

Eclampsia-Induced Posterior Reversible Encephalopathy Syndrome in a Donor Oocyte Recipient

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Abstract

Objective: Posterior reversible encephalopathy syndrome (PRES) has been robustly associated with preeclampsia, hyperperfusion or endothelial dysfunction suggested as possible mechanisms. In this article, we report an illustrative case of this complication in a patient with risk factors for hypertensive disorders in pregnancy, including advanced maternal age and donor oocyte fertilization.

Case report: We present a case of a 40-year-old pregnant, donor oocyte recipient with sudden decreased visual acuity accompanied by hypertension, proteinuria and tonic-clonic seizures. Magnetic resonance imaging (MRI) of the brain showed bilateral lesions in the parieto-occipital regions suggestive of vasogenic edema, leading us to suspect posterior reversible encephalopathy syndrome. The patient underwent an emergency cesarean section and labetalol and magnesium sulfate were administered intravenously. The neurological symptoms and radiological findings resolved following delivery and the patient's blood pressure normalized, supporting the diagnosis of posterior reversible encephalopathy syndrome.

Conclusion: Pregnancy by donor oocyte fertilization may entail a higher risk of eclampsia and associated posterior reversible encephalopathy syndrome.

Keywords: Oocyte Donation; Posterior Reversible Encephalopathy Syndrome; Eclampsia

Introduction

Donor oocyte fertilization has been proposed to confer a higher risk of pregnancy-induced hypertension and preeclampsia (1–6). Due to the progressively advanced maternal age in industrialized countries and the increased use of assisted reproductive technologies, these disorders may become more frequent in clinical practice (4, 5). Posterior reversible encephalopathy syndrome (PRES) is a clinico-radiological syndrome

characterized by white matter vasogenic edema and neurological symptoms including seizures, visual alterations, and headache (7). It is associated with preeclampsia, eclampsia, renal failure, blood pressure fluctuations, autoimmune disorders, and the use of some cytotoxic drugs, among other factors (8). Although the pathophysiology of posterior reversible encephalopathy syndrome is not fully understood, studies have proposed cerebral hyperperfusion and endothelial dysfunction as possible mechanisms (7). In this case report, we emphasize the importance of including posterior reversible encephalopathy syndrome in the differential diagnosis of acute neurological symptoms during pregnancy.

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Case report

A 40-year-old woman in the 35th week of gestation following donor oocyte in-vitro fertilization was admitted to the emergency room following an episode of tonic-clonic seizures. Her past medical and obstetrical history was unremarkable: there was no history of prior pregnancies and infertility was due to poor ovarian reserve, her body mass index was 28 kg/m² and she had received appropriate prenatal care with no evidence of complications during follow-up.

On arrival, the patient presented with a Glasgow Coma Scale score of 15 and reported reduced vision and a dull headache. Her blood pressure was high (240/135 mmHg) and fetal heart rate monitoring was normal. Peripheral intravenous access was established, and hemodynamic stability was achieved following treatment with intravenous perfusion of labetalol 1mg/minute and intravenous magnesium sulfate 2g/hour. Clinical examination showed decreased visual acuity in both eyes with normal pupillary responses, no other neurological deficit was found. Urgent laboratory tests were notable for a slightly low platelet count (106000/uL), and elevated liver enzymes (aspartate aminotransferase 188 IU/L, alanine aminotransferase 247 IU/L) and proteinuria (protein/creatinine ratio 3.2 mg/mg) on urinalysis, leading to the suspicion of eclampsia. Following hemodynamic stabilization, the patient underwent an emergency cesarean section without complications. The surgery was performed under epidural anesthesia with bupivacaine 10 mg and fentanyl 10 µg, and the newborn was healthy following delivery.

However, the patient continued to experience decreased visual acuity with reactive pupils after intervention. A fundoscopic examination was conducted with unremarkable results, but a magnetic resonance imaging brain scan performed the same day revealed bilateral hyperintensities in the parieto-occipital region, basal ganglia and thalamus on a T2-fluid-attenuated inversion recovery (FLAIR) sequence with no restricted diffusion, suggestive of vasogenic edema (Figure 1-A).

Following the algorithm proposed by Fugate and Rabinstein (8), and given the presence of acute neurological symptoms in a patient with suggestive radiological findings and the precipitating condition of eclampsia, a diagnosis of probable posterior reversible encephalopathy syndrome was

established. The patient's blood pressure was managed with labetalol 200 mg orally twice daily and amlodipine 10 mg orally once a day, which was subsequently reduced to labetalol 100 mg orally twice daily due to the progressive normalization of blood pressure levels.

No antiepileptic treatment was administered, and the patient experienced no further seizures during hospitalization. She recovered full visual acuity and her blood pressure levels returned to normal within seven days of antihypertensive treatment. Another magnetic resonance imaging brain scan on the seventh day showed resolution of the radiological findings previously observed (Figure 1-B), thus confirming the diagnosis.

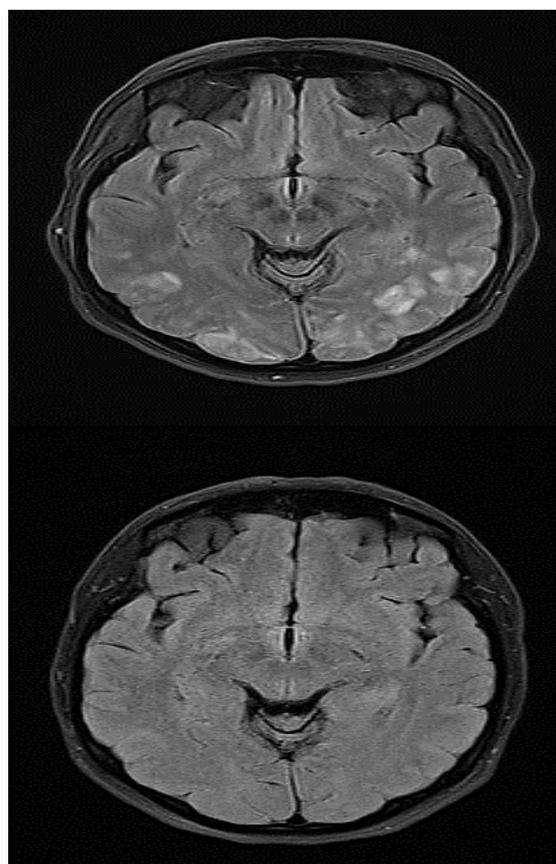


Figure 1. A. Axial T2-fluid-attenuated inversion recovery (FLAIR) MRI shows bilateral, symmetrical, cortico-subcortical hyperintensities in both occipital lobes (arrows) compatible with vasogenic edema. B. Axial FLAIR MRI performed seven days later, showing complete resolution of the hyperintense lesions present in the previous study, with no appearance of new lesions.

The neurological examination was unremarkable at discharge, and a follow-up appointment at the neurology outpatient clinic was scheduled for clinical assessment two months later, where the patient remained asymptomatic.

Discussion

Posterior reversible encephalopathy syndrome usually presents as reversible vasogenic edema, predominantly affecting the occipital lobes in a symmetrical pattern (8). The leading theory on its pathophysiology suggests that elevated blood pressure levels lead to hyperperfusion contributing to blood-brain barrier dysfunction with extravasation of plasma, resulting in vasogenic edema (7). However, hypertension is absent in up to 20% of patients with posterior reversible encephalopathy syndrome, and some authors have proposed that the endothelial dysfunction may be caused by an inflammatory response leading to leukocyte activation and the release of cytokines such as tumoral necrosis factor α , interleukin 1 and interferon γ (7, 8). Preeclampsia is a well-established condition associated with posterior reversible encephalopathy syndrome, related to risk factors including advanced maternal age and assisted reproductive technologies (9), both present in our patient.

The increasing maternal age in industrialized countries has made donor oocyte fertilization a widespread assisted reproductive technology (4, 5), and the number of pregnancies in donor oocyte recipients is steadily rising, with a mean age of 41 in the United States (10, 11). Other cases of eclampsia and posterior reversible encephalopathy syndrome following donor oocyte fertilization similar to that presented in this report have been described, reinforcing the hypothesis that this reproductive technique is an independent risk factor for hypertensive disorders in pregnancy (1–3). Pecks et al. reported a higher risk of pregnancy-induced hypertensive disorders in donor oocyte recipients with an odds ratio of 6.60 (95% CI, 4.55-9.57) compared to non-recipients, and an odds ratio of 2.57 (95% CI, 1.91-3.47) compared to women undergoing other assisted reproductive technologies (12).

The prognosis of posterior reversible encephalopathy syndrome is usually favorable, with up to 90% of patients achieving full recovery, although the nature of the outcome is primarily related to the underlying condition (7, 8). Posterior reversible encephalopathy syndrome secondary to preeclampsia appears to have better prognosis than

that related to immunosuppressive treatment or autoimmune disorders, with most patients achieving full clinical recovery (12, 13), as occurred in the case described in this report. However, some studies have reported a mortality rate of 3-6% in severe forms of the disorder, as well as persistent seizures and decreased visual acuity (8).

In a retrospective study of severe posterior reversible encephalopathy syndrome patients requiring admission to an intensive care unit, a longer time to causative factor control was associated with poorer outcomes (14). Preeclampsia is associated with an increased risk of postpartum hypertension and peripartum cardiomyopathy in the short term, and hypertension, coronary artery disease, cerebrovascular disease and death in the long term (9).

Although not fully understood, the pathogenesis of preeclampsia appears to be related to abnormal placentation early in the first trimester with maternal syndrome in the second and third trimesters characterized by an excessive release of antiangiogenic factors (9). An altered immune adaptation secondary to the brief exposure to non-maternal antigens has been proposed as one of the underlying mechanisms of abnormal placentation, the others being oxidative stress, pre-existing maternal disorders and genetic or environmental factors (3, 9). Normal trophoblast growth would therefore require immunological tolerance between the mother and the fetus (15).

Donor oocyte recipients share no genetic material with the embryo, and the higher rate of gestational hypertension and preeclampsia in those patients, even after adjusting for potential confounding factors such as maternal age, supports the significant role that abnormal immune response to fetal antigens plays in the development of this disorder (15, 16). Higher levels of child-specific human leukocyte antigen antibodies have been found in donor oocyte recipients compared to pregnancies conceived spontaneously or with other assisted reproductive technologies (17). Other studies have reported increased levels of proinflammatory cytokines in peripheral blood samples from donor oocyte recipients, as well as a positive correlation between genetic mismatch and an elevated proportion of activated T-cells in the placenta (18).

Conclusion

The diagnosis of posterior reversible encephalopathy

syndrome must be considered in cases of neurological symptoms and signs of preeclampsia in a pregnant patient if risk factors such as advanced maternal age or donor oocyte fertilization are present, given that early identification and treatment would significantly improve the prognosis.

Conflict of Interests

Authors have no conflict of interests.

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