

Efficacy of Osteopathic Manipulative Treatment for Management of Postpartum Pain

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Context: Pain is one of the most common postpartum complaints by women in the United States, and the pain varies in its location. Research on intervention strategies for postpartum pain has focused primarily on the lower back, but pain management for other types of postpartum pain remains unclear.

Objective: To investigate the effects of osteopathic manipulative treatment (OMT) on postpartum pain; the location, quality, and timing of pain; and the difference in pain between vaginal and cesarean delivery.

Methods: Postpartum patients who reported having pain were recruited at St Barnabas Hospital in Bronx, New York. The short-form McGill Pain Questionnaire was administered along with a screening questionnaire. Second- or third-year residents in neuromusculoskeletal medicine and osteopathic manipulative medicine examined patients and then diagnosed and managed somatic dysfunction with OMT for approximately 25 minutes. The short-form McGill Pain Questionnaire was again administered after OMT. Paired *t* tests and McNemar tests were used to analyze changes before and after OMT for continuous and categorical variables, respectively. Differences in visual analog scale (VAS) pain scores between patients who had vaginal vs cesarean delivery were tested using analysis of variance, and group differences in pain location were tested using a Pearson χ^2 test.

Results: A total of 59 patients were included in the study. The mean VAS score for pain was 5.0 before OMT and 2.9 after OMT ($P<.001$). The VAS scores before OMT significantly differed between patients who had a vaginal delivery and those who had a cesarean delivery ($P<.001$), but the mean decrease in VAS score was similar in both groups. Decreases in low back pain (34 [57.6%] before and 16 [27.1%] after OMT), abdominal pain (32 [54.2%] before and 22 [37.3%] after OMT), and vaginal pain (11 [18.6%] before and 5 [8.5%] after OMT) were reported after OMT ($P<.05$).

Conclusion: Preliminary results demonstrate that OMT is efficacious for postpartum pain management. The lack of a control group precludes the ability to make causal claims. Future studies are needed to solidify OMT efficacy and generalizability.

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Much research has been conducted on conventional treatments for patients with postpartum pain, including nonsteroidal anti-inflammatory drugs (NSAIDs), opioids, and ice packs or heating pads.¹⁻³ Currently, NSAIDs are most commonly used for nonspecific postpartum pain control, and cold packs seem to aid with postpartum perineal pain.³ However, these modalities are frequently not enough to mitigate the pain, and the discomfort often continues to cause significant distress.^{2,4}

Because of the anatomic changes that occur during pregnancy and delivery, it seems that osteopathic manipulative treatment (OMT) would be an effective adjunctive modality for treating patients with postpartum pain. With vaginal delivery, bony structural changes combined with ligamentous laxity make women particularly prone to postpartum sacroiliac dysfunctions, which can cause severe discomfort.⁵ Predisposing factors to somatic dysfunction in all postpartum patients include postural changes and emotional stress, which collectively lead to hyperirritability of muscles and increased pain.⁶ Many OMT techniques are able to help relax contracted muscle tissue, relieve joint pain, and alleviate ligamentous strain, thereby reducing this pain.⁷

Research examining the effects of OMT in the management of postpartum pain is lacking. A 2015 study by Schwerla et al⁸ showed that OMT performed 4 times during 12 weeks in an outpatient setting decreased pain intensity and functional disability in postpartum patients with low back pain. However, these results are specific to chronic low back pain and do not address other types of pain in the immediate postpartum period. Several studies also have demonstrated that OMT is effective in improving low back pain during pregnancy.⁹⁻¹²

Even though OMT is widely used for postpartum pain in hospitals that have neuromusculoskeletal medicine and osteopathic manipulative medicine (NMM/OMM) residency programs, no research documenting

treatment effects has been conducted by these institutions, to our knowledge.¹³ We conducted a survey-based study to investigate the effects of OMT on postpartum pain; the location, quality, and timing of pain; and the difference in pain between vaginal and cesarean delivery. We hypothesized that OMT would provide effective therapeutic relief of discomfort as an adjunct to the standard of care.

Methods

This study was approved by the New York Institute of Technology Institutional Review Board (IRB# BHS1122) and the St Barnabas Hospital Institutional Review Board (IRB #2015.33). The NMM/OMM residency program provides a consultation service to the postpartum unit at St Barnabas Hospital, and all patients who deliver at that hospital are routinely offered OMT. Eligibility criteria for the present study included the following: women older than 18 years who were candidates for OMT, reported having pain, delivered within the past 48 hours, and consented to receive OMT. The study took place between July 2015 and October 2015.

Protocol

Patients were approached to participate at bedside. A second- or third-year resident physician from the NMM/OMM department (6 residents total) first described the osteopathic structural examination and OMT using a standard script. Patients were asked if they currently had pain and, if so, whether they desired OMT. A screening questionnaire was administered to all patients to understand other possible factors related to their pain, and responses were verified using medical records. Patients then completed the short-form McGill Pain Questionnaire.¹⁴ All of the scripted text, consent forms, and surveys were available in English and Spanish and were labeled numerically to protect patient anonymity.

A supine osteopathic structural examination was then performed to determine somatic dysfunction. Specific examination style was left to the discretion of the physician. Patients were then treated with OMT to the regions of somatic dysfunction identified. The treatment times ranged from 20 to 30 minutes, were tailored on the basis of the physician's structural findings, and were performed according to osteopathic principles and practice. The most common OMT techniques used were balanced ligamentous tension, myofascial release, and facilitated positional release techniques, as these techniques are passive and easily performed at bedside. Immediately after OMT, the patients again completed the questionnaire.

Each encounter was documented in the patients' medical record. Medical record data were gathered on the following variables: delivery type, length of pregnancy at time of delivery, need for episiotomy, pregnancy or delivery complications, use of epidural anesthesia, and the need for pain medication postpartum.

Instrument

The short-form McGill Pain Questionnaire has 3 components: pain descriptors (sensory and affective), a drawing of a person on which areas of pain are marked, and a visual analog scale (VAS). Patients were first asked to rate applicable pain descriptors as being mild (1), moderate (2), or severe (3). Two pain scores were then calculated based on patients' responses to the pain descriptors. The sensory score was based on descriptors that defined the organic feeling of pain (eg, throbbing), and the affective score represented an emotional reaction to pain (eg, exhausting). Eleven of 15 descriptors were considered sensory; thus, the maximum possible sensory score was 33 (ie, severe in all categories). Four of 15 descriptors were considered affective, making the theoretical maximum affective score a 12. If the descriptor did not apply, it was given a value of 0. When analyzing individual pain quality descriptors separately, the presence or

absence of a particular pain quality was used regardless of its severity. The drawing component had anterior and posterior views, and patients indicated where on the drawing they had pain. The VAS, which quantified overall level of pain, was a 10-cm line, where 10 cm indicated the worst pain ever felt. Zero centimeters indicated no pain.

Statistical Analysis

SPSS version 22 (IBM) was used to conduct the statistical analysis. Paired *t* tests and McNemar tests were used to analyze changes before and after OMT for continuous and categorical variables, respectively. Differences in VAS pain scores between patients who had cesarean and patients who had vaginal delivery and between different pain medication regimens were tested using analysis of variance. Group differences in pain location were tested using the Pearson χ^2 test. Parametric tests were used after verifying that the data followed an approximately normal distribution. For each analysis, significance was determined at $\alpha=.05$, controlling for type I error per test at 5%. Descriptive statistics are provided as a landscape to examine trends and changes.

Results

Of the roughly 75 to 80 patients approached to participate in this study, 59 met the inclusion criteria and agreed to participate. All patients spoke either English or Spanish, and all patients received similar medical care.

Pain Medication

Pain medication typically followed 3 regimens: (1) 600 mg of ibuprofen every 6 hours (35 [59.3%]); (2) 2 combination acetaminophen-oxycodone tablets and 600 mg of ibuprofen every 6 hours (12 [20.3%]); or (3) 2 combination acetaminophen-oxycodone tablets, 600 mg of ibuprofen, and 30 mg of intravenous ketorolac every 6 hours (5 [8.5%]). One patient was

given 100 mg of tramadol only, 1 patient was given 2 combination acetaminophen-oxycodone tablets alone, 1 patient was given acetaminophen alone, 1 patient was given combination acetaminophen-oxycodone, ibuprofen, and acetaminophen, and 1 patient was given acetaminophen and ibuprofen. In 1 patient, OMT coincided with subsequent pain medication dose. In all other instances, OMT occurred in between doses. Among the 35 patients receiving NSAID monotherapy, 31 had vaginal delivery and 4 had cesarean delivery. Of the 22 patients receiving other pain medication regimens (including opioids, multiple NSAIDs, and acetaminophen), 5 had vaginal delivery and 17 had cesarean delivery. This difference was statistically significant ($P<.001$).

Somatic Dysfunction and OMT

Treatments were based on somatic dysfunction rather than specific patient complaints. Forty-two patients (71.2%) were found to have external rotation of the hip, and 39 (66.1%) had a lumbar extension dysfunction. Somatic dysfunction was especially prevalent in transitional zones; 42 patients (71.2%) had an extended occipitoatlantal joint, 29 (49.1%) had thoracolumbar dysfunction, and 24 (40.7%) had a restricted sacroiliac joint. An anterior sacral base was present in 30 patients (50.8%), and an inhaled hemidiaphragm was diagnosed in 33 patients (55.9%).

Impact on Pain

A total of 34 patients (57.6%) reported having back pain before OMT, and 16 (27.1%) reported back pain after OMT. This difference was significant ($P<.001$). Decreased abdominal pain was also reported, with 32 patients (54.2%) reporting abdominal pain before OMT and 22 patients (37.3%) reporting abdominal pain after OMT ($P<.001$). Eleven patients (18.6%) reported having vaginal pain before OMT, and 5 (8.5%) reported having vaginal pain after OMT ($P=.03$).

Short-Form McGill Pain Questionnaire

Patients most commonly described their pain before OMT as cramping (27 [45.8%]), aching (16 [27.1%]), throbbing (13 [22%]), tender (8 [13.6%]), sharp (10 [16.9%]), or heavy (10 [16.9%]). After OMT, pain frequencies decreased to 18 (30.5%) cramping ($P=.02$); 10 (16.9%) aching ($P=.07$); 7 (11.9%) throbbing ($P=.07$); and 8 (13.6%) heavy ($P=.68$). A slight increase in tenderness and sharpness were reported after OMT, both at 18.6% ($P>.05$) (Figure). Only the change in cramping was found to be statistically significant.

Overall decreases were seen in both sensory (before OMT, 2.98; after OMT, 1.97) and affective (before OMT, 0.31; after OMT, 0.15) mean pain scores. Findings were statistically significant for sensory score changes ($P<.001$) but not for affective score changes ($P=.13$).

Thirteen patients (22%) reported a VAS score of 0 after OMT. The mean VAS score for the study population as a whole was 5 before OMT and 2.9 after OMT ($P<.001$); however, the VAS scores before OMT significantly differed between patients who had a vaginal delivery and those who had a cesarean delivery (4.5 vs 6.0; $P<.001$). The 22 patients who had cesarean delivery reported slightly higher mean VAS scores (6.0 before OMT vs 3.5 after OMT; $P<.001$), compared with the 37 patients who had vaginal delivery (4.5 before OMT vs 2.6 after OMT; $P<.001$). The mean decrease in VAS score between both groups was similar (1.9 for vaginal delivery vs 2.5 for cesarean delivery).

The effect of differences in pain medication regimen was further analyzed to ensure that response to OMT was not confounded by this variable. Among patients given ibuprofen alone, the mean reported VAS score before OMT was 4.8, and after OMT was 2.9 ($P<.001$). No statistically significant difference was found in mean VAS scores before and after OMT between patients receiving NSAID monotherapy and those receiving other pain medication regimens (before OMT, $P=.25$; after OMT, $P=.87$).

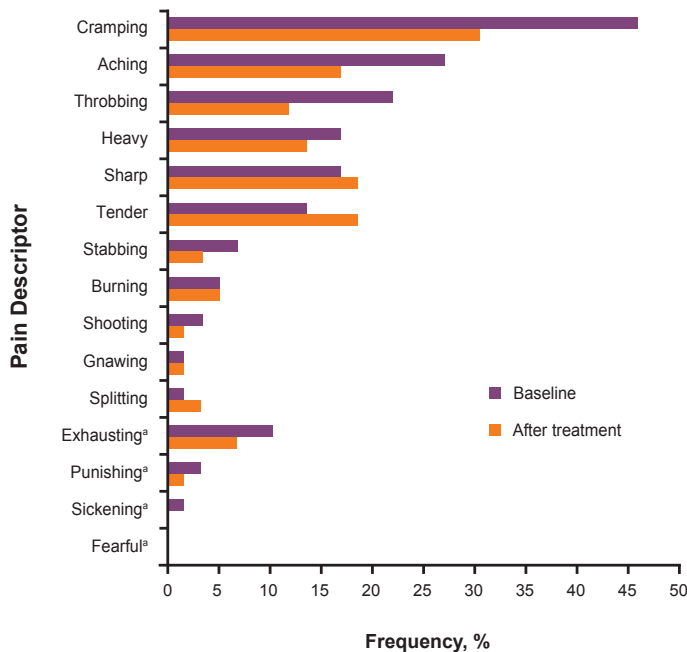


Figure.

Percentage of patients reporting specific pain descriptors before and after osteopathic manipulative treatment. Presence or absence of a particular pain quality was used regardless of its severity.

^aExhausting, punishing, sickening, and fearful were considered affective descriptors; all others were considered sensory descriptors.

Discussion

After OMT, a statistically significant decrease was found in scores on the short-form McGill Pain Questionnaire. Further, the results demonstrate that OMT was able to completely alleviate pain in 13 patients (22%), who reported a VAS score of 0 after OMT and resolution of low back pain, abdominal pain, and vaginal pain. These findings demonstrate that OMT might be promising for postpartum pain management as an adjunct to standard care.

Differences in baseline pain medication regimens are explained in large part by delivery type, with the cesarean delivery group being much more likely to receive dual pharmacotherapy, triple pharmacotherapy, or pharmacotherapy with opiates compared with the vaginal delivery group, who were more likely to receive NSAID monotherapy. Although the cesarean delivery group reported higher overall baseline VAS scores, the mean difference before and after OMT was similar to the vaginal delivery group, indicating that OMT could be useful for both groups. When analyzing groups separately regarding monotherapy with NSAIDs vs additional or alternative pain medications, no meaningful differences were found, which indicates that this factor was unlikely to confound results.

A statistically significant difference was detected in mean sensory pain scores before and after OMT; however, the clinical significance of this change remains questionable. Because the mean score before OMT was 3 out of a possible 33, a mean change of 1 point after OMT likely means very little when considering the range of this particular scale. The same can be said of affective pain score changes, although these changes were not statistically significant. Despite reported moderate to high average VAS scores before OMT, the sensory pain scores were calculated to be low before OMT. Because the list of pain descriptors was limited, it is possible that patients were having a quality of pain that did not fall under any of the categories listed; however, this finding is unclear. It is also possible that patients felt many different types of pain and were unable to differentiate just 1, leading to an artificially low sensory or affective score.

To further understand computed sensory pain scores, it is helpful to investigate the prevalence of specific types of pain quality along with their underlying mechanisms. The statistically significant decrease in cramping is meaningful. Postpartum cramping results from increased uterine tone and is regulated by postpartum hormone changes, specifically oxytocin, and by the autonomic

nervous system.¹⁵ Reducing somatic dysfunction in the thoracolumbar junction, especially if evidence of segmental facilitation is present (warm, boggy, paravertebral hypertonicity), helps regulate autonomic tone to the uterus and is a possible mechanism behind the observed decrease in cramping.¹⁶ Fascial strain of surrounding uterine ligaments may contribute to contractility, and OMT can target the normalization of this tension.¹⁷

A decrease in throbbing was also demonstrated after OMT. A widely held view is that throbbing results from the activation of local sensory neurons that stimulate arterial pulsations owing to their close proximity, although this view has been more recently challenged.¹⁸ Certain gentle OMT techniques are believed to facilitate an increase in blood flow and the opening of lymphatic channels, which may contribute to relief of this symptom.⁷ These clinical findings are consistent in supporting the mechanisms of OMT. The slight increase in tenderness after OMT, although not statistically significant, is still consistent with what is already a known side effect of OMT.⁷ Occasionally, patients report more tenderness immediately after OMT, which is believed to result from minor and temporary tissue irritation¹⁹; however, this initial inflammatory response usually subsides with time.

Because it is unclear how subjective feelings of pain are related to somatic dysfunction findings, it is helpful to know which areas are likely to have dysfunction to help target effective treatment. Patients reported improvement of pain resulting from techniques applied to these areas. The most common regions of dysfunction included transition zones of the spine and the lower extremities. Spinal somatic dysfunction likely resulted from the exaggeration of postural curves to accommodate the enlarging uterus during pregnancy. Many patients had dysfunctions in transition zones, where postural stress accumulates. Additionally, external rotation dysfunction of the femoroacetabular joint may have been a result of patients' feet placed in stirrups during delivery.

A bilateral sacral flexion dysfunction was found in half of the patients, which may have been a result of increased lumbosacral lordosis during pregnancy and the physiologic nutation that occurs during the fetal expulsion phase of the second stage of labor. The pelvic inlet and outlet also widen and narrow to accommodate engagement and expulsion of the fetus during the birth process, leading to pelvic dysfunction with a prevalence of anterior rotation in this population. Just over half of patients were found to have abdominal diaphragm inhalation dysfunction, possibly related to an anterior column fascial drag caused by uterine myofascial strain or from disruption of the myofascial integrity of the abdominal wall during cesarean delivery.

Collectively, these findings provide a starting point for the framework of a diagnostic approach to the postpartum patient. During the osteopathic structural examination, findings may direct the physician to particular areas to more efficiently target therapy. Mapping out these areas also lays groundwork for the possible construction of an OMT protocol for the postpartum patient to help determine the most effective OMT techniques.

Limitations

Several limitations are inherent to this study design. Most notably, there was no control group. The choice to proceed without a control group was made because of previously unclear evidence about the utility of OMT for the management of postpartum pain. The results of the current study, however, provide reasonable evidence to move forward with a randomized controlled trial in the future. Additionally, the use of immediate pre- and posttesting and consistency in patient baseline medical care allowed the reasonable conclusion of attributing decreases in pain to OMT itself, although the possibility of placebo effect cannot be ruled out. Future studies should also separate the roles of treating physician and data collector

to decrease self-report bias. Because only 1 post-treatment pain score was obtained, conclusions about sustained treatment effectiveness after OMT cannot be drawn. It is therefore unclear how long these effects last.

Although the initial results showed that OMT helped reduce postpartum pain, questions remain about which techniques in particular were most efficacious. The OMT was performed by different residents using different techniques; however, every technique was performed according to osteopathic principles and practice and demonstrated a statistically significant effect. Future research should consider the benefits and drawbacks of implementing a standardized treatment protocol to demonstrate a uniform effect.

The patient sampling method is another limitation. The use of nonprobability sampling within a single hospital limits the ability to generalize results. In this way, the study lacks external validity, and the results may not necessarily be replicated in other hospitals. The self-selecting nature of the study sample also has the potential to introduce bias. It is possible that women consenting to participate were more likely to believe that OMT would be effective and lead to a more favorable self-reported change. Attempts to limit this bias were made by creating the standard script used by all residents recruiting for the study. Further, 10% of patients had received OMT in the past, which limited preconceived biases about OMT.

Self-reported survey data have limitations. Patient accuracy and reliability is often called into question. When studying pain, however, it is almost impossible to use objective measures because the experience of pain itself is subjective. Self-report bias was likely reduced appreciably by the use of patients' medical records to verify demographic data and medical management at the time of treatment. For these reasons, possible inaccuracies in survey responses were minimized.

Conclusion

Preliminary results demonstrate that OMT is efficacious for pain management after both cesarean and vaginal delivery. Patients reported significant overall decreases in pain immediately after OMT, and some reported resolution of pain in specific areas. At this time, the lack of a control group precludes the ability to make causal claims. However, these descriptive results provide strong support for additional research to investigate these questions. Future research should attempt randomized controlled trials involving multiple hospitals to solidify the efficacy and generalizability of OMT for postpartum pain.

Author Contributions

Student Doctor Hastings and Drs McCallister and Yao provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; all authors drafted the article or revised it critically for important intellectual content; Dr Yao gave final approval of the version of the article to be published; and Student Doctor Hastings and Drs McCallister and Yao agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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