

Integrating Acupuncture for Preeclampsia with Severe Features and HELLP Syndrome in a High-Risk Antepartum Care Setting

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ABSTRACT

Background: Acupuncture is known to reduce blood pressure (BP) in essential hypertension. Acupuncture has been used for addressing several issues in pregnancy, such as morning sickness, labor preparation, and turning breeches. To date, there are very few studies on the use of acupuncture for preeclampsia in high-risk pregnancy.

Case: The subject of this single case report was a 35-year-old primipara, who developed preeclampsia with severe features and HELLP [*Hemolysis, ELevated liver enzymes, Low Platelet count*] syndrome at 27 weeks and 6 days of gestation. She was admitted to an antepartum high-risk hospital unit and was treated with acupuncture and acupressure for a 5-week duration.

Results: This patient experienced a temporary reduction in blood pressure and was able to maintain her pregnancy until 34 weeks. The patient had a vaginal birth of a baby girl with Apgar scores of 8 and 9.

Conclusions: By reducing the patient's BP, increasing her uterine blood flow, and providing renal protection and hepatoprotection, acupuncture was effective for increasing the length of gestation in a high-risk pregnancy to improve the viability of the baby.

Keywords: acupuncture, preeclampsia, hypertension, integrated medicine, pregnancy, obstetrics

INTRODUCTION

PREECLAMPSIA (PE) IS A HYPERTENSIVE DISORDER OF pregnancy, estimated to occur in 2%–8% of pregnancies.¹ PE is defined as new-onset hypertension that develops in pregnancy, most often after 20 weeks of gestation. PE is often accompanied by new-onset proteinuria, although PE can also present without proteinuria.² If proteinuria is not present, PE is diagnosed when gestational hypertension occurs in association with the following severe features: thrombocytopenia; impaired liver function as indicated by twice the normal concentration of blood levels of liver transaminases; persistent upper right-quadrant pain; a rise in serum creatine; pulmonary edema; new-onset headache that cannot be excluded by other diagnoses and does not respond to medication; and/or visual disturbances.³ (See Table 1.) PE

that occurs before 34 weeks of gestation is classified as early onset preeclampsia (EOPE), and late-onset preeclampsia occurs at 34 weeks of gestation or later.⁴

Hypertensive disorders of pregnancy comprise a leading cause of maternal and perinatal deaths worldwide.⁵ In the United States, hypertensive disorders comprising a cause of maternal deaths is decreasing; yet, hypertension still represented the fourth-leading direct cause of maternal deaths, accounting for 6.8% of pregnancy-related deaths in the United States from 2011 to 2015.⁶ While maternal mortality from PE is decreasing, the incidence of PE increased 24.6% between 1987 and 2004,⁷ and hospitalizations for severe PE increased 57.4% between 2004 and 2014.⁸

HELLP [*Hemolysis, ELevated liver enzymes, Low Platelet count*] syndrome is a serious complication of severe preeclampsia and is associated with increased rates of

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TABLE 1. DIAGNOSTIC CRITERIA FOR PREECLAMPSIA²

| | <i>Symptom</i> | <i>Diagnostic findings</i> |
|--|---|--|
| HYPERTENSION | New-onset hypertension | BP \geq 140/90 on 2 occasions 4 hours apart or BP \geq 160/110 on a single occasion |
| <i>AND</i> | | |
| PROTEINURIA | Proteinuria | Urine protein >300 mg per 24 hr. collection or Urine protein/creatinine ratio of 0.3 mg/dL or Urine dipstick 2+ protein (other quantitative urine measures preferred) |
| <i>OR hypertension with any of the severe feature symptoms, if proteinuria is absent</i> | | |
| SEVERE FEATURES | Thrombocytopenia Renal insufficiency Liver compromise Pulmonary edema Cerebral irritation | Platelets <100,000 \times 10 ⁹ /L Serum creatine >1.1 mg/dL or Serum creatine doubling in absence of renal disease 2 \times increase of normal concentration of transaminases AST and ALT Clinical signs New-onset headache unrelated to an alternative diagnosis and unresponsive to medication |

BP, blood pressure, AST aspartate aminotransferase; ALT, alanine aminotransferase

maternal mortality.² HELLP is reported to occur in 0.5%–0.9% of all pregnancies and in 20% of pregnant women with severe preeclampsia.⁹ The incidences of maternal mortality and morbidity are very high in patients who develop HELLP. Timely diagnosis and management are essential in such cases.¹⁰ There is a higher incidence of HELLP syndrome in EOPE.⁴

High-risk factors for PE include a previous pregnancy with PE, chronic hypertension, renal disease, autoimmune disease, type 1 or type 2 diabetes mellitus, and multiple gestation.² Moderate risk factors include a first pregnancy, maternal age over 35, body mass index over 30, and family history of PE.² Additional risk factors include both short and long pregnancy intervals, use of assisted reproductive technology, and Afro-Caribbean and South Asian ethnic origin.¹¹

There is no reliable first- or second-trimester test to predict the development of PE.⁵ Some promise has been shown by a combination of screenings of maternal risk factors, blood pressure (BP), placental growth factor, and uterine-artery pulsatility-index Doppler screening that might have a predictive value for detecting EOPE,^{11,12} however the American College of Obstetrician and Gynecologists guidelines cited this testing as not being able to predict PE accurately.² There is, likewise, no definitive cure for PE, although studies have shown a slightly lower rate of PE when women with moderate risk factors initiate treatment with low-dose (81 mg/day) aspirin as early as 12 weeks and optimally by 16 weeks of gestation with continued daily use until delivery.²

Frequent inpatient monitoring and supportive care is the suggested Western medical treatment for PE with severe features.¹² The goal of Western treatment is to enable as long a gestation as possible while controlling BP, and monitoring fetal well-being and multiple maternal organ systems.² Frequent BP and laboratory monitoring, anti-hypertensive medication, and magnesium sulfate to prevent the development of eclamptic seizures are urgent treatment measures.¹² Corticosteroids may be considered to hasten maturation of fetal lungs if premature delivery is expected.¹² Prior to 34 weeks of gestation, expectant management may be advised when the benefit to the neonate outweighs maternal risk. Delivery is recommended at any time in case of deterioration of maternal or fetal condition, and delivery at 34 weeks and 0 days of gestation through induction of labor is advised.²

Since 2004, the Penny George Institute for Health and Healing (PGIHH), a large tertiary hospital in the Midwest (Minneapolis, MN), has been providing integrative medicine—including acupressure, acupuncture, aromatherapy, reflexology, guided imagery, and massage—to support medical care for patients on bedrest with high-risk pregnancies. Over this 15-year period, PGIHH has observed a trend that patients with preeclampsia who received integrative medicine services tended to remain pregnant longer than was expected.¹³

This case study is an example of this trend in achieving extension of gestational age. This article also provides an opportunity to look more specifically at the possible effects of the inclusion of acupuncture and acupressure as part of

the standard of care for preeclampsia with severe features and HELPP syndrome. Informed consent was obtained from the patient for this report.

CASE

Patient Information and Clinical Findings

A 35-year-old gravida 1, para 0, female at 27 weeks and 6 days of gestation presented with elevated BP and results on liver-function tests (LFTs) and was admitted into the hospital. She reported having headaches regularly throughout her pregnancy. She also reported she had “white swirls” in her vision, as well as pedal edema since 20 weeks of gestation. As her BP and LFTs rose precipitously in the first few days in the hospital, she was diagnosed with preeclampsia with severe features and possible HELLP syndrome.

Clinical Findings

Upon admission, her BP was elevated from 140/91 to 164/91, with the highest reading rising to 209/94. Her aspartate aminotransferase (AST) levels ranged from 41 U/L to 75 U/L (normal value: 7–55 U/L) and her alanine aminotransferase (ALT) level was 75 U/L (normal value: 8–48 U/L). The initial slight dip to 41 U/L in her AST level was believed to be a temporary improvement caused by steroid treatment.

During the first week after admission, her BP readings ranged from 140/100 to 160/100, with isolated severe range BP readings that did not require pharmaceutical treatment. She had mildly elevated AST and ALT levels (with ALT rising to 2 times the upper limit of normal), and her urine protein was positive at 0.4 upon admission. She denied right-upper-quadrant (RUQ) pain and her platelet level remained in the normal range. She was given the standard medical care, consisting of betamethasone, to encourage fetal lung maturity, and magnesium sulfate for seizure prevention and fetal neuroprotection; close maternal/fetal testing; serial laboratory testing; and a neonatal intensive care unit consultation.

Traditional Chinese Medical Diagnostic Assessment

Two days after her admission, the integrative medicine department received orders to provide inpatient acupressure and acupuncture treatments. Upon examination, this patient had symptoms of intermittent temporal, frontal, and occipital headaches, neck pain, constipation, stress, high anxiety, pedal edema, and fatigue. Her pulses were moderate-rate, thin, and tight. Her Traditional Chinese Medicine diagnosis (TCM) was Liver Yang Rising with Liver and Kidney Yin Deficiency. The high BP readings, neck pain with

intermittent headaches, stress, “white swirls” in her vision, anxiety, and tight pulse were symptoms indicating hyperactivity of Liver Yang. Liver Yang Rising is a result of Blood and/or Yin Deficiency.¹⁴ Deficiency of Liver and Kidney Yin were indicated by the fatigue and thin pulse. Overwork or a hereditary Kidney Deficiency created a preexisting tendency toward Blood and/or Yin Deficiency. Given that Blood and Yin concentrate in the *Chong* and *Ren* meridians to nourish the fetus, the resultant tendency for Deficiency was aggravated, and Liver Yang became hyperactive.¹⁴

THERAPEUTIC INTERVENTIONS

The core treatment principle was to nourish Liver and Kidney Yin and subdue Liver Yang. The core acupuncture points utilized were: KI 7 (*Fuliu*) and KI 9 (*Zhubin*); LR 3 (*Taichong*), PC 6 (*Neiguan*), GB 20 (*Fengchi*), Ex-HN 5 (*Taiyang*), ST 36 (*Zusanli*), ST 37 (*Shangjuxu*), ST 38 (*Tiaokou*), and ST 39 (*Xiajuxu*); along with the auricular points *Shenmen*, Liver, Kidney, Lower Blood Pressure, and Sympathetic. See Table 2^{15–21} for a list of the core acupuncture points and their therapeutic functions. Acupressure was also provided regularly at KI 1 (*Yongquan*) and GB 20. Initial treatment was scheduled daily for the first 3 days. All body points were needled bilaterally with 0.18-mm DBC™ Spring Ten or 0.20-mm Seirin® stainless-steel needles that were retained for 20–25 minutes. Auricular points were administered with DBC Spring Ten ear needles on one side at a time, alternating the sides daily. At week 32, Seirin ear needles were used upon the patient’s request for a needle that was “less intense.”

During the first week of hospital admission, additional points—M-HN-1 (*Sishencong*), LU 7 (*Lieque*), LI 10 (*Shousanli*), TE 5 (*Waiguan*) and GB 43 (*Xiaxi*)—were added to address the symptoms—such as constipation, anxiety, and fatigue—that presented during treatment.

After the second week of this patient’s hospital stay, her laboratory results and BP readings normalized, and her urine protein tests were now negative (see Table 3 for diagnostic test results). Her temporal headache, pedal edema, constipation, and neck pain subsided. She continued to deny having any upper-quadrant pain. Day 12 of her hospital stay, the rounding obstetrician saw that her laboratory test results and BP readings were normalized and diagnosed her with “gestational hypertension with transient elevation of liver enzymes” and discharged her to go home.

The day following her initial discharge, she was seen in the outpatient perinatology department. Her BP was recorded at 164/102 and she complained of mild temporal and frontal headache. She was readmitted to inpatient care. After 6 days without acupuncture or acupressure, treatments were resumed when she was at 31 weeks and 4 days of

TABLE 2. CORE ACUPUNCTURE PRESCRIPTION

| <i>Acupuncture point</i> | <i>Pinyin</i> | <i>Therapeutic function^a</i> |
|--------------------------|------------------|--|
| KI 7 | <i>Fuliu</i> | Benefits Kidney; regulates Water passage to treat edema |
| KI 9 | <i>Zhubin</i> | Clears Heart & regulates Qi; Beautiful Baby point ^b |
| LR 3 | <i>Taichong</i> | Subdues Liver Yang & extinguishes Yin; nourishes Liver Blood & Yin; Clears the Head & Eyes; spreads Liver Qi |
| PC 6 | <i>Neiguan</i> | Clears Heat; unbinds Chest & regulates Qi; regulates Heart & Calms Spirit |
| GB 20 | <i>Fengchi</i> | Benefits Head & Eyes; eliminates Wind |
| ST 36 | <i>Zusanli</i> | Tonifies Qi & nourishes Blood and Yin |
| ST 37 | <i>Shangjuxu</i> | Sea of Blood point |
| ST 38 | <i>Tiaokou</i> | Sea of Blood point |
| ST 39 | <i>Xiajuxu</i> | Sea of Blood point |
| Ex-HN 5 | <i>Taiyang</i> | Clears Heat & stops pain |
| Ear Shenmen | — | Reduces BP & Calms Shen ^c |
| Ear Liver | — | Promotes smooth flow of Qi & Blood; regulates Liver ^d |
| Ear Kidney | — | Replenishes & regulates Kidney ^d |
| Ear Lower Blood Pressure | — | Reduces BP ^c |
| Ear Sympathetic | — | Balances activation of sympathetic nervous system with parasympathetic sedation ^c |

| <i>Acupressure point</i> | <i>Pinyin</i> | <i>Therapeutic function^a</i> |
|--------------------------|-----------------|---|
| KI 1 | <i>Yongquan</i> | Descends Excess from Head; Calms Spirit |

^aTherapeutic functions from Deadman, Al-Khafaji, Baker¹⁵ or as noted.

^bTexts by Flaws,¹⁶ Soulié de Morant,¹⁷ and West¹⁸ refer to classic Chinese texts that describe the use of KI 9 to prevent the transmission of hereditary disorders, and to promote health and vibrancy in babies from which the name “Happy Baby Point” or “Beautiful Baby Point” is derived. Betts¹⁹ describes the use of this point to Calm the Uterus when treating threatened miscarriage.

^cTherapeutic functions from Oleson.²⁰

^dTherapeutic functions from Cheng, Zheng, Xie.²¹

BP, blood pressure

gestation, providing core treatment with KI 7, KI 9, LR 3, GB 20, TE 5, and GB 41 (*Zulinqi*); auricular points *Shenmen*, Liver, Kidney, Sympathetic, and Point Zero; and acupressure on KI 1 along with EX-HN 5 and BL 2 (*Zanzhu*) to address her temporal and frontal headache.

Acupuncture and acupressure were continued 2–4 times weekly for the subsequent 4 weeks. Upon readmission, her headaches, neck pain, and BP had increased and, after a

week of the second hospital admission, her headaches and neck pain ceased, and she continued to be pain-free.

At 33 weeks of gestation, this patient’s BP had a high spike that did not need any additional medication. A day later at 33 weeks and 1 day of gestation, her BP spiked even higher and was stabilized with 10 mg of long-acting nifedipine. Beginning the following day, acupuncture and acupressure were provided for 4 consecutive days to both support her Liver and Kidney functions, reduce her BP, and prepare her for her upcoming induction. She continued to have rising BP, temporal headaches, neck pain, fatigue, bouts of nausea, and overall malaise during that time. After each treatment she reported relief from the headaches, nausea, and neck pain, and said that she “felt better overall.” Although her BP had a slow rise during those 4 days, she did not experience additional high spikes that required treatment with extra-long-acting antihypertensive medications. See Table 4 for diagnostic test values after readmission from 30 weeks and 3 days of gestation to 32 weeks and 3 days of gestation. See Table 5 for her diagnostic test values after readmission, which lasted from 32 weeks and 4 days of gestation until labor was induced at 34 weeks of gestation.

RESULTS

At 34 weeks of gestation, a medical induction of labor (IOL) was initiated with 3 doses of 100 µg of Cytotec to ripen the cervix. On day 2 of induction, ripening continued with a Foley bulb induction and artificial rupture of the membranes followed by intravenous (IV) Pitocin for dilation. Her BP spiked to 173–182/97–118 and she was treated with 60 mg of long-acting nifedipine and IV magnesium sulfate for prevention of seizures. She was able to go into labor and had an uncomplicated vaginal delivery of a viable female with Apgar scores of 8 and 9 that day. No acupuncture or acupressure treatments were provided during her IOL or during the first 2 postpartum days.

On postpartum day 1, her BP was controlled with decreased levels of nifedipine and IV magnesium sulfate was continued to prevent seizures. She denied having any headaches or discomfort. Per her chart, her doctor reported that “she is eating, drinking, ambulating and voiding without issue and was feeling well.” She had mild bilateral edema and was breast pumping. On postpartum day 2, her BP spiked to 150/100 and she continued to deny having any headaches, visual disturbances, or RUQ pain. She had brisk reflexes and absent clonus. The nifedipine was increased to 90 mg in the morning and 30 mg at night, and 200 mg of labetalol twice daily was added. Her last treatment of acupuncture and acupressure was provided on postpartum day 3, when she complained of elevated BP, fatigue, a slight temporal headache, and edema along her back and bilaterally in her feet. See Table 6 for her diagnostic test values during postpartum.

TABLE 3. DIAGNOSTIC TEST VALUES AT INITIAL TREATMENT AND DISCHARGE

| Tests | Gestation (wk/d) | | | | | | | | | | | |
|------------|------------------|--------------|---------------------------|--------------------------|---------------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------------------|
| | 27 wk 6 d | 28 wk 0 d | 28 wk 1 d ^a | 28 wk 2d ^a | 28 wk 3 d ^a | 28 wk 4 d | 28 wk 5 d | 29 wk 0 d | 29 wk 1 d | 29 wk 3 d | 29 wk 5 d | 30 wk 0 d ^b |
| AST | 75 | 75 | 55 | 41 | 46 | 63–67–69 | 68–65–58 | 45H | 48 H | 51 H | 48 H | 27 |
| ALT | — | — | — | — | — | — | — | — | 90 H | — | — | 52 H |
| Creatinine | — | 0.54 | 0.52 | 0.51 | — | 0.54 | — | — | — | — | — | PCR neg. |
| PLT | 203 | — | 193 | 198 | — | 225–220 | 213–216–217 | 201 | 195 | 211 | 189 | 198 |
| Hemoglobin | 13.9 | 13.0 | 11.7 | 11.9 | — | 13.2 | — | — | — | — | — | — |

^aIntegrative medicine treatments.

^bDischarged to go home.

wk, weeks; d, day(s), AST, aspartate aminotransferase, H, high value; ALT, alanine aminotransferase, PLT, platelets.

She continued to be diagnosed with Liver Yang Rising deriving from Liver and Kidney Yin Deficiency and was treated for postpartum recovery with the following bilateral points: LI 4 (*Hegu*); ST 36; LR 3; GB 20; and Ex-HN 5; the needles were retained for 25 minutes. Needles for right ear points Sympathetic, *Shenmen*, Kidney, Endocrine, and Point Zero stayed in for 45 minutes, while KI 1, KI 3 (*Taixi*), and KI 7 were massaged for a total of 20 minutes. Back *Shu* points BL 17 (*Geshu*), BL 18 (*Ganshu*), BL 19 (*Danshu*), and BL 23 (*Shenshu*), were massaged for 20 minutes prior to starting the acupuncture treatment. Postsession, she reported relief from her headache and fatigue.

No further acupuncture or acupressure treatments were provided, as the patient was often out of her room, visiting her baby in the special-care nursery, and the integrative medicine providers were unable to schedule a meeting with her. During her postpartum course, her BP became elevated and required a titration of BP medications. Postpartum days 4–6, she became hypotensive due to too many antihypertensive medications. On postpartum day 6, the medications were adjusted to a titration that stabilized her BP to a mild range. Throughout her postpartum time, her AST levels remained slightly elevated between 43 U/L and 55 U/L, with one spike to 125 U/L on the day that “her milk came in.” Then, on postpartum day 6, they finally lowered into the normal range of 33 U/L. Her hemoglobin and platelet levels remained within normal ranges. On postpartum day 9, she was discharged to go home, and her healthy baby was scheduled for discharge shortly after.

DISCUSSION

There are very few published studies in English on the use of acupuncture for hypertensive disorders of pregnancy and only 1 other prior study on the use of acupuncture for treating PE. A report of 2 cases of pregnancy-induced hypertension treated with acupuncture resulting in healthy term deliveries was published by Betts in 2003.²² A feasi-

bility study conducted in China in 2016 compared the addition of acupuncture 5 times per week for a 2-week course of treatment to the standard of care for early onset preeclampsia.²³ A cohort of 11 women with PE with severe features were matched with 11 controls. The primary outcomes were changes in BP between baseline and after the 2 weeks of treatment during delivery and within 24 hours of delivery. The BP readings at delivery and 24 hours after delivery were significantly lower in the acupuncture group than in the standard-of-care group. The mean BP was not significantly statistically different between the groups immediately after treatment, but the change from baseline to after treatment was greater in the acupuncture group than in the standard-of-care group. The authors concluded that acupuncture appeared to reduce BP in women with PE.²³

Although an exact understanding of the pathogenesis of PE is not yet definitive, the current theory suggests that, during the first trimester, the trophoblast of the invading placenta erodes into capillaries and small veins in the endometrium, and remodels spiral arteries from small caliber to distended uteroplacental vessels to create the pathway for increased uterine blood flow.^{5,24} When the trophoblast does not develop completely and the remodeling of spiral arteries is abnormal, placenta ischemia creates a maternal response that results in the release of angiogenic and antiangiogenic placental factors that, in turn, set off a succession of placental and systemic inflammation and oxidative stress.^{5,11,25} These changes result in maternal vascular narrowing, high-resistance low-diameter vessels, edema, and platelet destruction along with the inflammatory and thrombotic responses that can lead to organ damage.^{4,25}

A critical feature of preeclampsia is that the pathogenesis occurs in the first trimester, with vascular contraction and reduced blood volume leading to increases in BP late in the second trimester.²⁵ The rise in BP might be partially correlated with a disruption of the usual increase in the production of nitric oxide (NO) during pregnancy that regulates vasodilation.²⁵ Animal studies have shown that acupuncture lowers BP and increases NO, offering a potential

TABLE 4. DIAGNOSTIC TEST VALUES AFTER READMISSION

| Tests | Gestation (wk/d) | | | | | | | | | | | |
|------------|------------------------|------------------------|------------------------|------------------------|---------------|------------------------|------------------------|---------------|------------------------|------------------------|------------------------|--|
| | 30 wk 3 d ^a | 30 wk 4 d ^b | 30 wk 5 d ^b | 30 wk 6 d ^b | 31 wk 0 d | 31 wk 3 d ^b | 31 wk 5 d ^b | 31 wk 6 d | 32 wk 1 d ^b | 32 wk 2 d ^b | 32 wk 3 d ^b | |
| AST | 26 | - | - | 63 H | 55 H | - | 22 | 55 H | 29 | - | - | |
| ALT | - | - | - | 78 H | 78 H | - | - | 78 H | - | - | - | |
| Creatinine | 0.53 L | 0.55 L | - | 0.55 L | - | - | - | - | 0.53 L | - | - | |
| PLT | 164 | - | - | 197 | - | - | - | - | 190 | - | - | |
| BP range | - | 134/89-162/90 | 134/89-145/95 | - | 112/70-153/96 | 131/83-142/93 | 134/86-140/94 | 129/84-153/96 | 136/83-160/101 | 137/91-143/85 | 135/93-151/81 | |

^aReadmission.

^bIntegrative medicine treatments.

wk, weeks; d, day(s); AST, aspartate aminotransferase; H, high value; ALT, alanine aminotransferase; PLT, platelets; BP, blood pressure.

TABLE 5. DIAGNOSTIC TEST VALUES AFTER READMISSION THROUGH INDUCTION OF LABOR

| Tests | Gestation (wk/d) | | | | | | | | | | | |
|------------|------------------|---------------|------------------------|------------------------|------------------------|------------------------|------------------------|---------------|------------------------|--|--|--|
| | 32 wk 4 d | 33 wk 0 d | 33 wk 1 d ^a | 33 wk 2 d ^b | 33 wk 3 d ^b | 33 wk 4 d ^b | 33 wk 5 d ^b | 33 wk 6 d | 34 wk 0 d ^c | | | |
| AST | 32 | 46H | 36 | 36 | 34 | - | 43H | 34 | - | | | |
| ALT | - | - | 54H | 54H | - | - | - | - | - | | | |
| Creatinine | 0.56 L | 0.57 L | - | 0.52 L | 0.57 L | - | 0.54 L | 0.50 L | - | | | |
| PLT | 193 | 173 | 182 | 182 | 148 | 148 | 160 | 160 | 207 | | | |
| Hemoglobin | - | - | - | 12.5 | 12.2 | - | 12.0 | - | 12.5 | | | |
| BP range | - | 141/88-142/96 | 141/96-187/110 | 123/76-156/94 | 152/92-158/98 | 135/96-160/90 | 139/96-172/99 | 140/92-159/96 | 132/89-182/118 | | | |

^a10 mg of nifedipine given for severe BP range.

^bIntegrative medicine treatments.

^cInduction of labor.

wk, weeks; d, day(s); AST, aspartate aminotransferase; H, high value; ALT, alanine aminotransferase; PLT, platelets; BP, blood pressure.

TABLE 6. DIAGNOSTIC TEST VALUES BIRTH THROUGH POSTPARTUM

| Tests | 34 wk I d ^{a,b} | Gestation (wk/d) to PPD | | | | | | |
|------------|--------------------------|-------------------------|---------------|--------------------|----------------|----------------|--------------|--------------------|
| | | PPD 1 | PPD 2 | PPD 3 ^c | PPD 4 | PPD 5 | PPD 6 | PPD 9 ^d |
| AST | — | 43H | — | — | 125 H | 55 H | 33 | — |
| ALT | — | — | — | — | — | — | — | — |
| Creatinine | 0.58–0.55 L | 0.62 L | — | — | — | — | — | — |
| PLT | 194–206 | 264 | — | — | — | — | — | — |
| Hemoglobin | 12.8–13.2 | 12.3 | — | — | — | — | — | — |
| BP range | 130/79–159/93 | 133/80–151/96 | 125/81–156/94 | 139/89–153/97 | 139/85–162/104 | 130/84–166/103 | 89/58–127/82 | 129/79–155/88 |

^aInduction of labor.

^bBaby born.

^cIntegrative medicine treatments.

^dDischarged to go home.

wk, weeks; d, day; PPD, postpartum day; AST, aspartate aminotransferase; H, high value; ALT, alanine aminotransferase; PLT, platelets; BP, blood pressure.

mechanism by which acupuncture could address hypertension in preeclampsia.²⁶

Reducing BP does not explain fully the mechanism by which acupuncture added to the standard of care might produce clinical results. The ischemia that is characteristic of the placenta evolves into vascular changes systemically, including ischemia of organs such as the liver. Exposure of the liver to antiangiogenic placental factors could account for some of the observed damage to the liver in preeclampsia.⁴ A 2012 animal study demonstrated that electroacupuncture at ST 36 resulted in lowered plasma ALT after hepatic ischemic injury.²⁷ If a similar effect occurs in women with PE, the effects of acupuncture could be spread over multiple organ systems.

In addition to reducing BP and conferring hepatoprotective effects, acupuncture is known to increase uterine blood flow.²⁸ One of the features of PE is a high pulsatility index.⁵ Although studies have shown that acupuncture increases uterine blood flow in women undergoing *in vitro* fertilization by lowering uterine-artery resistance, as measured by the Doppler pulsatility index,²⁸ it is not known if acupuncture can increase placental blood flow. Further studies should investigate if there is a direct correlation between acupuncture and decreasing the pulsatility index in women with PE. If this correlation is demonstrated, acupuncture might provide a treatment directed at one of the causes—rather than the late symptoms—of PE.

This case report described the successful treatment of a gravida 1, para 0 woman who had PE with severe features. Through medical management, including integrative acupuncture treatments, a high-risk pregnancy was sustained for 5 additional weeks and 1 day culminating in the delivery of a viable baby at 34 weeks of gestation. Given that this article is a case report, it is unknown if similar results can be extended to a general population, which is a limitation of this report. However, lowering BP and liver enzymes was documented in this case. Values normalized after the first 2 weeks of treatment, to the extent that the patient was discharged but was then not able to continue acupuncture. Thus, her BP and liver enzymes subsequently increased again. An important consideration for an integrative care team is to consider that acupuncture might be a critical part of a treatment plan for a high-risk patient.

CONCLUSIONS

This case study is the first report of acupuncture treatment contributing to a positive outcome when integrated with the standard of care in a high-risk antepartum care unit in the United States. Because of the unique pathology of preeclampsia as an ischemic disease with hypertension, acupuncture might be effective for addressing the complex mechanism that causes preeclampsia, and not for just reducing its symptoms.

Preeclampsia is a potentially life-threatening condition that requires monitoring and immediate, urgent high-risk care. In this case, a primigravida mother was treated successfully to reduce BP and liver enzymes and was able to sustain her pregnancy until her baby reached viability. Each day that acupuncture contributed to maintaining this pregnancy added to the length of gestation and brought the fetus another day closer to viability.

This case involved treatment incorporated into a major urban high-risk antepartum hospital and demonstrated how acupuncture can be a valuable part of a health care team for the benefit of vulnerable patients. Additional study is needed to confirm that acupuncture can be effective for treating preeclampsia and to describe the mechanism of action further. Comparing the current evidence that acupuncture lowers uterine-artery resistance with the emerging theories that preeclampsia might stem from a disorder of ischemia, further research on the potential role of acupuncture as a preventative or earlier treatment for preeclampsia should be conducted.

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