CASE STUDY

Resolution of Gastroesophageal Reflux Disorder in an Infant with Vertebral Subluxation: A Case Report & Selective Review of Literature

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Abstract

Objective: This case report will discuss the role of chiropractic care in the resolution of gastroesophageal reflux disease (GERD) in an infant.

Clinical Features: The mother of a 10-month-old boy presented her son for chiropractic care with a medical diagnosis of gastroesophageal reflux disease (GERD). The patient’s complaints included interrupted sleep, difficulty feeding, poor appetite, repeated bouts of diarrhea, stomach distension, excessive intestinal gas, and poor weight gain. Previous, unsuccessful care involved medical treatment consisting of an over the counter antacid, followed by Nexium, and finally Zantac.

Interventions and Outcomes: A course of conservative management was carried out, consisting of 13 chiropractic visits over a seven-week period, utilizing the diversified full spine protocol adapted for pediatric adjusting. Notable improvements were attained throughout care, with complete resolution of GERD and return to normal weight.

Conclusions: This case report contributes to the body of scientific literature regarding chiropractic care of infants suffering from GERD.

Key Index Terms: Gastroesophageal reflux, GERD, chiropractic, vertebral subluxation, pediatric, infant, regurgitation

Introduction

Gastroesophageal Reflux (GER) describes a condition involving the backflow of stomach contents into the esophagus or mouth. A small amount of reflux is common among infants, due to the immature lower esophageal sphincter (LES), which normally prohibits retrograde flow of gastric contents. In healthy infants, GER is a functional or physiologic process with no pathological indication.1 In infants, GER typically peaks between the first and fourth months of age2, usually entailing postprandial milk regurgitation3, and gradually self-resolves by six to twelve months of age.4 In such cases, regurgitation occurs with normal weight gain and in the absence of signs of esophagitis, respiratory problems, and neurobehavioral symptoms.1

It is thought that GER presents in approximately 40-65% of infants under 1 year of age.5 For the majority of GER cases,

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no medical or surgical treatment is warranted, with rates of regurgitation decreasing to 1% by one year of age.\textsuperscript{1} In a minority of cases, complications of GER may arise and progress to a more persistent condition, referred to as gastroesophageal reflux disease (GERD). Incidence of GERD in the pediatric population is approximately 1 in 300 children.\textsuperscript{5}

Gastroesophageal reflux disease is a pathologic process in infants with clinical manifestations of poor weight gain, signs of esophagitis, persistent respiratory symptoms and neurobehavioral changes.\textsuperscript{1} Such manifestations can include regurgitation with poor weight gain, failure to thrive, irritability and pain in infants, dysphagia, hematemesis and iron deficiency anemia, apnea and cyanosis in infants, wheezing, chronic cough and stridor, asthma, and neck tilting in infants (Sandifer’s Syndrome).\textsuperscript{1} If GERD persists beyond one year of age, it becomes more resistant to complete resolution.

The pathophysiology of GERD is caused by dysfunction within the gastrointestinal and/or respiratory tract. Within the gastrointestinal tract, transient relaxation of the lower esophageal sphincter can account for the retrograde reflux of gastric content from the stomach back into the esophagus.\textsuperscript{2} Another mechanism affecting infants and children is delayed gastric emptying, which may result in increased abdominal distention, increased acid secretion, and manifestation of esophagitis.

Positional factors that promote reflux, such as laying an infant in the supine position immediately following a feeding, can exacerbate existing GER and increase the risk of GERD development due to decreased gravitational and positional peristaltic clearance of refluxed material from the distal esophagus.\textsuperscript{4} Mechanisms of GERD involving the respiratory tract manifest in a number of ways. If refluxed gastric content is aspirated, luminal mechanical obstruction may occur.\textsuperscript{1} Partial airway obstruction can progress to more severe obstruction, as mucosa exposed to gastric contents can result in mucosal thickening.\textsuperscript{7} Aspiration also enhances the stimulation of inflammatory cell mediators, which can cause further obstruction.\textsuperscript{1}

\section*{Case Report}

\subsection*{History}

The mother of a 10-month-old boy presented her son for chiropractic care with a medical diagnosis of gastroesophageal reflux disease (GERD). The patient’s complaints included frequently interrupted sleep, difficulty feeding, poor appetite, repeated bouts of diarrhea, frequent stomach distention, excessive intestinal gas, occasional post-prandial regurgitation and inadequate weight gain. At the initial visit, the patient was in the 5\textsuperscript{th} percentile of weight-for-age ratio, according to the Centers for Disease Control and Prevention clinical growth chart for infants.\textsuperscript{8}

Previous, ineffective medical care consisted of a variety of medications. Initially, an over the counter antacid was recommended, which the patient took for 20 days with no improvement. Next, a prescription for Nexium (esomeprazole) was given. Over the course of 20 days, the patient was still not improving. The prescription was stopped and Zantec (ranitidine) was prescribed. The patient was only given Zantec for two days before the mother ceased the medication due to frustration and inefficiency of treatment. All medication was discontinued prior to starting chiropractic care.

The patient was born via cesarean section in a hospital setting. No complications in pregnancy or birth were noted in the patient’s records or case history. Initially, the patient was solely being breastfed however the patient’s pediatrician recommended the introduction of formula at nine months of age due to GERD symptomology, low body weight and mother’s limited breast milk production.Similac formula was introduced first, with no change in reflux symptoms and body weight.

This was followed by a soy-based formula, which also had no positive effects. Enfamil Nutramigen with LGG was the third and final formula tried. This is a hypoallergenic, extensively hydrolyzed casein formula supplemented with the probiotic Lactobacillus rhamnosus GG (LGG).\textsuperscript{9} According to the patient’s mother, there was a slight improvement in the patient’s condition but low weight persisted. This formula was continued throughout the patient’s chiropractic treatment, as it had the most favorable effect among the three types. The patient had been introduced to solid foods such as rice cereal and bananas, which only made his GERD worse.

Upon intake, the patient was normally developed, despite being underweight, and had met all of his developmental milestones on time, consistent with his age. Aside from the patient’s presenting condition, the past medical history was unremarkable.

\subsection*{Chiropractic Examination}

The initial examination included primitive reflex testing, spinal active and passive ranges of motion, neurological testing, abdominal palpation, and static and dynamic palpation of all spinal segments. All primitive reflexes tested were within normal limits, given the patient’s age of 10 months old. The results included presence of the parachute, plantar grasp, and tonic labyrinthine reflexes, and absence of the Moro, palmar, stepping, placing, rooting, asymmetrical tonic neck reflex (ATNR), spinal gallant, Babinski, and symmetrical tonic neck (STNR) reflexes. All regional ranges of motion throughout the spine were within normal limits. Neurological testing was unremarkable. Palpation of the abdomen revealed distention, especially in the peri-umbilical region.

Static and motion palpation of the cervical, thoracic, lumbar and pelvic regions was performed. Mild muscle tension was noted on the right C1-C2 area. Left rotation restriction at C1 was also present. In the thoracic spine, mild muscle tension was present in the paraspinal muscles bilaterally from T5-T9, with a flexion restriction in this area. The infant also had flexion and left rotation restriction of the L3-L5 vertebral segments.

Through the use of physical examination, static and motion palpation findings, the infant was diagnosed with cervical, thoracic, and lumbar vertebral subluxations, in addition to the previously diagnosed infantile GERD.
Intervention

The treating chiropractor’s recommended frequency of care consisted of three times per week, until signs and symptoms of subluxation normalized. This recommendation was based on the patient’s initial complaints and chiropractic examination findings. A course of conservative management was carried out.

The total care received consisted of 13 chiropractic adjustments over a seven-week period. Chiropractic adjustments included C1, T3-T9, and L3-L5 throughout care. Diversified full spine was the technique used for this patient. With this approach, intersegmental motion restrictions of the spine and pelvis are addressed utilizing high-velocity, low-amplitude (HVLA) thrusts, which can be modified for pediatric adjusting, as was done in this case. The modification was achieved by significantly limiting the depth of the thrust applied at the site of correction. Because of the smaller dimensions of the infant’s spine, the chiropractor used smaller digits to contact the segments being adjusted, in order to achieve the desired level of specificity.

The initial treatment involved three high-velocity, low-amplitude (HVLA) chiropractic adjustments. During each of these adjustments a light, gentle thrust was applied to the spinal segment being addressed in the direction of the line of correction.

The first adjustment addressed the L5 vertebra with the infant in a left side lying position. Due to the small size of the infant’s L5 spinous process, it was contacted by the doctor’s second digit and supported by the third digit for a light finger push. The stabilization hand contacted the antero-lateral portion of the shoulder and axilla region with slight cephalad distraction.

The second adjustment was given to the thoracic region, T5-T9 using a bimanual thumb segmental contact, in which the chiropractor held the child from behind, with his thumbs on either side of the T5 spinous process, fingers wrapped around the child’s torso for stabilization. The child was then lifted in this position, and with the thoracic spine in slight extension, a gentle posterior to anterior thrust was delivered through the doctor’s thumbs to make the adjustment.

The last adjustment was given to the C1 (atlas) vertebra with the infant in a supine position. The chiropractic listing at this level was ASR, indicating left rotation restriction of the C1 vertebra compared to C2 (axis). The primary movement of the atlas relative to axis is in Y-axis rotation. Rotation and rotation restriction is readily determined through motion palpation. To correct this subluxation, the chiropractor contacted the lateral aspect of the patient’s right atlas transverse process with his index finger. With his contralateral hand, axis and the head were stabilized on the opposite side. The patient’s head was placed in slight right lateral flexion followed by a light impulse through the contact finger with a lateral to medial, right to left, line of correction.

During subsequent visits, the patient received similar adjustments, based on the patient’s presentation and static and motion palpation findings. The specific regions adjusted were consistent with the restrictions noted during the initial examination. The patient was seen three times per week for the first three weeks, followed by two times per week for the next two weeks, and finally once per week for the last two weeks. The change in frequency was based on improvement of clinical signs and symptoms of subluxation and GERD throughout the course, as per the chiropractor’s recommendations.

After the sixth visit, the patient started taking a daily dose (one capsule per day) of Klaire Labs Ther-biotic® Infant Formula, a multi-species probiotic designed to support the metabolic and intestinal needs of infants up to two years of age. The probiotic recommendation had been made during the patient’s first visit to the chiropractor’s office, but the mother had not followed through with the administration of the probiotic until the third week of care. At the 11th visit, the dosage had been increased to three capsules per day, meeting the chiropractor’s initial recommendation.

Results

Following a conservative course of chiropractic treatment for the reduction of vertebral subluxations and the introduction of a multi-species probiotic, a 10-month-old patient had complete resolution of gastroesophageal reflux disease. The patient was experiencing uninterrupted sleep, complete resolution in postprandial regurgitation, significant reduction in stomach distention, resolution of dysphagia, improved mood, and resolution of diarrhea with return to normal frequency and quality of bowel movements.

The vertebral subluxation indicators also showed significant improvement over the course of care, reflective of the decreased frequency of visits the seven-week treatment period. The patient’s gastroenterologist confirmed that the infantile gastroesophageal reflux had completely resolved. The patient had also gained two pounds since the previous appointment two months prior. The significant weight gain placed the patient into the 18th percentile for weight-for-age ratio, which the gastroenterologist referred to as a normal, healthy weight.

Discussion

Subluxation

Chiropractic focuses on the analysis and correction of vertebral subluxation to allow for proper neurological and physiological functioning to occur, thereby improving quality of life. Chiropractors adjust vertebrae of the spine when signs of articular dysfunction are present (e.g. restricted mobility, abnormal alignment, or inflammation). Chiropractors refer to this dysfunction as vertebral subluxation. Throughout the scientific literature, many theories of vertebral subluxation exist, as to its components and implications. What all theories have in common is the notion that the vertebral subluxation contains both a neurological and biomechanical components.

Mechanism of Subluxation

Lantz and Dishman developed the five-component model of the vertebral subluxation complex (VSC) including the
follows components: spinal kinesiopathology, neuropathophysiology, myopathy, histopathology and biomechanical changes. This model was later revised and expanded by Lantz to include 9 components: kinesiology, neurology, myology, connective tissue physiology, angiology, inflammation response, anatomy, physiology and biochemistry.14 Dysfunction in neurology and kinesiology are present in this case. The Segmental Facilitation Theory put forth by Kor illustrates this process.16

According to Kor’s theory, somatic joint dysfunction, present with vertebral subluxations, can cause facilitation of nerves exiting through the spinal column due to disturbances in joint integrity. With facilitation comes an altered neuronal state, due to multiple neurons firing. When this condition persists, changes in neuronal activity can lead to dis-regulation and hyperactivity of the sympathetic nervous system. With heightened sympathetic tone comes a decrease in the enzymes of digestion and peristalsis, among other changes.

With the correction of vertebral subluxation, autonomic nervous system homeostasis and spinal joint integrity are restored (i.e. neurological and biomechanical components) decreasing neuronal facilitation and sympathetic nervous system hyperactivity, thereby potentially resolving signs and symptoms of GERD.16

**Literature Review**

There is limited research pertaining to chiropractic care and infantile gastroesophageal reflux disease. Many case reports and literature reviews currently presented in the scientific literature support chiropractic as a safe and effective treatment for GERD in the infant population.

Rollette examined the case of a one-month-old infant who demonstrated significant improvement in infantile colic and reflux following six chiropractic visits over a three-week period. The infant had been experiencing 12-18 reflux episodes per day, with chronic crying and sleep deprivation. At the end of treatment, the number of reflux episodes had decreased to an average of three per day. His eating improved, colic resolved, and sleeping improved to six and a half hours per night.17

Alcantara and Anderson described the improvement of GERD complaints was also seen in a three-month-old girl after four visits with complete resolution after three months of chiropractic care. This effective treatment followed previous, ineffective medical care consisting of a Prilosec prescription.18

Swaminathan and Hanson discussed the resolution of GERD and constipation and significant improvement of deformational plagiocephaly in a 5-month-old patient. The patient was seen for 19 chiropractic adjustments over a 6-month period. At the end of treatment, the patient had discontinued her anti-reflux medication and was naturally having 1-2 bowel movements per day.19

Guiliani examined the case of a 15-month-old patient who presented for chiropractic care with developmental delay and a past history of colic and GERD, chiropractic care was shown to be beneficial. From birth to 5 months of age, the patient had suffered from colic and GERD, both of which resolved after three chiropractic adjustments with a care frequency of once per month for three months. Adjustments were given using the infant toggle headpiece and Logan basic protocol. Developmental progress was seen after 15 visits.20

Elster conducted a retrospective study of 16 infants with medically diagnosed acid reflux or colic, who underwent a course of upper cervical chiropractic care using the knee chest technique. Patients ranged in age from two weeks to 11 months old. 100% of patients’ GERD complaints resolved completely, within two to eight weeks under chiropractic care.21

Barnes reported on a case of a 3-month-old infant with GER. The infant’s incidence of regurgitation and other symptoms of GER improved and later resolved following two treatments consisting of chiropractic adjustments, abdominal myofascial massage and Kinesio Taping.22

The last case pertaining to GERD and chiropractic in the pediatric population was presented by Jonasson. In this report, an 8-year-old boy presented to a chiropractic office with complaints of neck pain and headaches. Based on the patient’s case history, GERD was diagnosed, along with cervicogenic headaches. The patient was referred for allopathic care for treatment of GERD after there was no resolution of abdominal symptomatology of GERD following seven chiropractic visits.23

Standard medical treatment of infantile GERD consists of an anti-reflux prescription. All anti-reflux medications work in the body by decreasing the amount of stomach acid produced. The goal of this treatment is to improve the anti-reflux function of the esophagus, reducing gastric reflux, relieving symptoms, and reducing the rate of reoccurrence.3 As demonstrated in this case and in the review of the literature, medical treatment is not always effective in resolution of infantile GERD.

**Chiropractic Care of Children**

Research regarding the efficacy of chiropractic care of pediatric patients is in its infancy, however, a lack of evidence does not infer ineffectiveness of chiropractic. Evidence-based practice does utilize the best available research evidence, while clinical expertise and patient values are also incorporated. Hawk et al stated, in a consensus process regarding the best practices recommendations for chiropractic care for infants, children, and adolescents, that “a therapeutic trial of chiropractic care can be a reasonable approach to management of the pediatric patient in the absence of conclusive research evidence, when clinical experience and patient/parent preferences are aligned.”24

According to a 2007 National Health Interview Survey, conducted by the National Center for Health Statistics, manipulation by chiropractors or osteopathic physicians was the most widely used provider-based complementary and alternative (CAM) therapy among children in the United States under the age of 18 years. Among the most common reasons for seeking CAM therapy, in general, were back or neck pain, though CAM therapy was sought out for children...
with a variety of other health complaints as well. Other complaints included other musculoskeletal conditions and those of non-musculoskeletal origin.25

A large retrospective study, measuring the adverse effects of spinal manipulative therapy in children younger than three years, found that 85% of parents reported improvement, while seven parents reported adverse effects. All adverse effects reported were transient in nature with no serious complications. This study included 697 children who received a total of 5242 chiropractic treatments.26 On the whole, this evidence supports conservative chiropractic treatment in the care for pediatric patients.

Conclusion

The case of a 10-month-old male with a history of infantile gastroesophageal reflux disease presented. After failed attempts of treating the condition through the utilization of prescription medication, a conservative course of chiropractic care was implemented. Following 13 chiropractic adjustments attempts of treating the condition through the utilization of GERD was achieved, concomitant with the reduction of gastroesophageal reflux disease presented. After failed

References
