported (11). This is thought to be due to the restoration of the increased arterial blood pressure to normal ranges during ECT by administering medication (12).

The blood pressure was also closely followed in our case. Although propofol is preferred as an anesthetic agent in the literature for being more reliable in terms of hemodynamic stability, it is known to increase the seizure threshold and shorten the seizure duration (13). Considering current antiepileptic medication used by the patient, thiopental was chosen as it is known to increase the seizure threshold less (13). Although there are no definite data on how to adjust the anticonvulsant dose used during ECT, some studies have shown that the seizure thresholds of patients receiving ECT and anticonvulsant therapy concomitantly were higher and that the number of ECT sessions was increased and the length of hospital stay prolonged compared with those who did not receive combined therapy (14). The patient was using the anticonvulsant drug lamotrigine because of an epileptic seizure that he had had before rather than as a mood stabilizer. Therefore, the dose of lamotrigine was reduced to 50mg/day from 100mg/day in consultation with the neurology department. The ECT was applied to the patient with two sessions per week, as suggested in many studies (15). A number of studies recommend ECT to be administered with an

average of 7-12 sessions (15). However, a higher number of sessions is also known to be applied for some more refractory cases (16,17). In fact, ECT administration was also continued till the 20th session, considering the patient's limited response to other treatment modalities. The patient developed no significant ECT-related complications in any of the sessions where effective seizure control was observed.

In conclusion, ECT may be considered a therapeutic option even in patients with an increased risk for ECT-induced complications due to intracranial aneurysm. It should be performed after comprehensive assessment and under close monitoring. Control of blood pressure during the procedure, intervening without delay in short episodes of blood pressure rise, and precautions with premedication if necessary will provide a safer application of ECT. ECT is still an alternative treatment option in cases that do not respond to other treatments, especially if the risk of suicide remains.

## REFERENCES

- American Psychiatric Association. The Practice of Electroconvulsive Therapy: Recommendations for Treatment, Training and Privileging: A Task Force Report of the American Psychiatric Association. Second ed. Washington DC: American Psychiatric Association, 2001.
- Gaines GY, Rees DI. Electroconvulsive therapy and anesthetic considerations. *Anesth Analg* 1986; 65:1345-1356. [\[CrossRef\]](#)
- Okamura T, Kudo K, Sata N, Sameshima T, Doi N, Kato N. Electroconvulsive therapy after coil embolization of cerebral aneurysm: a case report and literature review. *J ECT* 2006; 22:148-149. [\[CrossRef\]](#)
- van Herck E, Sienaert P, Hagon A. Electroconvulsive therapy for patient with intracranial aneurysms: a case study and literature review. *Tijdschr Psychiatr* 2009; 51:43-51. (Dutch)
- Sharma A, Ramaswamy S, Bhatia SC. Electroconvulsive therapy after repair of cerebral aneurysm. *J ECT* 2005; 21:180-181. [\[CrossRef\]](#)
- Salaris S, Szuba MP, Traber K. ECT and intracranial vascular masses. *J ECT* 2000; 16:198-203. [\[CrossRef\]](#)
- Mayor S. ECT may be better than drugs for short term depression. *BMJ* 2003; 326:569. [\[CrossRef\]](#)
- Bader GM, Silk KR, Dequardo JR, Tandon R. Electroconvulsive therapy and intracranial aneurysm. *Convuls Ther* 1995; 11:139-143.
- Drop LJ, Bouckoms AJ, Welch CA. Arterial hypertension and multiple cerebral aneurysms in a patient treated with electroconvulsive therapy. *J Clin Psychiatry* 1998; 49:280-282.
- Najjar F, Guttmacher LB. ECT in the presence of intracranial aneurysm. *J ECT* 1998; 14:266-271. [\[CrossRef\]](#)
- The International Study of Unruptured Intracranial Aneurysms Investigators. Unruptured intracranial aneurysms--risk of rupture and risks of surgical intervention. *N Engl J Med* 1998; 339:1725-1733. [\[CrossRef\]](#)
- Wilkinson ST, Helgeson L, Ostroff RB. Electroconvulsive therapy and cerebral aneurysms. *J ECT* 2014; 30:47-49. [\[CrossRef\]](#)
- Stadtland C, Erfurth A, Ruta U, Michael N. A switch from propofol to etomidate during an ECT course increases EEG and motor seizure duration. *J ECT* 2002; 18:22-25. [\[CrossRef\]](#)
- Rakesh G, Thirthalli J, Kumar CN, Muralidharan K, Phutane VH, Gangadhar BN. Concomitant anticonvulsants with bitemporal electroconvulsive therapy: a randomized controlled trial with clinical and neurobiological application. *J ECT* 2017; 33:16-21. [\[CrossRef\]](#)
- Frey R, Schreinzer D, Heiden A, Kasper S. Use of electroconvulsive therapy in psychiatry. *Nervenarzt* 2001; 72:661-676. (German) [\[CrossRef\]](#)
- Ceylan ME, Oral ET. *Biological Psychiatry in Research and Clinical Application: Mood Disorders*. First ed., vol. 4, Istanbul: Yesilyurt Kitabevi, 2001, 401. (Turkish)

| Contribution Categories |                                   | Author Initials          |
|-------------------------|-----------------------------------|--------------------------|
| Category 1              | Concept/Design                    | I.K., K.B.               |
|                         | Literature review                 | I.K., K.B.               |
|                         | Data analysis/Interpretation      | I.K., K.B.               |
|                         | Case follow-up (if applicable)    | I.K., K.B., O.E.A., S.O. |
| Category 2              | Drafting manuscript               | I.K.                     |
|                         | Critical revision of manuscript   | K.B., O.E.A., S.O.       |
| Category 3              | Final approval and accountability | I.K., K.B., O.E.A., S.O. |
| Other                   | Technical or material support     | N/A                      |
|                         | Supervision                       | K.B., O.E.A., S.O.       |
|                         | Securing funding (if applicable)  | N/A                      |

**Informed Consent:** Written consent was obtained from the participants.

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** Authors declared no conflict of interest.

**Financial Disclosure:** Authors declared no financial support.