Published in final edited form as:

Psychiatry Res. 2014 August 15; 218(0): 247–248. doi:10.1016/j.psychres.2014.04.001.

Prevention of supine hypotensive syndrome in pregnant women treated with transcranial magnetic stimulation

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Abstract

In our studies of transcranial magnetic stimulation in pregnant women with major depressive disorder, two subjects had an episode of supine hypotensive syndrome and one subject had an episode of dizziness without hypotension. Prevention of the supine hypotensive syndrome in pregnant women receiving transcranial magnetic stimulation is described.

Keywords

Pregnancy; depression; adverse events

Major depressive disorder during pregnancy (antenatal depression) affects up to 10–13% of women (Bennett et al., 2004). Women with antenatal depression are more likely to abuse substances, less likely to get prenatal care and more likely to suffer adverse birth outcomes (Bonari et al., 2004; Kim et al., 2013). Treatment with antidepressants during pregnancy is controversial and pregnant women prefer non-medication alternatives (Kim et al., 2011a). While psychotherapy is a reasonable option for mild antenatal depression, moderate to severe depression generally requires psychopharmacologic intervention (Yonkers et al., 2009). Therefore, research into non-pharmacologic treatment options is of vital importance to this patient population. Repetitive transcranial magnetic stimulation (TMS) has been shown to be an efficacious treatment for major depressive disorder (MDD) in adults who have failed a single antidepressant trial in the current depressive episode (Lam et al., 2008). Typically, TMS treatments last from 10–15 minutes with right-sided, low frequency TMS to 35–45 minutes with left-sided, high frequency TMS. An acute course of TMS is usually 20 treatments given Monday-Friday for 4 weeks. It is well-tolerated with headache and facial pain being the most common side effects (Janicak et al., 2008). We have been studying TMS

in pregnant women since 2005 in both an open-label design (Kim et al., 2011b) and now in a randomized, sham-controlled trial. The only pregnancy-related adverse event that has occurred in more than one patient that is attributable to TMS is supine hypotensive syndrome. Because we get frequent questions regarding the use of TMS during pregnancy, this brief report is intended to alert both clinical and research practitioners to the possibility of supine hypotensive syndrome in pregnant women undergoing TMS treatments.

Supine hypotensive syndrome (also referred to as inferior vena cava compression syndrome) is caused when the gravid uterus compresses the inferior vena cava when a pregnant woman is in a supine position, leading to decreased venous return centrally. Up to 8% of women in the 2nd and 3rd trimesters of pregnancy can be affected (Lanni et al., 2002). Symptoms usually occur within 3–10 minutes after lying down (Kinsella and Lohmann, 1994). As the pregnancy proceeds, the uterus grows with increasing gestational age, and compression becomes more common. Symptoms include pallor, dizziness, low blood pressure, sweating, nausea and increased heart rate; these are transient symptoms which resolve with maternal position change, such as leftward tilt. Definitions vary but supine hypotension syndrome is generally diagnosed with a decrease in systolic BP of at least 15–30 mmHg (Kinsella and Lohmann, 1994). Risk factors include size, shape and weight of the uterus such that it is more common in multiple pregnancy and women with a BMI in the obese range (De Giorgio et al., 2012; Kienzl et al., 2013). In severe cases, women can have loss of consciousness. While avoiding long periods of time in the supine position after 24 weeks gestational age is preferred, if a woman develops symptoms, she should be moved into the left lateral position and the symptoms will resolve rapidly.

In our cohort, the first episode of supine hypotension occurred in the open label pilot study (Kim et al., 2011b). The treatment protocol was 20 daily sessions of TMS (300 pulses/session, 60 sec trains, 60 sec inter-train intervals) at 100% of motor threshold. The subject was a 33 year old healthy, Caucasian female at 32 and 4/7 days gestational age with her 3rd pregnancy. She was taking sertraline 100 mg, lorazepam 2.5 mg daily and denied recent episodes of lightheadedness, dizziness or fainting. During her 10th TMS session, at minute 10, she reported light-headedness. The session was paused and her blood pressure (BP) was 66/30 mmHg and her heart rate (HR) was 110 bpm (her BP prior to treatment was 95/67 mmHg, HR 103 bpm). Her oxygen saturation was 97% on room air. She was repositioned into the left lateral position and the symptoms resolved immediately. Her BP increased to 104/65 mmHg and HR decreased to 80 bpm. The fetus was monitored during the episode as per the protocol and there were no accelerations or decelerations in fetal heart rate. She was monitored for twenty minutes after the treatment was finished with uterine tocometry and fetal heart rate measurements. Her non stress test was reactive and an EKG showed normal sinus rhythm. TMS was resumed without further episodes despite continuation of treatments in the supine position. Of the 10 subjects treated in this study, this was the only occurrence. However, in the randomized-controlled trial currently underway, similar episodes occurred in 2 subjects. This protocol increases the numbers of pulses to 900 per session in one train so the session lasts for 15 minutes. A 27 year old African American female at 30 weeks 5/7 days gestation of her 3rd pregnancy reported dizziness at minute 7 of treatment 4. Treatment was paused. Her BP was 66/35 mmHg, no HR documented (her BP prior to treatment was 129/68 mmHg). HR was not documented. She was moved to her left lateral side and the

symptoms resolved after 60 seconds. She was repositioned with a wedge under her right side lower back (see picture). Her BP increased to 111/68 and treatment was resumed without further episodes. At this time a change in protocol was instituted such that any woman over 24 weeks gestational age would be positioned on her left side using a wedge cushion since symptoms are less likely to occur with at least a 30 degree left pelvic tilt (Kinsella et al. 1994).

Finally, a 20 year old African American, healthy female, off psychotropics during her 1st pregnancy asked to have a fan turned on to cool her down at minute 11 of her 11th TMS session. She was 33 weeks and 2/7 days gestational age. She stated she was dizzy so we pushed the lower back wedge further under her right side and the dizziness immediately resolved. Her BP was 118/69 mmHg, not indicative of supine hypotensive syndrome. Because her BP was normal and her symptoms resolved immediately no further actions were taken.

Positioning for TMS is different depending on which device is used. Not all devices would have a subject supine. However, given the increased interest in using TMS in pregnancy, it is important to rapidly share information regarding its safety in this special population. None of the women had an increased BMI but they were all in the 3rd trimester of pregnancy. During pregnancy, women develop collateral venous circulation; in women that it is not well-developed are at risk for developing hypotensive symptoms when lying on their back. The magnetic coil should be positioned after the subject is positioned and the wedge is placed. In conclusion, when giving pregnant women TMS we recommend avoiding the supine position and monitoring pregnant women closely for signs and symptoms of supine hypotension syndrome.

Acknowledgments

Funding source: MINH grant K23MH092399 (P.I. Deborah R. Kim)

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Picture.

Foam wedge under right lower back of pregnant woman to tilt pelvis to the left.