

## Osteopathic Manipulative Treatment in Pregnant Women

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**Pregnant women experience extensive physiologic and structural changes during pregnancy that affect their daily functioning. The addition of osteopathic manipulative treatment (OMT) to the standard care of pregnant women has been hypothesized to enhance homeostasis and improve quality of life as the body adapts to these changes. Specifically, it has been postulated that OMT can ease pain in pregnant women by eliminating somatic dysfunction and maintaining proper structure. Also, through the viscerosomatic connection, the hemodynamic changes of the maternal body can be controlled, the duration of labor reduced, and the complications of labor avoided. The author reviews the available literature on the use and effectiveness of OMT during pregnancy.**

*J Am Osteopath Assoc.* 2012;112(6):343-346

The philosophy of osteopathic medicine focuses on the unity of all body parts and the principle that structure and function are interrelated. Osteopathic medicine's founder, Andrew Taylor Still, MD, DO, believed that our body systems depend upon one another to function, and that maintenance of the body in its proper alignment improves the body's function and its ability to maintain health.<sup>1</sup> Osteopathic manipulative medicine involves examination of the whole patient—body, mind, and spirit—and treatment of any stresses placed upon the body.

This philosophy can be applied to the care of pregnant women. During pregnancy, the maternal body undergoes various structural changes to accommodate the growing fetus. As pregnancy progresses, these changes have a profound effect on the daily functioning of the pregnant patient.<sup>2</sup> The release of such hormones as relaxin and progesterone changes the body's physiology, which can exaggerate anatomic stresses in the maternal body. Relaxin, which starts to be released around the 10th to 12th week of pregnancy, causes laxity within the sacroiliac joints and pubic symphysis to allow for widening of the pelvic girdle. As the pelvis begins to tilt anteriorly, the lumbar lordosis increases, which places an increased stretch on the extensor muscles of the trunk and on the sacroiliac joints, leading to increased low back and pelvic pain. Furthermore, as the fetus descends into the widened pelvis, the increased pressure on the lumbosacral plexus can induce sciatic pain and paresthesia in the leg.<sup>3-5</sup>

Throughout pregnancy, various physiologic changes occur within the maternal body that can disrupt normal bodily structure and function.<sup>6</sup> The major hemodynamic changes induced by pregnancy include increases in cardiac output, sodium retention, and water retention, leading to expansions in blood volume and reductions in systemic vascular resistance and systemic blood pressure. These changes begin early in pregnancy, reach their peak during the second trimester, and then remain relatively constant until delivery.<sup>2</sup>

In accordance with the osteopathic tenet that the body is self-regulating and self-healing,<sup>7</sup> the application of osteopathic manipulative treatment (OMT) may improve and optimize physiologic function, which can alleviate somatic dysfunctions and improve quality of life for pregnant women.<sup>8</sup> If OMT is applied from the beginning of pregnancy through delivery, these hemodynamic changes can be controlled so that they may continue to provide benefits to the fetus but also be cultivated to avoid harm to the pregnant patient.

In the present article, I review the osteopathic medical literature on the use of OMT in the pregnant population, particularly how it alleviates somatic dysfunctions that occur within pregnant patients and how it improves their quality of life. Articles were selected by conducting searches in PubMed and Google Scholar databases. Search terms included *osteopathic manipulative medicine*, *manual therapy*, *pregnancy*, and *obstetrics*.

**Financial Disclosures:** None reported.

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Submitted August 12, 2011; final revision received January 19, 2012; accepted February 8, 2012.

### **OMT's Effects in Pregnancy Viscerosomatic Interactions**

In 1907, Louisa Burns, DO, studied animals in various stages of pregnancy.<sup>9</sup> She showed that electrical stimulation of the uterine cervix caused muscular contractions near the lumbosacral joint, while electrical stimulation of the body of the uterus caused contraction of the muscles near the second lumbar vertebra. Furthermore, electrical stimulations at the second lumbar vertebra caused uterine contractions that were regular and strong. These stimulations were accompanied by contraction of the uterine vessels and rigidity of the uterine cervix. Inhibition of the tissues near the lumbosacral joint caused dilatation of the cervical vessels and relaxation of the cervix.<sup>9</sup>

This report by Burns<sup>9</sup> delineates the concept of viscerosomatic interactions, which are central to the osteopathic philosophy of disease. This concept, which has been confirmed by Irvin Korr, PhD,<sup>10</sup> in dogs, shows that there is a mechanism by which the sensory afferent neurons from the viscera convey impulses through the spinal cord and internuncial connections with  $\gamma$  efferent motor nerves to the paraspinal muscles. Through this viscerosomatic neural pathway, OMT can potentially either stimulate the uterine cervix, thus inducing and shortening labor time, or inhibit the uterine cervix, thus prolonging and reducing preterm labor.

### **Labor**

During pregnancy, OMT to the lower lumbar vertebrae can affect the pelvic viscera. For example, a study involving 223 pregnant women conducted in 1911 by Whiting<sup>11</sup> showed a decrease in the duration of labor in pregnant women who received OMT compared with pregnant women who did not receive OMT. Whiting found that the average labor time for primiparous women who received prenatal OMT was 9 hours 54 minutes, compared with 21 hours 6 minutes for primiparous women who did not receive OMT. Labor time for multiparous women who received prenatal OMT was 6 hours 19 minutes, compared with 11 hours 41 minutes for multiparous women who did not receive prenatal OMT.

In 1918, Hart<sup>12</sup> also documented a decrease in labor time in women who received OMT to the lumbar vertebrae compared with those who did not receive OMT. Hart found that the average duration of labor among the 100 women studied was 9 hours 20 minutes for primiparous women and 5 hours for multiparous women, compared with 15 hours and 9 hours, respectively, for women who did not receive prenatal OMT. Although their findings did not reach statistical significance, these studies suggest that by manipulating the lumbar spine, it is possible through viscerosomatic feedback to affect the pelvic viscera and possibly induce uterine contractions.

Similarly, Gitlin and Wolf<sup>13</sup> were able to initiate uterine contractions with the application of osteopathic craniosacral manipulation. This study illustrates that the effects of OMT are not limited to musculoskeletal complaints but can also induce change within the viscera through the viscerosomatic connection.

A retrospective study by King et al<sup>14</sup> revealed that the use of OMT in pregnant patients significantly decreased the probability of meconium-stained amniotic fluid, use of forceps during delivery, and likelihood of preterm delivery. These findings confirm Burns' conclusion that there is a viscerosomatic connection between the lumbar spine and the uterus.

### **Cardiovascular Health**

Burns<sup>15</sup> also showed that electrical stimulation of the tissues near the fourth thoracic vertebra caused an increase in pulse rate of up to 15 beats per minute. When efficient stimulation was given, blood pressure increased. In addition, stimulation of the tissues near the fourth and fifth thoracic vertebrae caused vasoconstriction in the hands.<sup>15</sup> This effect on the cardiovascular system is likely caused by the location of the sympathetic nervous system (SNS). The sympathetic trunk lies lateral to the vertebral body from the first thoracic vertebra to the second lumbar vertebra. The thoracic SNS is part of the body's autonomic nervous system and provides innervation to the viscera within the chest and upper extremities.<sup>16</sup> Therefore, OMT to the thoracic spine can affect the cardiovascular system of the upper extremities and the heart by stimulating or inhibiting the SNS.

For example, stress induced by increased cardiac output (a rise of 30%-50%) can cause cardiac compensation in women with underlying heart disease during the latter half of pregnancy.<sup>3</sup> However, OMT of the cervical spine, especially from the atlas to C3, can regulate the symptoms of overstimulation of the vagus on the heart. Also, applying OMT to the thoracic vertebrae can help reduce the activation of the SNS, which can help alleviate systemic vasoconstriction and afterload in the heart. Osteopathic manipulative treatment to the thoracic spine can also help regulate blood pressure as the demands on the heart increase.<sup>2</sup>

Women also experience an increase in bodily fluid during pregnancy, which is exacerbated by a decrease in venous and lymphatic return. The maternal thoracic cage forms an increased kyphosis to compensate for the increased lumbar lordosis. This increased kyphosis can cause restriction within the diaphragm, which results in decreasing venous and lymphatic return and worsening congestion.<sup>2</sup> Pressure from the fetus can cause compression of the vena cava, further decreasing venous return. This venous stasis has been postulated to cause nausea, headache, and light-headedness due to a decrease in oxy-

generation.<sup>17</sup> Osteopathic physicians can apply OMT to the respiratory diaphragm or use lymphatic drainage techniques such as lymphatic pump to help improve drainage of fluid congestion and prevent detrimental effects of fluid overload.<sup>18</sup>

Increased progesterone levels during pregnancy cause increases in fluid retention. This increased fluid retention causes increased congestion within the maternal body, leading to swelling of the extremities and structural problems like carpal tunnel syndrome.<sup>2</sup> Application of OMT to the transverse carpal ligament and thoracic spine can relieve somatic dysfunction and reduce upper extremity complaints such as carpal tunnel syndrome by decreasing upper extremity fluid retention.<sup>19</sup>

### Back Pain

Back pain is a common complaint among pregnant women. In 1996, a prospective study<sup>20</sup> of 200 women reported the following:

Seventy-six percent reported back pain at some time during pregnancy. Sixty-one percent reported onset during the present pregnancy. In this group, the prevalence rate increased to 48% until the 24th week and then remained stable and declined to 9.4% after delivery. The reported pain intensity increased by pain duration. The pain score correlated closely to self-rated disability and days of sickness benefit.... The 30% with the highest pain score reported great difficulties with normal activities.

Evidently, the back pain started with pregnancy and worsened throughout the course with a peak at the 24th week. Another study<sup>21</sup> published in *Spine (Phila Pa 1976)* in 1991 showed that in 885 women who were followed beginning with the 12th week of pregnancy, the prevalence of low back pain at 9 months was 49%.

Osteopathic manipulative treatment can alleviate musculoskeletal complaints that arise during pregnancy. In 1982, Guthrie and Martin<sup>22</sup> performed a placebo-controlled study of 500 women. They found that the women who received OMT to the lumbar region had decreased pain compared with those who received sham treatment, which involved application of pressure to the thoracic spine. Of the women, 352 experienced pain in the low back during labor, a prevalence of 70.4%. In this study, application of OMT to the low back during labor reduced the need for major narcotic pain medication.

Furthermore, another article<sup>23</sup> from *Spine (Phila Pa 1976)* in 1997 revealed a decrease in the amount of sick leave associated with low back pain in pregnant patients who received physical therapy. Another study<sup>24</sup> for low back pain in the *Family Practice Research Journal* found that 91% of pregnant patients with sacroiliac dysfunction had alleviation of their low back pain after receiving manipu-

lation. As the body goes through the changes of pregnancy, OMT applied to the low back and sacroiliac joint can help alleviate some of the discomfort that occurs because of these maternal physiologic changes.

Diakow et al<sup>25</sup> found that there was a statistically significant reduction of degree of back pain during labor in women who received spinal manipulative therapy during pregnancy. Also, a study by Licciardone et al<sup>26</sup> published in 2010 in the *American Journal of Obstetrics and Gynecology* looked at the effects of OMT on low back pain during pregnancy. They conducted a randomized, placebo-controlled trial to compare usual obstetric care and OMT, usual obstetric care and sham ultrasound treatment, and usual obstetric care only. They reported that back pain was reduced and deterioration of back-specific function was statistically significantly less in the usual obstetric care and OMT groups, compared with the 2 non-OMT groups.<sup>26</sup>

### Comment

The data reviewed support the theory that manipulation can have a beneficial effect on back pain in pregnancy. Considering how common low back and pelvic pain are in pregnant patients, trained physicians should try sufficient means to alleviate such discomfort. Published research suggests that osteopathic physicians can alleviate many physical discomforts of pregnancy by applying OMT at each patient encounter through the duration of pregnancy (*Figure*). One of osteopathic medicine's main tenets is the belief that, through OMT, the body can maintain health.<sup>7</sup> Therefore, when the body undergoes multiple anatomic and physiologic changes, such as those that occur during pregnancy, it is important that OMT be available to maintain the pregnant woman's health.

However, there is a lack of current randomized, controlled clinical trials on the effectiveness of the application

- Decreased probability of having meconium-stained amniotic fluid
- Decreased use of forceps during delivery
- Decreased likelihood of having a preterm delivery
- Decreased duration of labor
- Decreased blood pressure
- Decreased fluid overload
- Decreased sacroiliac dysfunction
- Decreased low back pain
- Decreased carpal tunnel symptoms

**Figure.** Benefits of osteopathic manipulative treatment in pregnant women.<sup>11,12,14,15,18,19,24-26</sup>

of OMT in pregnant women. The present article shows that many variables should be further studied, including heart rate, blood pressure and edema control, occurrence of perinatal complications, preterm delivery and development of low back pain, and optimal amount and timing of OMT during pregnancy. The evidence described in this article sets precedence for the effectiveness of OMT in pregnant women and for performing further clinical trials.

The field of medicine is shifting to accountable care organizations, and the scrutiny of procedures performed is likely to increase. In light of these changes, osteopathic physicians need strong evidence to support their use of and billing for OMT. Furthermore, as health care payment evolves to pay for performance, osteopathic physicians can use OMT in their care of pregnant women to improve the quality of care and outcomes for their patients. Further research in this area will give osteopathic physicians the opportunity to be at the forefront of modern health care by performing the highest quality of care for their patients.

### Conclusion

Treatment of somatic dysfunction in pregnant women can enhance homeostasis and improve comfort and quality of life as the maternal body adapts to the physiologic and structural changes of pregnancy. Through the application of OMT, osteopathic physicians can dramatically improve the lives of women during pregnancy.

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