

CASE STUDY

Resolution of Breech Presentation Confirmed by Ultrasound Following the Introduction of Webster Technique: A Case Study & Selective Review of the Literature

Pamela Stone-McCoy, D.C., CACCP¹ & Margaret Sliwka, D.C.²

Abstract

Objective: The chiropractic care of a patient presenting with breech pregnancy using the Webster Technique is described.

Clinical Features: A 37 year old woman pregnant 35 weeks with her third child presented into the office after discovering through ultrasound that the baby was in breech position. The patient stated she was looking for an alternative to having a cesarean section.

Interventions and Outcomes: Light-force, contact specific (Webster Technique) chiropractic adjustments were administered, as well as light effleurage trigger point therapy and home exercises. After five Webster Technique adjustments, the fetus turned from a frank breech position to a vertex, head-down position.

Conclusion: Chiropractic care was given for a breech pregnancy by utilizing Webster Technique. The ligamentous and musculoskeletal issues associated with the breech presentation were cleared in the patient. Pre and post ultrasounds confirmed the transition of the fetus from a breech to a vertex position.

Key Words: *Chiropractic, Webster Technique, intrauterine constraint, pregnancy, subluxation, advanced maternal age, malposition*

Introduction

In the World Health Organization (WHO) document Healthy People 2010, the goal percentage of cesarean births for first time mothers is listed as 15%.¹ This number is a reflection on those countries with the lowest infant mortality and highest obstetrical health, of which the United States is not a contender. According to the Center for Disease Control (CDC), the United States is currently ranked 29th in the world

in terms of infant mortality.^{2,3} Take into account the risks associated with elective cesarean births, which are undeniable, and the prospect of birth via cesarean is even more daunting: increased overall neonate risk, increased postpartum risks of cardiac arrest, wound hematoma, hysterectomy, major puerperal infection, anesthetic complications, venous thromboembolism and hemorrhage requiring hysterectomy, longer hospital stays when compared to women having vaginal births, increased risk of serious respiratory morbidity

1. Private Practice of Chiropractic, Kennesaw, GA, USA
2. Private Practice of Chiropractic, Zoetermeer, Netherlands

and increased risk of severe maternal morbidity.^{4,5,6} In addition to this, a survey study by MacDorman and colleagues found several sources that had concluded from their research that “higher cesarean rates are predominantly correlated with higher maternal mortality. A similar pattern is found for infant and neonatal mortality.”⁷

Despite the recommendation of the WHO to limit the number of cesarean sections, the rate continues to grow, and as of 2006, the cesarean rate in the United States was estimated to be 31.1%.⁷ This number is significantly higher for breech presentation, and as of 2003 it was estimated that 85.1% of breech presentations were delivered by cesarean section.⁸ The necessity of cesarean sections for malpositioned fetuses is becoming more controversial, as noted in an article looking at the long-term results of breech vaginal versus breech cesarean deliveries, which suggests that given current standards of obstetric and neonatal care, the planned mode of delivery has little effect on long term outcome up to school age.⁹

Advanced maternal age is classified as 35 years of age and older and is associated with higher risks of many conditions during pregnancy such as chronic hypertension, severe pre-eclampsia, and gestational diabetes.¹⁰ Indeed, women have an increasingly higher risk of uterine dysfunction as they age.¹¹ Women of advanced maternal age are also more likely to undergo cesarean section. In 2006, nearly half (47.6%) of births among women ages 40 and over were delivered by cesarean compared with 22.2% of teen births.⁷

Having an alternate birth plan available to a pregnant woman may mean the difference between an invasive, complicated birth and a natural, un-complicated birth. Utilizing the Webster Technique (previously known as Webster In-Utero Constraint Technique), a chiropractic technique which aims to correct the biomechanical causes of intrauterine constraint, may help those women presenting with a breech fetus achieve a vaginal birth, thereby avoiding a planned cesarean delivery.^{12,13}

Case Report

History

The patient in question was a pregnant 37 year old female presenting to the office 35 weeks into her pregnancy with a frank breech. The patient stated she wished to avoid having a scheduled cesarean section and after some personal research on the internet found out about the Webster Technique as a possible alternative to the surgery. The patient history is as follows.

The patient was pregnant with her third child at the time she came into the office. She had been to her OBGYN for an ultrasound at 31 weeks, which showed the male fetus to be in a breech position. The patient had also been experiencing pelvic pain around her 29th week of pregnancy, which required her to discontinue her daily exercise regimen of running three miles per day. She described the pelvic pain as more of a pressure as opposed to a “pain.” The patient also mentioned the fact that she had gained more weight with this pregnancy than with either of her two previous pregnancies in addition to the fact that she’s experiencing heartburn and acid reflux with

this pregnancy.

She suffered from pre-eclampsia during her first pregnancy, for which she endured some bed rest in the last month of that pregnancy. The birth of her first child (a female) was by vaginal delivery without the use of an epidural and lasted 14 hours. The child was born on her projected due date and weighed in at 8 pounds 10 ounces. After her first child was born, the patient began experiencing thyroid issues, which were documented and treated by her medical doctor.

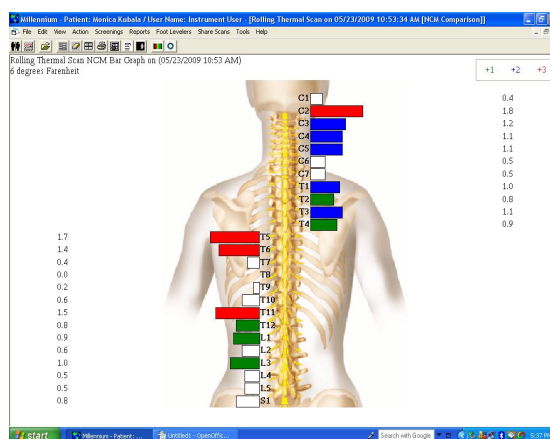
During her second pregnancy, the patient suffered from sciatica, which she stated was mild and not too painful. The birth of her second child (a male) was also vaginal, though the labor only lasted 2 hours. The baby was 8 pounds 14 ounces at birth and was born nine days earlier than his projected due date.

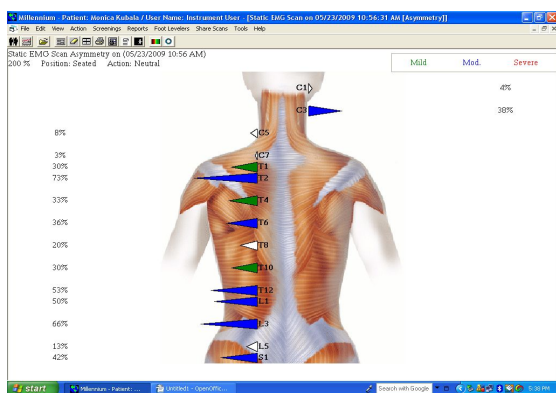
Examination

Postural examination revealed fair to poor overall posture, with an anterior cervical shift, external foot rotation bilaterally, and increased lordotic curve in her lumbar spine. Muscle spasm and tenderness were palpated bilaterally at the L3, L4, L5, and Sacral levels. Deerfield leg check revealed a negative Deerfield on the right, which correlates to the posterior-inferior malposition of the Posterior-Inferior Iliac Spine (PSIS) on the ipsilateral innominate.¹⁴ Range of motion testing was not performed due to pregnancy.

Insight technology® was utilized to measure paraspinal skin temperature, which detected mild levels of asymmetry at T1, T2, and T3 on the right and T12, L1, and L3 on the left. Moderate levels of asymmetry were found at C3, C4, C5, and T3 on the right. Severe levels of asymmetry were found at levels C2 on the right and T5, T6, and T11 on the left. Muscle tension asymmetries were evaluated on the patient using Insight’s surface electromyographic (sEMG) scan. Reduced muscle tension was found at T10 and T12 bilaterally and additionally at L1, and L3 on the right. Moderate increase in muscle tension was found at T1 and T12 on the right. Significant, or severe, increases in the paraspinal muscle tension were found at C3 on the right and at T2, T6, T12, L1, L3, and S1 on the left. No radiographs were taken, as they are contraindicated in cases of pregnancy.

Thermography Scan





earlier than the baby's projected due date and approximately one month after the mother had started chiropractic care.

Discussion

Breech presentation of a fetus occurs when the head of the baby does not go into a cephalic-presenting position in the third trimester of pregnancy, prior to the onset of labor.¹⁶ In normal delivery, the top of the baby's head (the vertex) starts in the cephalic-presenting position, facing the mother's spine, though this will change slightly during the actual delivery as the baby descends and maneuvers its way down the birth canal.¹⁶ It is to be noted that the normal mechanisms of labor are dependent on the optimum presenting diameters of the fetus, as well as good uterine activity and an adequate maternal pelvis.¹⁶

The hormone relaxin is responsible for creating ligamentous laxity as a pregnancy progresses, which allows the pelvis to accommodate the size and shape of the uterus as the fetus develops.¹⁷ Because of this, the pelvic joints and ligaments are relaxed and capable of more extensive movement, sometimes causing the movement to be excessive, creating subsequent malpositioning of the pelvis. In turn, the muscles and ligaments attaching to the bony pelvis may be compromised, twisted, or torqued. In chiropractic, this may be seen as a cause for further vertebral subluxations and uterine constraint. If the round ligament, which is attached to both the uterus and the pelvis through a series of ligamentous and fascial connections, is being pulled in one direction by the pelvis, the opposite end attached to the uterus is compromised. This may create intrauterine constraint, preventing the fetus to turn to a vertex position in the uterus at the appropriate time. Because the Webster Technique is specifically aimed at relieving the musculoskeletal causes of intrauterine constraint, it gets to the root of the breech issue, making it an ideal alternative compared to cesarean delivery.¹³

Fetuses in the breech position are more at-risk than those in vertex position at time of delivery. Serious complications, such as intra- and extra-uterine anoxia, intracranial hemorrhage, neurological, musculoskeletal, intra-abdominal or genital damage and trauma may occur when attempting a vaginal birth of a breech baby.¹⁸ At this time, current medical management for a confirmed breech presentation in the latter part of the third trimester is to first undergo an external cephalic version (ECV), which involves manually manipulating the fetus into a vertex position. This technique proves unsuccessful approximately 16 to 65% of the time after 37 weeks.^{13,18} Many times, the ECV incurs complications of its own, including cord entanglement, hypoxia, premature rupture of the membranes, separation of the placenta (abruption placentae), fetal bradycardia, vaginal bleeding, and even fetal death.^{13,18} If the ECV is unsuccessful, the societal norm in the United States is to schedule a cesarean section.

Webster Technique

The Webster Technique has been shown to have high rates of success, based on a survey of 112 chiropractic practitioners who utilized the Webster Technique in their offices; 92% had resolution of breech presentation, while 88% resulted in unassisted vaginal births.¹³ There have also been multiple

Intervention

The patient presented to the office with a misaligned posterior-left sacral base, which was found per Webster Technique protocol and corrected using a light-force, contact-specific, pisiform to left sacral base side posture adjustment with a line of drive of posterior to anterior, left to right, and superior to inferior. The patient's lower abdomen was then palpated for tenderness, taut bands of muscle, nodules, or adhesions, and one such spot was found in the area of the right round ligament. This area was subsequently treated with light effleurage trigger point therapy.

The next six office visits showed the same misalignment of the patient's sacrum, as well as the same trigger point area on the patient's lower abdomen. The same treatment was given, with the exception of the fifth visit, in which the patient's misaligned sacrum was adjusted on a drop table with the patient in the prone position. The drop table adjustment also utilized a low-force, contact-specific, pisiform to left sacral base contact with a line of drive posterior to anterior, left to right, and superior to inferior. The patient was also advised at every visit (as of the second visit) to perform at-home exercises which included those found on the website: www.spinningbabies.com.

One such exercise was the "Hands and Knees" position, which is essentially resting and stretching on all fours over a balance ball, which is similar to the movements of birth, thus preparing the fetus for the birthing process. Another exercise advised for the patient was the "Breech Tilt" position. For this exercise, the mother inverts her uterus either by tilting forward or raising her feet and pelvis so the uterus is in an "upside down" position. The benefit of this position is said to reduce the tension on the pelvic ligaments, thus relieving intrauterine constraint.¹⁵

Outcome

The patient received seven Webster Technique adjustments over the course of a three week period. An ultrasound was performed by the patient's obstetrician after the patient's fifth adjustment, showing that the fetus had moved into a vertex position. The patient gave birth to the 7 pound 12 ounce boy vaginally after an uncomplicated 12 hour labor five days

case studies showing the efficacy of the Webster Technique in reducing intrauterine constraint and allowing a breech baby to turn to a vertex position. One such case study discusses an instance where a woman presented to a chiropractic office with a breech pregnancy and experienced success when utilizing the Webster Technique in relieving the intrauterine constraint of the mother.¹⁷ After a period of one month and five Webster Technique adjustments, the fetus had moved itself into a vertex-presenting position, which was confirmed by use of an ultrasound performed by the mother's perinatologist.¹⁷

Another case study showed that in a 28 year old mother with a 34 week breech fetus, the fetus turned into a vertex position after one application of the Webster Technique.¹⁹ This was confirmed by the woman's nurse midwife two days after her adjustment.¹⁹ An interesting fact about this particular case was that the woman had presented with breech presentation in her first pregnancy, as well, which was also turned after visiting the chiropractor at 37 weeks into the pregnancy.¹⁹

Aside from relieving the intrauterine constraint causing breech presentation, the Webster Technique has also been utilized when women wish to engage in a vaginal birth after prior cesarean births.²⁰ A case study showed the effectiveness of the Webster Technique and chiropractic care in relieving musculoskeletal complaints of the 34 week pregnant mother.²⁰ This mother was also able to give birth naturally to her third child, after having two previous cesareans with her older children. The authors hypothesize that by relieving intrauterine constraints due to improper pelvic alignment and increased muscular tension and spasms via the introduction of the Webster Technique and chiropractic care, the mother was more likely able to give birth naturally.²⁰

The effects of the Webster Technique in reducing intrauterine constraint have also been hypothesized to aid a mother during the actual birthing process. There is a case study in which a pregnant woman is in labor and presents with dystocia, wherein her labor is prolonged and hindered by several possible variables, including uterine dysfunction, bony pelvic dysfunction, malposition of fetus, or soft tissue abnormalities.²¹ The woman had three midwives and her chiropractor attending her home birth and after several interventions by the midwives without progression of the labor, the chiropractor performed the Webster Technique on the mother, immediately after which the midwives reported significant improvement in the labor progression.²¹ The study uses the Webster Technique as the method by which the mother's intrauterine constraint was removed and therefore the fetus was allowed to move into a more desirable birthing position, as well as the route by which the dystocia was lessened.²¹

The Webster Technique consists of two steps. The first includes a low-force chiropractic adjustment of the sacrum, which aims to both relieve the tension exerted on the uterus due to sacral rotation as well as restore the proper biomechanics and symmetry of the pelvic bowl.¹³ The second step involves palpating the mother's lower abdomen for nodules, taut bands, edema, adhesions, or tenderness in the round ligament where it passes the anterosuperior iliac spine (ASIS) in an inferomedial direction and applying light

effleurage trigger point therapy to such areas, called myofascial trigger points (MTrP).¹³

MTrP are thought to further intrauterine constraint by creating tension on or over the round ligament, leading to further uterine constraint. The most reliable signs and minimal criteria needed to identify a MTrP are spot tenderness, taut band, and pain recognition, whereas the two best confirming aspects of a MTrP are referred pain and local twitch response.^{22,23,24} According to Hong²³ and Simons²⁴, the mechanical stimulation of the MTrP may be the most important factor for pain relief. It has been found that mechanical pressure relieves the areas of pain and relaxes the muscle fibers.²³ This relaxation of muscle fibers in turn allows the bony attachments of the muscles and ligaments wider range of motion, allowing them to return to optimal positioning.

A review of the literature looking at chiropractic care during pregnancy found the utilization of chiropractic care during pregnancy was both safe and effective at correcting musculoskeletal imbalances commonly found in pregnant women.²⁵ These claims can be backed up by other research looking at the effects of chiropractic care on the pregnant woman in terms of low back pain (LBP) relief.^{26, 27} A case series by Lisi²⁶ found that due to the lack of adverse events amongst pregnant women under chiropractic care, utilizing it as a treatment for LBP in women is considered safe. The same review found that over the course of chiropractic care, the LBP levels in the 17 women studied went from an average of 5.9 on a 10-scale of pain before treatment to a 1.5 out of 10 after treatment.²⁶

Instrumentation

The Insight® and its related technologies have peer-reviewed research demonstrating its applications, indications, normative data, protocols, reliability, clinical outcomes and applications.²⁸⁻⁵⁵ The paraspinal thermal reading attained with the Insight unit is designed to pick up abnormal surface temperature differentials, which signal the presence of neurological interference and aberrant sympathetic nervous system function. The paraspinal thermal reading is performed by running an infra-red scanner up a person's spine, which measures the temperatures at 25 anatomical paired points along the person's spine. Mild levels of asymmetry are indicated by differences one to two standard deviations above the accepted normal means, whereas moderate levels are two to three standard deviations above normal means and severe asymmetry is three to four (and beyond) standard deviations above normal means.

Abnormal muscle asymmetry is evaluated with the surface electromyograph (sEMG) scan using the Insight's technology. Paired electrodes are placed over the skin at 15 or 25 specific anatomical sites along a person's spine, which measure the paraspinal muscle activity. Mild asymmetries in muscle tension is indicated when readings are one to two standard deviations from normal means; moderate with two to three standard deviations and severe with three or more.

Conclusion

This case of a 37 year old pregnant woman under chiropractic

care shows that the Webster Technique is effective at relieving intrauterine constraint by correcting musculoskeletal and ligamentous issues associated with such a predicament. Because the Webster Technique utilizes the chiropractic foundations of correcting skeletal (in this case sacral) misalignments and the associated musculoskeletal complications, and because there was no contact made to the actual fetus for re-arrangement as seen in ECV, this procedure is within the scope of chiropractic and not obstetrics.

This paper is limited in the fact that it is the case study of one woman's experience with the Webster Technique. More in-depth research must be done to show the effectiveness and usefulness of this particular technique in the chiropractic profession.

References

1. Maternal, infant, and child health, Healthy People 2010 objectives, Obstetrical Care, Reduce cesarean births among low risk (full term, singleton, vertex presentation) women. In: US Department of Health and Human Services. Healthy People 2010. 2nd ed. With Understanding and Improving Health and Objectives for Improving Health. 2 vols. Washington, DC: US Government Printing Office; November 2000. Available from: <http://www.healthypeople.gov/document/>
2. MacDorman M, Mathews TJ. Recent Trends in Infant Mortality in the United States. NCHS Data Brief. No. 9. October 2008. Available from: <http://www.cdc.gov/nchs/data/databriefs/db09.pdf>.
3. Infant mortality rates and international rankings: Selected countries and territories, selected years 1960–2004. In: National Center for Health Statistics. Health, United States, 2007. With Chartbook on Trends in the Health of Americans. Hyattsville, MD: 2007. Available from: <http://www.cdc.gov/nchs/data/hs/hs07.pdf>.
4. Liu S, Liston RM, Joseph KS, Heaman M, Sauve R, Kramer MS. CMAJ. Maternal mortality and severe morbidity associated with low-risk planned cesarean delivery versus planned vaginal delivery at term. 2007;176(4):455-460.
5. Hansen AK, Wisborg K, Ulbjerg N, Henriksen TB. Risk of respiratory morbidity in term infants delivered by elective cesarean section: cohort study. BMJ. 2008;336:85-91.
6. Villar J, Carroli G, Zavaleta N, Donner A, Wojdyla D, Faundes A, et al. Maternal and neonatal individual risks and benefits associated with cesarean delivery: multicentre prospective study. BMJ. 2007;335:1025-1035.
7. MacDorman M, Menacker F, Eugene Declercq E. Cesarean Birth in the United States: Epidemiology, Trends, and Outcomes. Clin Perinatol. 2008;35(2):293-307.
8. Lee HC, El-Sayed Y, Gould JB. Population Trends in Cesarean Delivery for Breech Presentation in the United States 1997–2003. Am J Obstet Gynecol. 2008; 199(1): 59.e1–59.e8.
9. Danielian PJ, Wang J, Hall MH. Long term outcome by method of delivery of fetuses in breech presentation at term: population based follow up. BMJ. 1996;312(8):1451-1453.
10. Srinivas SK, Stamilio DM, Sammel MD, Stevens EJ, Piepert JF, Odibo AO, et al. Vaginal birth after cesarean delivery: does maternal age affect safety and success? Paediatr Perinat Epidemiol. 2007;21:98-113.
11. Main DM, Main EK, Moore II DH. The relationship between maternal age and uterine dysfunction: A continuous effect throughout reproductive life. Am J Obstet Gynecol. 2000;182(6):1312-1320.
12. Betran AP, Merialdi M, Lauer JA, Bing-Shun W, Thomas J, VanLook P, et al. Rates of caesarean section: analysis of global, regional and national estimates. Paediatr Perinat Epidemiol. 2007;21:98-113.
13. Pistolesse R. The webster technique: a chiropractic technique with obstetric technique. J Manipulative Physiol Ther. 2002;25(6):e1-e9.
14. Cooperstein R, Gleberzon BJ. Technique systems in chiropractic. Churchill Livingstone;2004. p. 243-246.
15. Techniques. Spinning Babies. 2008. Available at: <http://www.spinningbabies.com>. Accessed January 4, 2010.
16. Akmal S, Paterson-Brown S. Malpositions and malpresentations of the foetal head. Obstet Gynecol Reprod Biol. 2009;19(9):240-246.
17. Drobbin D, Welsh C. Chiropractic care of a pregnant patient presenting with intrauterine constraint using the Webster in-utero constraint technique: a retrospective case study. J Pediatric Maternal & Family Health. 2009;2:1-3.
18. Tiran D. Breech presentation: increasing maternal choice. Complement Ther Nurs Midwifery. 2004;10:233–238.
19. Thomas JC. The Webster technique in a 28 year old woman with breech presentation & subluxation. JVSR. 2008; April 7:1-3.
20. Alcantera J, Hamel I. The chiropractic care of a gravid patient with a history of multiple caesarean births & sacral subluxation. JVSR. 2008; March 11:1-5.
21. Alcantara J, Ohm Ju, Ohm Je. Chiropractic care of a patient with dystocia & pelvic subluxation. J. Pediatric, Maternal & Family Health. 2009; February 1:1-5.
22. Hong CZ, Simons DG. Pathophysiologic and Electrophysiologic Mechanisms of Myofascial Trigger Points. Arch Phys Med Rehabil. 1998;79:863-72.
23. Hong CZ. Specific sequential myofascial trigger point therapy in the treatment of a patient with myofascial pain syndrome associated with reflex sympathetic dystrophy. Australas Chiropr Osteopathy. 2000;9(1):7–11.
24. Simons D. Clinical and etiological update of myofascial pain from trigger points. In: Russel J, editor. Clinical overview and pathogenesis of the fibromyalgia syndrome, myofascial J. Pediatric, Maternal & Family Health - February 2, 2010 New York: 102.
25. Borggren CL. Pregnancy and chiropractic: a narrative review of the literature. J Chiropr Med. 2007;6:70–74.
26. Lisi AJ. Chiropractic Spinal Manipulation for Low Back Pain of Pregnancy: A Retrospective Case Series. J Midwifery Womens Health. 2006;51(1):e7-e10.
27. Stuben KI, Smith DL. Chiropractic treatment of pregnancy-related low back pain: a systematic review of the evidence. JMPT. 2008;31(6):447-456.

28. Eumatsu S, Edwin DH, Jankel WR, Kozikowski J, Trattner M. Quantification of Thermal Asymmetry Part 1: Normal Values and Reproducibility. *J Neurosurg.* 1988;69(4):552-555.
29. Senzon, S.A. The Theory of Chiropractic Pattern Analysis Based on the New Biology. Abstracts of the Eighth Annual Vertebral Subluxation Research Conference Sponsored by Sherman College of Straight Chiropractic. *Journal of Vertebral Subluxation Research*, Vol 4, No. 1, 2000
30. Kent C. The Mental Impulse: A Strategy for Clinical Assessment. Abstracts of the 2007 International Research and Philosophy Symposium Sponsored by Sherman College of Straight Chiropractic. *J. of Vertebral Subluxation Res.* January 22, 2008.
31. Kent C: Surface electromyography in the assessment of changes in muscle activity associated with vertebral subluxation: a review. *J. Vertebral Subluxation Res.* 1997, Vol 1(3):1-8
32. McCoy, M., Blanks, R., Campbell, I., Stone, P., Fedorchuk, C., George, I., Jastremski, N., Butaric, L. Inter-examiner and Intra-examiner Reliability of Static Paraspinal Surface Electromyography. Proceedings of the 2006 International Research and Philosophy Conference. Sherman College of Straight Chiropractic. Spartanburg, SC. November 3-5, 2006. *J. Vertebral Subluxation Res.* November 27, 2006.
33. Kaminski TM Female Infertility and Chiropractic Wellness Care: A Case Study on the Autonomic Nervous System Response while Under Subluxation Based Chiropractic Care and Subsequent Fertility. *J. Vertebral Subluxation Res* November 2, 2003, pp. 1-10.
34. Lyons DD. Response to Gonstead Chiropractic Care in a 27 year old Athletic Female with a 5 year history of Infertility *J. Vertebral Subluxation Res* November 9, 2003, pp 1-3
35. McCoy M, Malakhova E, Safronov Y, Kent C, Scire P. Improvement in paraspinal muscle tone, autonomic function and quality of life in four children with cerebral palsy undergoing subluxation based chiropractic care: Four retrospective case studies and review of the literature. *J. Vertebral Subluxation Res* June 21, 2006, pp 1-15
36. Pauli Y. Quality of Life Improvements and Spontaneous Lifestyle Changes in a Patient Undergoing Subluxation-Centered Chiropractic Care: A Case Study. *J. Vertebral Subluxation Res* October 11, 2006, pg 1-15
37. Kelly S, Boone R. The Clinical Application of Surface Electromyography as an Objective Measure of Change in the Chiropractic Assessment of Patient Progress: A Pilot Study. *J. Vertebral Subluxation Res.* Vol 2, No. 4, p 1-7
38. Miller E, Redmond P, Changes in Digital Skin Temperature, Surface Electromyography, and Electrodermal Activity in Subjects Receiving Network Spinal Analysis Care. *J. Vertebral Subluxation Res.* Vol 2, No. 2, p 1-9
39. Kaminski T. Female Infertility and Chiropractic Wellness Care: A Case Study on the Autonomic Nervous System Response while Under Subluxation Based Chiropractic Care and Subsequent Fertility. *J. Vertebral Subluxation Res.* November 2, 2003, pp. 1-10.
40. Shelley J. Healthy Pregnancy in A Previously Infertile Patient Following D.N.F.T. Chiropractic Care: A Case Report. *J. Vertebral Subluxation Res.* December 8, 2003, pp 1-7.
41. Behrendt M, Olsen N. The Impact Of Subluxation Correction On Mental Health: Reduction Of Anxiety In A Female Patient Under Chiropractic Care. *J. Vertebral Subluxation Res.* September 20, 2004, pp 1-10.
42. Gentempo P, Kent C, Hightower B, Minicozzi SJ. Normative Data for Paraspinal Surface Electromyographic Scanning Using a 25-500 Hz Bandpass. *J. Vertebral Subluxation Res.* August 1996, Vol 1, No. 1, p 1-4.
43. Fedorchuk C. Treatment and Recovery of a Patient Suffering From Muscular Dystrophy, and Hypertension Utilizing Chiropractic Care: Case Report. Proceedings of the 2008 International Research and Philosophy Symposium. Sherman College of Straight Chiropractic. *J. Vertebral Subluxation Res.* November 26, 2008.
44. Fedorchuk C. Restored Hearing From Subluxation Reduction in a Female Patient Who Suffered From Stroke-Induced Hearing Loss: A Case Report. Proceedings of the 2008 International Research and Philosophy Symposium. Sherman College of Straight Chiropractic. *J. Vertebral Subluxation Res.* November 26, 2008.
45. Fedorchuk C. Self-Reported Quality of Life Assessment of a Patient Undergoing Chiropractic Wellness Care and Suffering From Amyotrophic Lateral Sclerosis: A Case Report. Proceedings of the 2008 International Research and Philosophy Symposium. Sherman College of Straight Chiropractic. *J. Vertebral Subluxation Res.* November 26, 2008.
46. Fedorchuk C. Correction of Subluxation and Reduction of Dyspnea in a 7 Year-Old Child Suffering From Chronic Cough and Asthma: A Case Report. *J. Vertebral Subluxation Res.* November 26, 2007 pp 1-5.
47. Hoffman N, Russell D. Improvement in a 3½-year-old Autistic Child Following Chiropractic Intervention to Reduce Vertebral Subluxation. *J. Vertebral Subluxation Res.* March 24, 2008, pp 1-4.
48. Pauli Y. Improvement in Attention in Patients Undergoing Network Spinal Analysis: A Case Series Using Objective Measures of Attention. *J. Vertebral Subluxation Res.* August 23, 2007, pp 1-9.
49. Desaulniers A. Effect of Subluxation-Based Chiropractic Care on Quality of Life in a Patient With Major Depression. *J. Vertebral Subluxation Res.* April 23, 2008, pp 1-7.
50. Faulkner H. Test Re-Test Reliability of sEMG Paraspinal Scans: A Comparative Study. Proceedings of the 2007 International Research and Philosophy Symposium. *J. Vertebral Subluxation Res.* January 22, 2008, pp 1-33.
51. McCoy M. Inter-examiner and Intra-examiner Reliability of Static Paraspinal Surface Electromyography. Proceedings of the 2006 International Research and Philosophy Conference. *J. Vertebral Subluxation Res.* Nov. 27, 2006, pp 1-30.
52. Ressel O, Rudy R. Vertebral Subluxation Correlated with Somatic, Visceral and Immune Complaints: An Analysis of 650 Children Under Chiropractic Care *J. Vertebral Subluxation Res.* October 18, 2004 pp 1-23.
53. Bohacek S., Jonckheere E. Chaotic Modeling in Network Spinal Analysis: Nonlinear Canonical Correlation with Alternating Conditional Expectation (ACE): A

Preliminary Report. J. Vertebral Subluxation Res. Vol 2, No. 4, p 1-8.

54. McCoy M. The Use of Objective Measures of the Biomechanical and Neurological Components of Vertebral Subluxation to Develop a Composite Measure of Spinal Health. Platform presentation. International Research and Philosophy Symposium. Sherman College of Chiropractic. October 2009.
55. McCoy M, Campbell I, Stone P, Fedorchuk C, Wijayawardana S, Easley K. Intra-examiner and Inter-examiner Reproducibility of Paraspinal Thermography. Platform presentation. International Research and Philosophy Symposium. Sherman College of Chiropractic. October 2009.