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.

International Journal of Case Reports and Images (IJCRI)

International Journal of Case Reports and Images (IJCRI) is an international, peer reviewed, monthly, open access, online journal, publishing high-quality, articles in all areas of basic medical sciences and clinical specialties.

Aim of IJCRI is to encourage the publication of new information by providing a platform for reporting of unique, unusual and rare cases which enhance understanding of disease process, its diagnosis, management and clinico-pathologic correlations.

IJCRI publishes Review Articles, Case Series, Case Reports, Case in Images, Clinical Images and Letters to Editor.

Website: www.ijcasereportsandimages.com

CASE REPORT

PEER REVIEWED | OPEN ACCESS

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

How to cite this article

Sánchez-Luna SA, Jagolino AL, Núñez M, Sánchez-Luna JP, Ortiz GA. Stroke after blood patch in a patient with postpartum angiopathy and posterior reversible encephalopathy syndrome. *Int J Case Rep Images* 2016;7(11):696–700.

Article ID: Z01201611CR10708SS

doi:10.5348/ijcri-2016120-CR-10708

INTRODUCTION

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

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

Received: 23 May 2016
Accepted: 15 July 2016
Published: 01 November 2016

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 artery (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.

Copyright

© 2016 Sergio Alejandro Sánchez-Luna et al. This article is distributed under the terms of Creative Commons Attribution License which permits unrestricted use, distribution and reproduction in any medium provided the original author(s) and original publisher are properly credited. Please see the copyright policy on the journal website for more information.

REFERENCES

1. Tate J, Bushnell C. Pregnancy and stroke risk in women. *Womens Health (Lond)* 2011 May;7(3):363–74.
2. Tang CH, Wu CS, Lee TH, et al. Preeclampsia-eclampsia and the risk of stroke among peripartum in Taiwan. *Stroke* 2009 Apr;40(4):1162–8.
3. Singhal AB. Cerebral vasoconstriction syndromes. *Top Stroke Rehabil* 2004 Spring;11(2):1–6.
4. Fugate JE, Ameriso SF, Ortiz G, et al. Variable presentations of postpartum angiopathy. *Stroke* 2012 Mar;43(3):670–6.
5. https://www.uptodate.com/contents/post-lumbar-puncture-headache?source=search_result&search=post%20lp%20headache&selectedTitle=1~44
6. Kittner SJ, Stern BJ, Feeser BR, et al. Pregnancy and the risk of stroke. *N Engl J Med* 1996 Sep 12;335(11):768–74.
7. Klein AM, Loder E. Postpartum headache. *Int J Obstet Anesth* 2010 Oct;19(4):422–30.
8. Olsen KS. Epidural blood patch in the treatment of post-lumbar puncture headache. *Pain* 1987 Sep;30(3):293–301.
9. Hasiloglu ZI, Albayram S, Ozer H, Olgun DC, Selcuk H, Kaynar MY. Cranial subarachnoid hemorrhage as an unusual complication of epidural blood patch. *Clin Neurol Neurosurg* 2011 Oct;113(8):689–92.
10. Ghatge S, Uppugonduri S, Kamarzaman Z. Cerebral venous sinus thrombosis following accidental dural puncture and epidural blood patch. *Int J Obstet Anesth* 2008 Jul;17(3):267–70.
11. Mercieri M, Mercieri A, Paolini S, et al. Postpartum cerebral ischaemia after accidental dural puncture and epidural blood patch. *Br J Anaesth* 2003 Jan;90(1):98–100.
12. Ng MD, Manikappa S. Postpartum seizure and ischaemic stroke following dural puncture and epidural blood patch. *Anaesth Intensive Care* 2012 Mar;40(2):347–51.
13. Boezaart AP. Effects of cerebrospinal fluid loss and epidural blood patch on cerebral blood flow in swine. *Reg Anesth Pain Med* 2001 Sep-Oct;26(5):401–6.
14. Ahmed SV, Jayawarna C, Jude E. Post lumbar puncture headache: Diagnosis and management. *Postgrad Med J* 2006 Nov;82(973):713–6.
15. Raskin NH. Lumbar puncture headache: A review. *Headache* 1990 Mar;30(4):197–200.
16. Fugate JE, Wijidicks EF, Parisi JE, et al. Fulminant postpartum cerebral vasoconstriction syndrome. *Arch Neurol* 2012 Jan;69(1):111–7.

ABOUT THE AUTHORS

Article citation: Sánchez-Luna SA, Jagolino AL, Núñez M, Sánchez-Luna JP, Ortiz GA. Stroke after blood patch in a patient with postpartum angiopathy and posterior reversible encephalopathy syndrome. *Int J Case Rep Images* 2016;7(11):696–700.

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

Access full text article on
other devices

Access PDF of article on
other devices

Edorium Journals: An introduction

Edorium Journals Team

About Edorium Journals

Edorium Journals is a publisher of high-quality, open access, international scholarly journals covering subjects in basic sciences and clinical specialties and subspecialties.

Invitation for article submission

We sincerely invite you to submit your valuable research for publication to Edorium Journals.

But why should you publish with Edorium Journals?

In less than 10 words - we give you what no one does.

Vision of being the best

We have the vision of making our journals the best and the most authoritative journals in their respective specialties. We are working towards this goal every day of every week of every month of every year.

Exceptional services

We care for you, your work and your time. Our efficient, personalized and courteous services are a testimony to this.

Editorial Review

All manuscripts submitted to Edorium Journals undergo pre-processing review, first editorial review, peer review, second editorial review and finally third editorial review.

Peer Review

All manuscripts submitted to Edorium Journals undergo anonymous, double-blind, external peer review.

Early View version

Early View version of your manuscript will be published in the journal within 72 hours of final acceptance.

Manuscript status

From submission to publication of your article you will get regular updates (minimum six times) about status of your manuscripts directly in your email.

Our Commitment

Six weeks

You will get first decision on your manuscript within six weeks (42 days) of submission. If we fail to honor this by even one day, we will publish your manuscript free of charge.*

Four weeks

After we receive page proofs, your manuscript will be published in the journal within four weeks (31 days). If we fail to honor this by even one day, we will publish your manuscript free of charge and refund you the full article publication charges you paid for your manuscript.*

Favored Author program

One email is all it takes to become our favored author. You will not only get fee waivers but also get information and insights about scholarly publishing.

Institutional Membership program

Join our Institutional Memberships program and help scholars from your institute make their research accessible to all and save thousands of dollars in fees make their research accessible to all.

Our presence

We have some of the best designed publication formats. Our websites are very user friendly and enable you to do your work very easily with no hassle.

Something more...

We request you to have a look at our website to know more about us and our services.

* Terms and condition apply. Please see Edorium Journals website for more information.

We welcome you to interact with us, share with us, join us and of course publish with us.

Edorium Journals: On Web

Browse Journals

CONNECT WITH US