
CASE STUDY

Resolution of GERD, Infantile Colic, and Failure to Thrive in a 3-Month-Old Female Following Kale Specific Upper Cervical Chiropractic Care: A Case Report & Review of the Literature

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ABSTRACT

Objective: To describe the chiropractic care of an infant suffering from GERD, infantile colic, and failure to thrive.

Clinical Features: A 3-month-old female presented with infantile colic, GERD and FTT since after thirteen days of exclusive tube feeding at the NICU. Her symptoms progressively worsened without known palliative or provocative factors. The infant's pediatrician prescribed Zantac, Prilosec and Pepsin that were ineffective.

Intervention and Outcome: Chiropractic care utilizing the Kale Upper Cervical Specific Protocol was instituted with resolution of GERD, infantile colic and FTT.

Conclusion: This case report provides supporting evidence on the successful chiropractic care of an infant suffering from GERD, infantile colic and failure to thrive. We encourage continued documentation of similar cases in the scientific literature.

Key Words: *Kale Upper Cervical, GERD, infantile colic, failure to thrive, vertebral subluxation, adjustment*

Introduction

The “tip of the iceberg” phenomenon is a common description in medicine to portray the mostly unseen phenomenon of a disease. In chiropractic, Collins et al.¹ uses the term to illustrate much of the unseen iceberg as the burden of cranial dysfunction/distortion. In this case report, we describe the iceberg phenomenon effects of chiropractic care in an infant with gastroesophageal reflux disease (GERD), infantile colic

and failure to thrive. Two of these disorders – infantile regurgitation or gastroesophageal reflux and colic – are two of the three most common functional gastrointestinal disorders (FGID) with the third being functional constipation. This comes as no surprise to those involved in the care of children – allopathic or non-allopathic approach – given that more than half of all infants suffer from at least one FGID or related

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signs and symptoms during the first year of birth.²

According to Vandenplas et al.³, the worldwide prevalence of the three most common FGIDs in infants (i.e., infantile regurgitation, colic and functional constipation) was 30%, 20% and 15%, respectively. These three most common FGIDs are also the most common motivation for parents to consult a medical professional in the first months after birth.^{4,5} In coherence with motivations for parents to consult an alternative practitioner for their child, FGIDs are also more likely to be a common motivation for chiropractic care. In the interest of evidence-informed practice, we describe the successful chiropractic care of an infant with presenting complaints of infantile colic, gastroesophageal reflux disease (GERD), and failure to thrive (FTT).

History

The patient was 3-month-old female presented by her mother for consultation and possible care with the aforementioned clinical presentations. The infant's parents first noticed the associated symptoms of infantile colic, GERD and FTT since taking their baby home from the neonatal intensive care unit (NICU) after thirteen days of exclusive tube feeding. Since then, her symptoms have progressively worsened. Palliative or provocative maneuvers for the infant were not noted. However, both parents admitted to having a difficult time dealing with their infant's symptoms, suffering from lack of sleep, and having feelings of frustration and anxiety. The infant's mother noted that her husband had a harder time dealing with their infant's problems. Since birth, the infant was described as unable to hold down more than 3 ounces of formula per feeding without spitting up and/or crying.

In-utero, ultrasound imaging determined that the child's umbilical cord was wrapped around her neck twice. The infant was delivered premature by Cesarean Section at 34 weeks gestation. After three weeks (and approximately 5 weeks since birth) of progressively worsening symptoms, the infant's parents took her to her pediatrician. The infant's pediatrician first prescribed Zantac to address gastroesophageal reflux disease. After four weeks of use, the parents noted no improvement. The pediatrician then prescribed Prilosec and Pepsin. After two weeks of Prilosec and Pepsin, the infant's parents still noticed no improvement. The parents denied the use or consultation of other non-allopathic practitioners. The patient's mother stated that her husband was very hesitant to take their baby to a chiropractor and "didn't believe" that chiropractic care for babies had any merit. The use of over-the-counter medication was denied by the patient's mother.

Examination

Physical examination findings were the following. The infant was slightly agitated and crying. A noticeable right head tilt was observed on visual postural examination. On digital palpation, hypertonic muscles were notable on the right paraspinal muscles of the cervical spine. The transverse process of the atlas was palpated to be more prominent on the right side compared to the left. On motion palpation, the C₁ vertebral body was restricted in motion on the right side with decreased right rotation and lateral flexion between the atlas vertebra and occipital bone. No specific orthopedic testing was

performed. In terms of neurological testing, modified fencer test was performed. The infant was observed as raising her head higher on the right, indicating possible atlas subluxation on the right. Using Kale Upper Cervical Specific Protocol, the Neurocalometer (NCM) and Chirometer were utilized. Asymmetric paraspinal measurements of the atlas indicated a 4-point break to the right with the NCM and Chirometer readings were 85.5 units on the left and 86.5 units on the right. Based on the history and physical examination findings and in keeping with the technique utilized, orthogonal views of the infant's cervical spine were performed consisting of a lateral cervical view and anterior-posterior open mouth (APOM) radiograph. The lateral view indicated the atlas with a superior misalignment position with a positive 11° angle (i.e., a positive 8-10° angle is average). The APOM revealed the C₁ vertebral body measured 1 mm to the right of the arc lines of the foramen magnum line. Subluxation findings involved a spinal listing of the first cervical vertebra as Atlas Superior Right (i.e., ASR).

Intervention & Outcomes

Using Kale Upper Cervical Specific Protocol, the infant was placed prone with her head turned to the right on the knee chest solid headpiece table. The attending chiropractor contacted the posterior arch of C₁ with the modified pisiform contact used specifically on infants. The modified contact point is located midway between the pisiform bone and the metacarpal-phalangeal joint of the small finger (i.e., the "pinky"). The modified pisiform contact point of the right hand was then used to deliver a body drop toggle torque with recoil adjustment. The line of drive was superior to inferior and right to left.

After the adjustment, the infant rested for 20 minutes before re-evaluation. The first comparative scan of the atlas with the NCM indicated 3-point break to the left and the Chirometer read 87.5 units left and 87.0 units right. A second series of scans were performed at 30 minutes. The NCM read 1.0 units on the right side and the Chirometer read as 87.0 units left and 87.0 units right. Only one adjustment was given over the course of care. Comparative scans indicated that the infant's subluxation was corrected. The infant attended care at 3 visits over a 2-week period.

Following the infant's spinal adjustment, her mother noted that when they returned home, the patient went immediately to sleep and took a long nap. This was noted as very unusual for her to take a long nap during the day. The infant woke up from her nap, ate without difficulty and went back to bed. By her second visit five days later, the infant's improved sleep (i.e., length and quality) was still maintained with her mother noting an overall improvement in her child.

The infant was able to consume around 4 to 5 ounces of food without any issues. In fact, according to the infant's mother, the infant consumed 6 ounces on the morning of her second visit. By day twelve after receiving adjustments, the infant was consuming 6 ounces of food regularly without issue. In the morning, she was described as able to take in 8 ounces of food. Sleep/mood was described by the infant's mother as still improved. Her mother noted that her child was to be seen by her MD later in the week to check the weight of the baby since

she was now continuing to gain weight.

Discussion

For our discussion in the case presented, we will focus on the infant's GERD and the positive outcome of chiropractic and issues salient for the chiropractor in the care of children. We are of the opinion that the child's infantile colic and failure to thrive are both a consequence of the infant's GERD. Note that in most instances, both infantile colic and failure to thrive are diagnosis of exclusion as a result of failure to find a true cause of the child's excessive crying or in this instance, failure to feed properly.

In the case presented, the infant was prescribed a number of medications to address her symptoms associated with infantile regurgitation or GERD with clear ineffectiveness. We note here that insofar as can be determined by the attending chiropractor, no definitive objective outcomes measures (i.e., pH monitoring) were performed by the pediatrician to support a definitive diagnosis of GERD. The medications prescribed by the infant's pediatrician were Zantac, Prilosec and Pepsin. Reviews of the literature indicate that these pharmacological treatments either lack evidence for effectiveness along with significant risks associated with a number of adverse events.⁶⁻¹⁰ Unfortunately, there are indications that pediatricians are not practicing according to the published evidence when it comes to the care of infants and children with GERD.

Quitadamo et al.¹¹ found that only 2% of pediatricians completely adhered to Pediatric Gastroenterology, Hepatology, and Nutrition guidelines. They also found that 56% of pediatricians prescribed proton pump inhibitors (PPIs) for infants with unexplained crying and/or distressed behavior and 38% prescribed PPIs in infants with uncomplicated recurrent regurgitation and vomiting. Seventy nine percent of those surveyed reported to overprescribe PPIs. This is not uncommon among pediatricians. For example, the Avon Longitudinal Study of Parents and Children (ALSPAC) found that 16% of infants with colic and flatulence were given activated dimethicone.¹² We note here that dimethicone or its derivative (i.e., semithicone) have been found to be ineffective and inferior to spinal manipulation.¹³

Cohen et al.¹⁴ examined the adverse events associated with the number of medications to treat GERD. Their findings are summarized in Table 1. When one compares this data to the prevalence of adverse events associated with chiropractic adjustments in children, there is no comparison in terms of the superiority of safety of chiropractic. Based on parental reports, the prevalence of adverse events is 1 in 120 patients (0.83%) or 1 in 867 visits (0.11%) and based on chiropractor reports, in 192 patients (0.52%) or 1 in 1812 visits (0.055%). These reported adverse events were minor (i.e., self-limiting and does not require medical attention).¹⁵

Chiropractic Care

In the case presented, upper cervical care of atlas subluxation resulted in improvements in an infant's ability to hold down food and improved sleep as well as abatement of GERD and infantile colic, failure to thrive.

In 2008, Alcantara and Anderson¹⁶ published their case report of a 3-month old girl with a medical diagnosis of GERD augmented with a review of the literature on the chiropractic care of children with GERD. As a follow-up to their review, we utilized Pubmed (2008-2018), MANTIS (2008-2018) and Index to Chiropractic Literature (2008-2018) utilizing similar search terms. Inclusion criteria for our review are: (1) Chiropractic care (spinal adjustments and adjunctive therapies) was utilized, (2) The patient is \square 17 years of age and (3) the publication is in the English language.

We found continued documentation in the literature describing the successful care of infants with GERD. The case report by Ferranti et al.¹⁷ provided an update of the literature on this subject to 2016. They described the care of a 1-month-old female medically diagnosed with GERD with symptoms of gurgling at night, wakeful sleep, and facial grimacing. As in the case presented, previous unsuccessful medical care involved a prescription of Zantac. The infant was cared for a total of 15 visits over a 3-month period receiving fingertip "touch and hold" adjustments, cranial work, and gastric pull down manual therapy. Notable improvements in symptoms were reported by the mother as documented by use of the Global Rating of Change (GROC) scale.

In their review of the literature, Ferranti et al.¹⁷ found an additional 7 papers¹⁸⁻²⁴ since the review by Alcantara and Anderson¹⁶ in 2008. Since then 2 additional case reports have been published. Steinberg and Hill²⁵ published their case report of an 11-week-old female with a history of acid reflux, digestive problems, and possible seizures. Previous medical care included a prescription for Zantac. The child was cared for with chiropractic adjustments utilizing the Torque Release Technique® analysis and protocol via the Integrator. Adjustments were delivered specifically at C₁, C₂, and T₆ vertebral body, the coccyx and sacrum. The patient demonstrated improved developmental changes, reduction in acid reflux, and improved bowel function and was no longer congested, fidgety or having issues with lying supine.

Lacroix²⁶ described the care of a 4-month-old female presenting with recurrent regurgitation after feeding. The infant was exclusively breastfed. She was averse to being carried and her complaints included frequent postprandial regurgitation, difficult eructation, interrupted sleep, choking and rumination, wheezing during sleep, fussiness, distended stomach and excessive intestinal gas. No medication was taken by the infant or the mother and lifestyle changes were made before consulting a chiropractor. The care provided was Diversified Technique, craniosacral therapy and myofascial therapy. The infant attended a total of 17 visits over a 20-week period. After 14 visits, her symptoms of GERD improved and resolved at the 17th visit.

Our examination of the literature thus far reveals that, to the best of our knowledge, this is the first publication describing the care of an infant suffering from GERD using the Kale Upper Cervical Specific Protocol and the 2nd of the upper cervical techniques. Barnes²¹ utilized the NUCCA Technique in the care of patients. In our initial comments of the case presented, we mentioned the iceberg phenomenon of chiropractic care such that with subluxation-based care, the infant's GER improved with concomitant abatement of

infantile colic and failure to thrive.

Based on the research paradigm of constructivism²⁷ (i.e., ontology is dictated by individual experiences), this case report is epistemologically congruent with evidence-informed practice (i.e., research that emphasizes the meaning due to the human experience) that supports our need to learn from our clinical experience and in informing patients with similar clinical presentations that they can benefit from chiropractic care. We therefore encourage chiropractors to take note of this case report to inform their clinical practice in the care of infants presenting similarly.

Conclusion

This case report provides an educational vehicle and evidence on the successful chiropractic care of an infant suffering from GERD, infantile colic and failure to thrive. We encourage continued documentation of similar cases in the scientific literature.

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Table 1. Summary of adverse events associated with prescription medications for GERD in children.

Drug		Adverse Events
Proton pump inhibitors (PPIs)	Esomeprazole: Based on 12 studies involving children, the cumulative sample size was 764 children (age 0-17 years) with five studies involving patients less than 1 year.	The prevalence of at least one adverse event (AE) was 34.8% (i.e., 266/764). These included: diarrhea in 3.2% (N=25); abdominal pain in 2.7% (N=21); fever in 2.2% (N=17); eczema in one (0.1%); nausea, vomiting or regurgitation in 4% (N=31); pharyngitis in 2.2% (N=17); irritability in 4% (N=3); flatulence in one (0.1%); somnolence in 0.4% (N=3); constipation in 0.8% (N=6); arthralgia in 0.4% (N=3); and headache in 4.4% (N=34). In one study of 57 patients who received esomeprazole parenterally, 10% (N=6) suffered from catheter-related infection.
	Omeprazole: Based on 10 studies with a cumulative sample size of 318 children (age 0-16 years) with 4 studies involving infants < 1 year of age.	The prevalence rate of at least one AE was 34% (N=108). These included: abdominal pain in 0.6% (N=2); eczema in one (0.3%); nausea, vomiting or regurgitation in 9.7% (N=31); pharyngitis in 5.3% (N=17); irritability in 0.9% (N=3); flatulence in 0.3% (N=1); somnolence in 0.9% (N=3); constipation in 1.9% (N=6); arthralgia in 0.9% (N=3) and headache in one patient (0.3%).
	Lansoprazole : The cumulative sample size from 9 studies involved 620 children (age 0-18 years) with three studies involving infants < 1 year.	The prevalence of at least one AE was 43.7% (N= 271). Serious AEs were reported in 2.3% (N=14) of patients. Ten children had asthma exacerbations and four had pneumonia that was diagnosed as serious. Other AEs include: upper respiratory tract infection (URTI) in 15% (N=93); pharyngeal pain in 12% (N=77); sinusitis in 2.6% (N=16); otitis media in 1.9% (N=12); bronchitis in 1.6% (N=10); asthma exacerbation in 1.6% (N=10); abdominal pain in 1.5% (N=9); pneumonia in 1.5% (N=9); headache in 1.1% (N=7); pharyngitis in 1% (N=6); nausea, vomiting or regurgitation in 1% (N=6); diarrhea in 0.5% (N=3); dizziness in 0.5% (N=3); liver enzyme elevation in 0.3% (N=2); flushing in 0.3% (N=2); and anorexia, anemia, chest tightness, hair loss or constipation in 0.2% (N=1).
	Pantoprazole: Based on 6 studies involving 340 children (age 0 to 16 years) with 4 studies having patients <1 year.	The prevalence of patients experiencing at least one AE was 40% (N=135). More like an underestimate given that one large study of 128 children did not report AEs. For all the other studies combined, the prevalence of AEs was 63.7%, ranging from 44% (N = 43) and 100% (n = 1). In addition to pancreatitis, all other reported AEs were; abdominal pain in 10% (N=13); diarrhea or gastroenteritis in 19% (N=26); headache in 9% (N=12); nausea, vomiting or regurgitation in 15% (N=20); pharyngeal pain or pharyngitis in 5% (N=7); eczema or rash in 9% (N=12); viral infection in 4.5% (N=6); constipation in 4% (N=5); URTI in 55% (N=74); anemia in 3% (N=4); and tooth discoloration in 1.5% (N=2). Overall, there were 8% (N=11) of cases of “accidental injuries” reported.
	Rabeprazole: This is based on 2 pediatric RCTs with a cumulative sample size of 52 children age 1-16 years.	The prevalence of patients experiencing at least one AE was 61.5% (N=32). Reported AEs were: diarrhea in 5.7% (N=3); abdominal pain in 5.7% (N=3); fever in 3.8% (N=2); pharyngitis and pharyngolaryngeal pain in 5.7% (N=3); headache in 7.7% (N=4); cough in 5.7% (N=3) and asthma exacerbation in 3.8% (N=2). The following AEs were each reported once (1.9%): URTI, proteinuria, dysmenorrhoea, fatigue, periorbital oedema, increase in urine output, mild hypergastrinaemia, increase in blood uric acid, heart murmur, chills, toothache and pancreatitis. Nausea, vomiting or regurgitation was reported by 13.4% of patients (N=7). Considered a serious AE, one patient (1.9%) suffered from moderate viral gastritis and severe intestinal volvulus and moderate hepatitis.

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Table 1 continued

H ₂ receptor antagonists (H ₂ RAs)	Ranitidine: Four studies with cumulative sample size of 245 children (0-15 years) with 2 studies involving patients <1 year.	The prevalence of patients experiencing at one AE was 23.7% (N=58) but this may be an underestimate since in one large study of 91 children, the prevalence of one AE was 59%, while in another large study of 102 patients the proportion was 4%. Reported AEs were: abdominal pain in 1.7% (N=1); diarrhea or gastroenteritis in 74% (N=43); headache in 3.4% (N=2); somnolence in 1.7% (N=1) and pneumonia in 19% (N=11).
	Cimetidine: No prospective studies of pediatric patients with GERD exposed to cimetidine reporting AEs.	Cimetidine is rarely used clinically as there are concerns about its effect on cytochrome P450 and possible multiple drug interactions and interference with vitamin D metabolism and endocrine function
	Famotidine: The medication is not licensed for use in children in the United Kingdom but is licensed in the United States.	One study involving pediatric patients with GERD but no AEs were reported systematically as the focus of the study was on the pharmacokinetics of famotidine.
	Nizatidine: One study involving pediatric patients (N= 210) ranging in age from 0 to 18 years.	The prevalence of one AE was 54.7% (N=115). A total of 292 AEs occurred in 115 patients. The AEs reported were: fever in 4% (N=12), diarrhea in 3% (N=9), pharyngitis in 4% (N=12), cough or URTI in 14% (N=40), vomiting in 3% (N=9), somnolence in 03% (N=1) and eczema in 0.3% (N=1).
Prokinetics	Metoclopramide:	AEs were reported in only 4 of 12 studies. The AEs consisted of dystonic reactions, oculogyric crisis, irritability, drowsiness, emesis and apnea in 9–15% of the patients. Two single case reports reported dystonia (N=1) and galactorrhoea (N=1).
	Betanechol: No pediatric studies were found involving this compound during the review.	-----
	Domperidone: Based on 4 studies with a cumulative sample size of 120 infants (0-12 months).	None of the four studies systematically addressed AEs. The studies focused on whether or not domperidone prolonged the QT interval based on electrocardiogram studies. Two of the studies reported no change in the QT interval (N = 43 and 45, respectively) while the other two reported an increase in the QT interval (N=31 and N=1, respectively).
	Cisapride: As of 14 July 2000, the medication was withdrawn from the market	With this medication, at least 341 reports of heart rhythm abnormalities, including 80 deaths.
	Baclofen: Two studies with a cumulative sample size of 38 infants aged 0.2–17.4 years.	No AEs were reported.