

# Chiropractic care of a pediatric patient with symptoms associated with gastroesophageal reflux disease, fuss-cry-irritability with sleep disorder syndrome and irritable infant syndrome of musculoskeletal origin

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*The mother of a 3-month old girl presented her daughter for chiropractic care with a medical diagnosis of gastroesophageal reflux disease. Her complaints included frequently interrupted sleep, excessive intestinal gas, frequent vomiting, excessive crying, difficulty breastfeeding, plagiocephaly and torticollis. Previous medical care consisted of Prilosec prescription medication. Notable improvement in the patient's symptoms was observed within four visits and total resolution of symptoms within three months of care. This case study suggests that patients with complaints associated with both musculoskeletal and non-musculoskeletal origin may benefit from chiropractic care.*

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*Une mère d'une fillette de trois mois s'est présentée chez un chiropraticien avec un diagnostic de reflux gastro-oesophagien chez son nouveau-né. Au nombre des maux dont souffrait sa fillette, on relevait des sommeils interrompus, des gaz intestinaux excessifs, des vomissements fréquents, des pleurs démesurés, de la difficulté à l'allaitement, de la plagiocéphalie et le torticolis. Un traitement médical antérieur a consisté à lui administrer le médicament Prilosec. On a observé une amélioration importante chez le patient au cours de quatre visites et une disparition des symptômes après trois mois de traitement. Cette étude de cas porte à croire que les patients aux prises avec des douleurs musculosquelettiques ou non musculosquelettiques pourraient profiter des services d'un chiropraticien.*

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**key words:** GERD, chiropractic, pediatric

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## Introduction

For the chiropractor attending to the care of the pediatric patient, a number of clinical challenges arise from the simple and realistic reassurance for the parents that chiropractic care "can help" to making the proper referral to a specialist for co-management and ultimately providing an effective and safe intervention. As demonstrated by

surveillance studies on the use of complementary and alternative medicine (CAM) by children,<sup>1-5</sup> the patient may present with multiple symptom complex associated with both musculoskeletal and non-musculoskeletal origin. In the interest of evidence-based practice on the chiropractic care of children, we describe the successful care of a pediatric patient with multiple symptoms consisting of

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frequently interrupted sleep, excessive intestinal gas, frequent vomiting, excessive crying, difficulty breastfeeding, plagiocephaly and torticollis.

### Case Report

The mother of a three-month-old female presented her daughter for chiropractic consultation and possible care with a chief complaint of gastroesophageal reflux disease (GERD). At 2 months of age, the patient was diagnosed by her family physician with GERD and prescribed 2 mg/ml of Prilosec™ (Omeprazole). Instructions were to take 2 cc p.o.q. days at two a day for about six weeks with a follow up visit in eight weeks. Prior to her medical diagnosis and concurrent with medical care, the patient was attended to by another chiropractor to address complaints of intestinal gas and vomiting. The patient attended a total of 5 visits with the first chiropractor but the infant's subjective complaints "somewhat improved" without total resolution. According to her mother, the patient suffered from frequently interrupted sleep, excessive intestinal gas, frequent vomiting, and excessive crying and difficulty breastfeeding. The patient was described as "very fussy" at feeding time and had difficulty making a complete seal so that she had no desire to breastfeed, refused a pacifier or suck on her mother's fingers or her own. Crying described as a high-pitched sound and vomiting were noticed as worst after her feedings. When she was picked up or held, the patient would cry excessively and go into full body rigidity and throw herself into an upper body extension (i.e., an arching motion). According to the patient's mother, walking and "bouncing" her baby was the only way her daughter would breastfeed. The patient's frequent interrupted sleep was associated with an almost constant "wiggling" of the body throughout the night. The patient would sleep continuously for only 2 hours during the night with even shorter "nap-time" during the day.

Physical examination of the patient revealed the following. The infant was very agitated and displayed the high-pitched painful cries throughout her evaluation. While being held and crying, the patient would go into upper body extension (i.e., arch her back) as described by her mother. Notable examination findings included a positive suckling reflex with no response to stimulus. The patient's head was observed to be approximately 45° in right rotation with slight left lateral flexion of the cervical

spine. A flattening of the patient's right occiput (i.e., plagiocephaly) was noticeable. Further inspection revealed her mandible was "seated" to the right and could explain her inability to make a proper seal for breastfeeding. Moderate blistering on the right lower lip was also noticed. The patient's abdomen was extremely taut with discomfort on digital palpation as noticed by the patient's withdrawal response. Based on a chiropractic examination procedure incorporating postural examination and static and dynamic palpation of the spine,<sup>6</sup> it was determined that the patient had spinal segmental dysfunctions at the atlas and the 4th thoracic vertebrae.<sup>7</sup> The atlas was determined to have a right posterior rotation and right laterality malposition with respect to the C2 vertebral body (VB). The 4th thoracic VB had a posterior malposition with respect to C3VB. Following craniosacral technique procedures,<sup>8</sup> cranial distortions of the right parietal and temporal bones were determined as well as aberrant motion of the mandible at the right temporomandibular joint (TMJ).

With the parent's consent, the patient was cared for with high velocity low amplitude (HVLA) thrust type spinal manipulative therapy (SMT) characterized as Diversified Technique<sup>9</sup> with technique modification appropriate for the patient's age and size. Chiropractic SMT was applied to the atlas in the following manner. With the patient in the seated position, the clinician's index finger contacted the right transverse process of the patient's atlas. An HVLA thrust with a lateral to medial vector and a slight posterior to anterior component was applied (see Figure 1). The patient also received pediatric SMT to correct the posterior malposition of the T4 VB using an index finger contact over the spinous process of the patient's T4 VB. A posterior to anterior HVLA vector was applied (See Figure 2). With respect to the patient's cranial distortions; the patient's parietal, temporal bones and mandible were corrected using Craniosacral Therapy<sup>8</sup> (see Figure 3 and 4). Following the patient's initial visit, the patient's mother stated that her child was able to feed from both breasts, that she was able to make a complete seal with her mouth and not "pull off" from her mother's breast. The patient's mother was able to sit to feed her infant rather than walk and "bounce" her child as previously described. The infant also slept for 3½ hours the night after her initial treatment without the uncomfortable "wiggling" that would awaken her. Given

Figure 1 *The patient receiving chiropractic SMT to correct an atlas malposition*



Figure 3 *The patient receiving cranial-sacral therapy to the parietal bone*

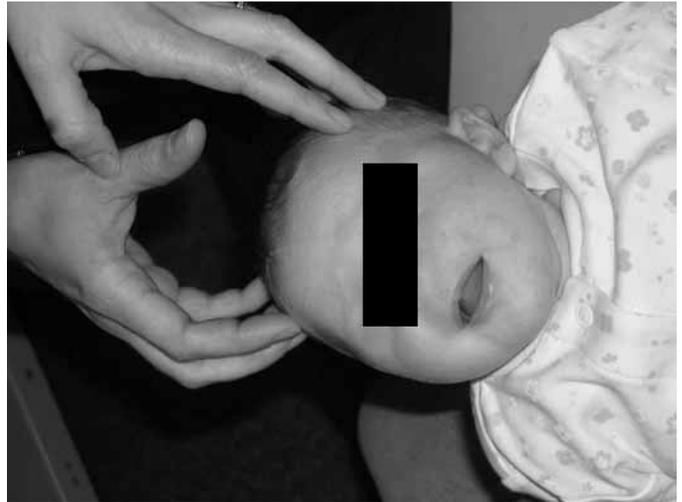


Figure 2 *The patient receiving chiropractic SMT to correct the posterior malposition of the T4 vertebral body*



Figure 4 *The patient receiving light force cranial sacral therapy to the mandible*



the positive response to care, the patient was scheduled with a treatment frequency of 3 visits per week for 3 weeks followed by 2 visits per week for 3 weeks and 1 visit per week thereafter. The patient was cared for similarly as described for the first visit. With continued chiropractic care came continued improvement in the patient's

symptoms. Following her 4th chiropractic visit, the mother intimated to the attending clinician that she made an independent decision to take her daughter "off" Prilosec™ due to the noticeable improvement in her daughter's symptoms. By the 7th visit, the patient was vomiting only once per day as compared to vomiting fol-

lowing after every feeding. The patient was now able to latch on to her mother's breast more efficiently without pulling off before finishing her feeding. According to the patient's mother, her daughter began to increase her sleeping time during the night to 4–5 hours at a time as well as increasing the length of her "nap-time" in the day to approximately 2 hours. The infant's parents also noticed that their daughter was not crying as often or for extended lengths of time as before chiropractic care. The patient's high-pitched, "painful cry" began to subside and replaced by quieter, "whimpering-like" cry. The infant's whole body began to relax without the body rigidity that was noticed when she was held. The patient's mother attributed her daughter's improvement to the chiropractic care received. Long term follow up revealed full resolution of symptoms.

### Discussion

Several topics are salient for discussion in the case reported; particularly for the patient that presents with multiple symptoms concomitant with several diagnoses.

The principal reason for attending chiropractic were symptoms initially attributed to GERD. GERD is a pathologic process in infants associated with poor weight gain, signs of esophagitis, occult blood loss, anemia, recurrent and persistent respiratory problems, dysphagia and a complex of changes in neurodevelopmental patterns. An infant with GERD may likely have more than 5 episodes of reflux per day, regurgitate approximately 28g per episode, refuse and have problems with feeding, have problems gaining weight and demonstrate increasing irritability.<sup>10</sup> GERD may also have otolaryngologic manifestations such as chronic sinusitis and recurrent otitis media.<sup>11</sup> Complications include such serious conditions as esophageal ulcerations, strictures, and Barrett's esophagus.<sup>12</sup> The differential diagnosis of GERD involves a variety of disorders and is provided in Table 1.<sup>13</sup> The definitive diagnosis of GERD in the pediatric population is determined by several means although no exact diagnostic protocols exist to accurately diagnose GERD in infants.<sup>13</sup> Three tests frequently used to diagnose GERD include 1) intra-esophageal pH monitoring, scintigraphy, and intraluminal esophageal impedance; 2) inflammation testing; and 3) the use of symptom-assessment questionnaires. The least invasive of these diagnostic methods of course is the symptom-assessment questionnaire. The attending clini-

cian in this case report was well aware of the medical diagnosis of GERD and concurred. The diagnosis of GERD was confirmed by the chiropractor based on the patient's presenting complaints of excessive crying and irritability, which often occurred following feeding. The patient also demonstrated the arching back characteristic of babies with acid reflux as well as vomiting, regurgitation and intestinal gas. Blistering of the right lower lip may be associated with the patient's suckling dysfunction but more than likely may be attributed to acid burns as a result of gastric acid regurgitation. Lastly, the patient did not respond to medication, which is characteristic for patients with GERD that are less than 2 years of age. Upon further retrospection, we would also include the diagnosis of irritable infant syndrome of musculoskeletal origin (IISMO) and infant-cry-irritability with sleep disorder syndrome (IFCIDS).<sup>14,15</sup> The diagnostic criteria for IISMO/GERDS and IFCIDS are provided in Tables 2 and 3. The patient satisfies the diagnostic criteria provided for both IISMO and IFCIDS. The patient's musculoskeletal complaints of right plagiocephaly and torticollis concomitant with cranial distortions and malposition of the mandible may likely be more associated with intra-uterine constraint since a right occiput plagiocephaly is not consistent with a torticollis posture of right rotation and left lateral flexion of the head and neck.<sup>16,17</sup> Intra-uterine positional plagiocephaly occurs more often on the right occiput. The right-sided preference is based on the finding that 85% of vertex presentations lie in the left occipital anterior position. As the infant's head descends into the pelvis, growth of the right occiput and left frontal areas may be limited, leading to potential development of plagiocephaly.<sup>18</sup> The malposition of the mandible is more than likely associated with the plagiocephaly and its concomitant cranial distortions causing an anterior displacement of the ipsilateral TMJ.<sup>19</sup>

### Implications for Chiropractic Care

The chiropractic care of the pediatric patient with complaints associated with non-musculoskeletal and musculoskeletal problems are fraught with anecdotes and testimonials in the chiropractic profession. To provide a context for discussion on the implications of the case presented, we performed a selective review of the literature involving the chiropractic care of pediatric patients with GERD, in addition to IFCIDS and IISMO. Unfortunately, IFCIDS and IISMO are descriptive terms only and thus

Table 1 *Differential Diagnosis for GERD\**

Category of Manifestation	Differential Diagnosis of GERD
Gastrointestinal	Hirschsprung's Disease Colic Peptic Ulcer Disease Intussusception Midgut volvulus malrotation Meconium Ileus Intestinal Atresia/Stenosis Pyloric Stenosis Necrotizing Enterocolitis
Infection	Otitis Media Gastroenteritis Hepatitis Meningitis Sepsis Urinary Tract Infection
Respiratory	Asthma Apnea Foreign Body Aspiration
Other	Dysfunctional parent-child interactions Cow's milk protein allergy Metabolic Disorder Rumination Syndrome

\*Modified from Orensterin and colleagues (13).

too general to perform a review of the literature in the context of chiropractic care. We encourage the reader to access the papers by Miller and colleagues<sup>14,15</sup> on these topics as well as the article by Alcantara and colleagues on their review of the sleep disorders in pediatric patients under chiropractic care.<sup>20</sup> A literature search of Pubmed [1966–2007] using the subject heading “gastroesophageal reflux disease AND chiropractic” or “GERD AND chiropractic or “acid reflux disease AND chiropractic” with search limits: English, Complementary Medicine, and All Child: 0–18 years, Similarly, MANTIS [1965–2007] was consulted using similar search terms as above specified to the Chiropractic Discipline, the English language in Refereed Journals and High Clinical Relevancy. Two articles were found. Jackson<sup>21</sup> addressed the clinical assessment strategies (and augmented by clinical experience) regarding the condition of GERD but provided no

chiropractic treatment strategies or approaches to this condition. Recently, Jonasson and Knapp<sup>22</sup> presented the care of an 8-yr-old boy with gastroesophageal reflux disease. The patient initially presented with complaints of headache and neck pain. Treatment to the patient was described as chiropractic SMT to the upper cervical spine in combination with cranial therapy and dietary advice (i.e., remove all wheat and dietary products from diet). This approach to care was unsuccessful with the patient referred to a colleague where an eventual diagnosis of GERD was made and referred for medical care.

With respect to the chiropractic technique described in this case report, the use of HVLA-type thrusts are well documented in several clinical trials.<sup>23–27</sup> Furthermore, pediatric chiropractic SMT has recently been found to be safe with only a handful of reported adverse events (i.e., 10 cases) in 104 years of scientific publications based on

Table 2 Diagnostic criteria for IISMO and GERD in the context of the patient presented (15)

Characteristics	IISMO	GERD	Patient Presentation/Complaints
Crying Patterns	Excessive crying any time of the day, generally increasing in the evening	Irritable and excessive crying within a few minutes of feeding possibly due to heartburn and acid reflux/abdominal pain.	The patient exhibited excessive crying and irritability; particularly following feeding. The patient had abdominal pain as demonstrated by abdominal muscle contractions
Postures, movements, positional preferences	Prolonged antalgic posture for the sake of comfort; asymmetric movements/ activities; unilateral spinal hypertonicity; tactile defensiveness; spinal sensitivity in specific areas	Prefers to sit upright; dislikes the prone position and demonstrates mild arching related to feeding.	Demonstrated the arching posture in addition to exhibiting spinal sensitivity in certain areas. Tactile sensitivity to stimulation on the abdomen
Eating Behaviors	Feeding disturbance which may be related to suck dysfunction	Frequent, recurrent vomiting, regurgitation; re-swallowing; may bite lip, show acid burns on lip; retching, choking, frequent cough; tongue thrusting nipple or pacifier; occasional diaphoresis while feeding	Frequent recurrent vomiting and regurgitation in addition to feeding disturbances. The patient demonstrated suck dysfunction.
Digestive Disturbance	None or Unrelated	Occasional heme-positive stools or emesis; occasional failure to thrive	Patient has failure to to thrive
Other signs, Symptoms and Timing of Disorder	Restless sleep or may refuse to sleep supine; affective disorder common; condition does not tend to improve over time, but may change as infant gains more strength and control, distress may change to “control” behaviors, such as head banging.	Persistence after 12 weeks, resolves by 1 year; diagnosed most often with history. Tests are barium swallow, pH probe, upper GI endoscopy or gastric emptying studies (usually unnecessary). Rarely responds to medication under 2 years of age	Restless sleep along with non-responsiveness to medication.

a systematic review of the literature.<sup>28</sup> However, the same cannot be said of cranial technique and remains to be fully investigated.<sup>29</sup> The craniosacral interventions and health outcomes, the validity of craniosacral assessment, and the pathophysiology of the craniosacral system have

been found to have insufficient evidence. Research methods to conclusively evaluate its effectiveness have not been applied to date.

With respect to generalizations and making cause and effect inferences from the case presented, we caution the

Table 3 *Diagnostic Criteria for IFCIDS in the context of the patient presented (15)*

IFCIDS Patient Characteristics	Patient Characteristics
1–6 months of age (seen less frequently 7–12 months of age)	Patient was 3 months of age
Gender: male predominant (60:40)	Female gender
Paroxysmal fuss, cry patterns which are not easily consoled	The patient's crying described as not easily consoled.
High intensity, piercing cries are common	Cries are described as high-pitched sounds.
Crying peaks in evenings, but may occur throughout the day.	Crying occurs throughout the day, particularly after feeding
Many episodes of crying as well as long bouts of crying	Many episodes and long bouts of crying
Feeding patterns: breast, formula or mixed	Feeding difficulties: the patient was unable to make a complete seal
Feeding problems common	Feeding difficulties: the patient was unable to make a complete seal
“Pained faces” (facial grimaces) accompany crying	Facial grimacing accompany crying
Body unrest, flailing limbs, raised knees, clenched fists, arching postures, general irritability	Body unrest described as “wiggling” during sleep and general irritability. The patient demonstrated arching posture.
Sleep disorders common (difficulty falling asleep and staying asleep)	Difficulty falling asleep and staying asleep.

reader for the following reasons. As with all case reports, improvement in a patient's symptoms may be attributed to (a) the natural history, (b) regression to the mean and (c) the result of placebo. Furthermore, both the clinician and the patient (or in this case the patient's mother) may make incorrect inferences from treatment due to (d) the demand characteristics of the therapeutic encounter and (e) subjective validation. Consider for example the “dogma” that the majority of children outgrow their GER or GERD symptoms is challenged.<sup>30</sup> Studies now indicate that childhood GERD may be a risk factor for long-term severe disease sequelae in adulthood.<sup>31</sup> There are findings that in infants with acid reflux, after 1 year, despite resolution of symptoms, the histology remained abnormal.<sup>32</sup> Based on 22 studies, Pace et.al.<sup>33</sup> concluded that placebo is a relatively inactive drug in the short-term treatment of erosive ulcerative reflux and does not appear to change the natural history of the disease.

## Conclusion

We reported the successful chiropractic care of a 3-month old female with subjective complaints consistent with GERD in addition to fuss-cry-irritability with sleep disorder syndrome and irritable infant syndrome of musculoskeletal origin. This study suggests to the possibility that similar patients may benefit from chiropractic care.

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