

Stroke after blood patch in a patient with postpartum angiopathy and posterior reversible encephalopathy syndrome

Sergio Alejandro Sánchez-Luna, Amanda L. Jagolino, Manuel Núñez, Juan Pablo Sánchez-Luna, Gustavo Andres Ortiz

ABSTRACT

Introduction: The peripartum period is associated with physiological changes that increase the risk of both ischemic and hemorrhagic stroke. The incidence and risk of stroke attributed to pregnancy vary among studies, with up to 210 strokes per 100,000 deliveries. Our objective is to increase awareness of possible cerebrovascular complications with the use of blood patch treatments. **Case Report:** We report a case of a 37-year-old postpartum female who developed worsening cerebral vasospasm and acute ischemic stroke immediately after receiving an autologous epidural blood patch for post-lumbar puncture (LP) headache. This occurred in the setting

of postpartum vasculopathy, including both posterior reversible encephalopathy syndrome (PRES) and postpartum angiopathy (PPA). After treatment with nimodipine, a calcium channel blocker (CCB), there was radiological improvement of the severe vasospasm. Patient remained clinically stable with eventual resolution of postpartum vasculopathy, with no new complications for two years of follow-up. **Conclusion:** For patients with predisposing risk factors for stroke, the vasomotor effects of epidural blood patch may decrease a threshold for an ischemic event to occur.

Keywords: Epidural blood patch, Posterior reversible encephalopathy syndrome (PRES), Post-lumbar puncture headache, Stroke

Sergio Alejandro Sánchez-Luna^{1,2}, Amanda L. Jagolino³, Manuel Núñez⁴, Juan Pablo Sánchez-Luna⁵, Gustavo Andres Ortiz⁶

Affiliations: ¹Internal Medicine Resident Physician, Department of Internal Medicine, University of Iowa Roy J. and Lucille A. Carver College of Medicine, Iowa City, Iowa, USA; ²Internal Medicine Resident Physician, Department of Internal Medicine, Iowa City Veterans Administration Medical Center (VAMC), Iowa City, Iowa, USA; ³Faculty Physician, Department of Neurology, McGovern Medical School, University of Texas Health Sciences Center, Houston, Texas, USA; ⁴Faculty Physician, División de Neurología, Hospital Municipal de Surco, Santiago de Surco; ⁵Internal Medicine Resident Physician, División de Medicina Interna, Hospital Ángeles del Pedregal, Ciudad de México, México; ⁶Faculty Physician, Department of Neurology, University of Miami Leonard M. Miller School of Medicine, Miami, Florida, USA.

Corresponding Author: Gustavo Andres Ortiz, MD, Department of Neurology, University of Miami Leonard M. Miller School of Medicine, Post Office Box 016960 (D4-5), Miami, Florida USA, 33101; E-mail: Gortiz2@med.miami.edu

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INTRODUCTION

The peripartum period is associated with physiological changes that increase the risk of both

ischemic and hemorrhagic stroke [1]. The incidence and risk of stroke attributed to pregnancy vary among studies, with up to 210 strokes per 100,000 deliveries [1, 2]. Stroke contributes to significant morbidity and mortality, resulting in an estimated 12% of maternal deaths [2].

Cerebral vasoconstriction syndromes have become increasingly recognized as a cause of stroke under age sixty [3]. Postpartum angiopathy (PPA), characterized by reversible multifocal cerebral vasoconstriction, is known to cause vasogenic edema and stroke [4]. Post lumbar puncture headache is caused by leakage of cerebrospinal fluid (CSF) from the dura with resultant traction on pain-sensitive structures. One of the well known treatments, also known as an epidural blood patch, over the years for post lumbar puncture headaches has been a relatively simple procedure in which autologous blood is injected epidurally at or near the site of the prior lumbar puncture [5].

CASE REPORT

A 37-year-old female developed headache, nuchal rigidity and seizures five days after uncomplicated vaginal delivery with epidural anesthesia. She was diagnosed with eclampsia. Her brain magnetic resonance imaging (MRI) scan showed hyperintense lesions on fluid attenuated inversion recovery (FLAIR) sequences, suggestive of vasogenic edema consistent with posterior reversible encephalopathy syndrome (PRES). She was admitted to the hospital normotensive, with normal chemistries, and a urinalysis negative for protein and drugs. She was treated with intravenous magnesium sulfate for seizure prophylaxis and discharged with Neurology follow-up. Five days later she returned, referring worsening headaches and a ten-minute episode of right hand numbness. Her physical examination was unremarkable, however, her magnetic resonance angiography (MRA) showed multifocal areas of intracranial arterial irregularity suggestive of mild vasospasm, consistent with PPA (Figure 1A). She was found to be mildly hypertensive. She was again treated with intravenous magnesium sulfate and her blood pressure was controlled. Two days later, after improvement of symptoms, she was discharged.

The next morning, she returned to the emergency room with continued headaches. Anesthesiology evaluated her and post lumbar puncture headache was suspected. She was treated with a 20 cc autologous epidural blood patch. Immediately afterwards, her headache improved but she noted some changes in her right visual field. She was discharged home, and the next morning returned with persistent visual difficulty. Neurology was consulted, and a right homonymous hemianopia was detected on examination.

Repeat brain MRI scan showed an acute left posterior cerebral artery (PCA) ischemic stroke (Figure 2A–B). Brain MRA at this time showed increased narrowing of the intracranial arteries, interpreted as vasospasm (Figure 1B). Workup was negative for other stroke etiologies. She was normotensive before and after blood patch. Her symptoms gradually improved after initiating treatment with oral nimodipine, a calcium channel blocker (CCB), at a dose of 30 mg every 4 hours while hospitalized.

Three days later, follow-up brain MRI demonstrated stable PCA infarct and significant reduction of vasogenic edema. In addition, MRA showed significant improvement of the vasospasm (Figure 1C). She continued CCB therapy upon discharge -at the same dose and frequency- for a couple of days and then discontinued the medication by herself since she reported having low blood pressures. The patient came for regular Neurology follow-up consults twice within a 5-month period after being discharged. During that period of time, she was clinically stable and without any new neurological symptoms although her right homonymous hemianopia persisted. Since then, she has not had any vascular complications.

DISCUSSION

This patient experienced ischemic stroke symptoms immediately after receiving an epidural blood patch for suspected post lumbar puncture headache. Several peripartum conditions may have contributed to an increased risk of stroke in this patient, including eclampsia, PRES, and PPA.

Several population-based studies have suggested a relationship between stroke during pregnancy and the post-partum period [1]. Kittner et al. [6] reported a relative risk of 8.7 for ischemic stroke and 28.3 for intracerebral hemorrhage postpartum. There was minimal increase during pregnancy itself, suggesting that physiological changes after delivery cause stroke.

Headache is a recognized complication of lumbar puncture [7]. Epidural blood patch has been shown to alleviate post lumbar puncture headache with minimal complications in the general population [8]. Known complications of this procedure are: subarachnoid hemorrhage [9], cerebral venous thrombosis [10], and ischemic stroke [11, 12].

Ng and Manikappa [12], described a postpartum patient with ischemic stroke after epidural blood patch. Initial brain MRI was normal. After blood patch, the patient experienced focal symptoms and repeat MRI scan revealed an infarct. Stroke was attributed to late postpartum eclampsia and PRES, but the authors did not consider involvement of the blood patch.

Mercieri et al. [11] described a postpartum patient without peripartum vasculopathy prior to an ischemic stroke after blood patch. One week after undergoing

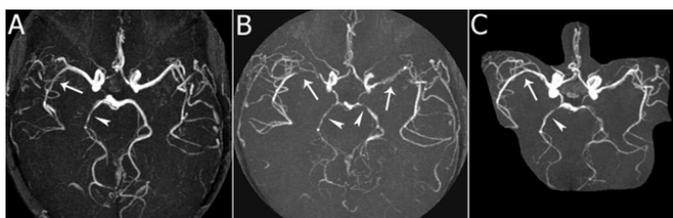


Figure 1: Magnetic resonance angiography (MRA). (A) Prior to blood patch, showing multiple areas of focal stenosis, including the distal right middle cerebral (MCA) and posterior cerebral arteries (PCAs), consistent with PPA, (B) One day after blood patch showing increased vasospasm, with significant stenosis of bilateral PCAs and middle cerebral arteries (MCAs), and (C) Three days after starting calcium channel blocker treatment, showing significant improvement of the prior stenosis (Arrows = MCAs, arrowheads = PCAs).

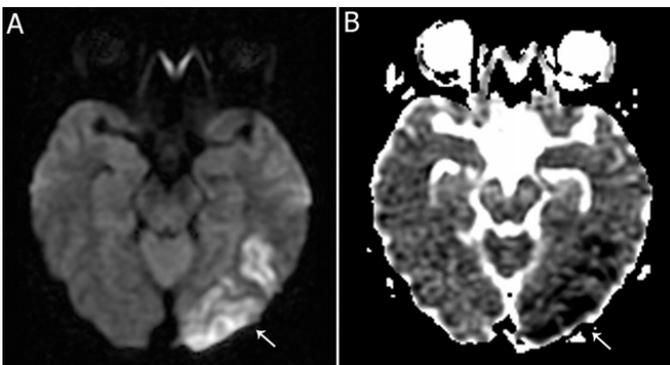


Figure 2: Magnetic resonance imaging (MRI) one day after blood patch showing acute infarct in the left posterior cerebral artery (PCA) distribution. (A) Diffusion weighted image (DWI), (B) Apparent diffusion coefficient (ADC).

two blood patches for headache after epidural analgesia, the patient experienced seizures and focal deficits. Transcranial Doppler of the left middle cerebral artery (MCA) showed increased velocities. An MRI scan confirmed ischemic event in the same vascular territory. Without evidence of other vascular pathology, the authors proposed that vasospasm from the epidural blood led to ischemic stroke.

Manipulation of the epidural space affects cerebrovascular blood flow and CSF movement [13]. How epidural blood patch works to alleviate post lumbar puncture headache is not definitively known. One theory is that post-lumbar puncture headache results from cerebral vasodilation [14]. Known vasoconstrictors, including theophylline and caffeine, are used commonly in the treatment of post lumbar puncture headache. With this in consideration, Boezaart [13], showed that removal of CSF from the foramen magnum of pigs resulted in increased cerebral blood flow. Subsequent injection of blood into the epidural space led to an immediate decrease to baseline in blood flow.

Vasoconstriction after epidural blood patch may be a result of adenosine receptor antagonism [15]. This is consistent with the use of adenosine receptor

antagonists such as caffeine and theophylline in treating post lumbar puncture headache. Theophylline and caffeine do not appear to cause stroke. However, a comparison between the intensity of vasoconstriction of theophylline versus epidural blood administration has not been made to our knowledge. It is possible that epidural blood can provoke enough vasospasm to result in an ischemic event.

Based on the acute onset of visual symptoms and an MRA showing increased vasoconstriction, we attribute the onset of new ischemic stroke to the epidural blood patch.

To our knowledge, no case report has documented onset of ischemic stroke symptoms immediately following epidural blood patch for post lumbar puncture headache, in the setting of postpartum angiopathy. However, there are case reports [9–12] of ischemic stroke and other cerebrovascular events occurring in association with epidural blood patch, which support the possibility of alterations in the cerebral hemodynamics after the procedure. This patient had overlapping features of both PPA and PRES. The PPA is often categorized as reversible cerebral vasoconstriction syndrome (RCVS) [3]. However, it is still to be determined whether PPA and RCVS are presentations of the exact same underlying pathophysiology [6].

The potential disabling, and even fatal, consequences that can be seen in RCVS [16], should prompt physicians to consider angiographic imaging in postpartum women with severe headaches or focal neurological symptoms.

CONCLUSION

In conclusion, with this report we seek to increase awareness of possible cerebrovascular complications of epidural blood patch treatments. It is possible that these treatments in women with eclampsia or posterior reversible encephalopathy syndrome (PRES) who develop post lumbar puncture headaches may be associated with risk of vasospasm and ischemic stroke.

Author Contributions

Sergio Alejandro Sánchez-Luna – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published
Amanda L. Jagolino – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Manuel Núñez – Acquisition of data, Analysis and interpretation of data, Drafting the article, Final approval of the version to be published

Juan Pablo Sánchez-Luna – Substantial contribution to acquisition of data, Drafting the article, Final approval of the version to be published

Gustavo Andres Ortiz – Substantial contributions to conception and design, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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ABOUT THE AUTHORS

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Sergio A. Sánchez-Luna is an Internal Medicine Resident Physician at the Division of Internal Medicine in the University of Iowa Hospitals and Clinics, Iowa City, Iowa, USA. He earned MD degree from Universidad Autónoma de Guadalajara in Guadalajara, Jalisco, México. His research interests include gastroenterology, hepatology, and mind-body interactions and its impact on well-being. He intends to pursue a gastroenterology-hepatology fellowship in future.
E-mail: sergio-sanchezluna@uiowa.edu



Amanda L. Jagolino is a Faculty Physician at the Department of Neurology, McGovern Medical School, University of Texas Health Sciences Center, Houston, Texas, USA. She completed a Neurology Residency at the University of Miami Leonard M. Miller School of Medicine and a Stroke Fellowship at the University of Texas Health Sciences Center. Her research interests include vascular neurological diseases and stroke.

E-mail: amanda.l.jagolino@uth.tmc.edu

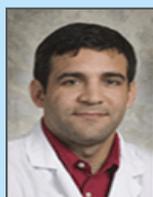


Manuel Núñez is a Faculty Physician at the Department of Neurology, Hospital Municipal de Surco, Santiago de Surco, Perú.



Juan Pablo Sánchez-Luna is an Internal Medicine Resident Physician at the Division of Internal Medicine, Hospital Ángeles del Pedregal, Ciudad de México, México. He earned MD degree from Universidad Autónoma de Guadalajara in Guadalajara, Jalisco, México. His research interests include general and interventional cardiology. He intends to pursue a cardiology fellowship in the future.

E-mail: juanpablosanchezluna@gmail.com



Gustavo A. Ortiz is a Faculty Physician at the Department of Neurology, University of Miami Leonard M. Miller School of Medicine, USA. He completed both a Neurology Residency and a Stroke Fellowship at the University of Miami Leonard M. Miller School of Medicine. He has published several PubMed indexed peer-reviewed research papers in national and international academic journals. His research interests include vascular neurological diseases and stroke.

E-mail: gortiz2@med.miami.edu

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