The Use of CranioSacral Therapy To Treat Gastroesophageal Reflux in Infants

Gastroesophageal reflux (GER) in infants can be a frustrating experience for caregivers. The cause of GER is often unknown. Traditional treatment approaches include positioning, formula changes, medications, and surgery, which often are unsuccessful or have undesirable side effects. This case study presents an effective, non-traditional treatment approach called *CranioSacral Therapy*. Key words: *CranioSacral Therapy, early intervention, gastroesophageal reflux, vagus nerve*

Pat Joyce, OTR/L
Consultant
Valley Infant Development Service
Private Practice CranioSacral Therapy
River Valley Health Associates
Hadley, Massachusetts

Cindy Clark, OTR/L
Board Certified in Pediatrics
Team Leader
Valley Infant Development Service
Springfield, Massachusetts

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GASTROESOPHAGEAL REFLUX (GER) can be a very frustrating condition for many caregivers. Because feeding is viewed as one of their primary roles, caregivers often measure their success by the child's eating abilities. Most people expect to see a small amount of spitting up in infants, but when this occurs frequently or in large quantities, or the child has GER, parents and other caregivers can find the experience to be very stressful. Many interventions have been suggested, from positioning the infant to performing surgery, in order to address the problem of GER. This article offers the view that CranioSacral Therapy (CST) can be an effective modality for resolving conditions of gastroesophageal reflux of unknown etiology.

Gastroesophageal reflux refers to the backwards flow of acidic stomach contents into the esophagus. Although vomiting is a frequent result, the acidic material can be brought up and swallowed, aspirated, or left to sit in the esophagus for a period of time. These last two events can result in pneumonia or in an irritation to the mucosal lining of the esophagus.[1]

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Studies by pH probe have indicated that asymptomatic GER is a normal physiologic event that occurs in everyone.[2,3] Symptomatic GER is said to occur among 3% of all newborns,[4,5] and it is thought to be prevalent in up to 70% of neonates weighing less than 1,700 g.[6,7] In addition to the risk of respiratory problems through aspiration of refluxed contents, infants with GER show a high incidence of other respiratory conditions, including apnea, bronchospasm, laryngospasm, stridor, nocturnal asthma symptoms, and frequent respiratory infections.[4,8–10]

Some of these conditions can be life threatening or may require intensive medical intervention. In most cases, parents are told that their children will outgrow the GER by approximately 18 months,[11] and not to worry as long as weight gain continues. However, the daily realities of frequent changes of clothing, associated odors, and clean-up tasks can be frustrating for caregivers. Additionally, caregivers have expressed concerns about the potential side effects of medications, along with possible impacts on infant motor development that can result from limited movement and positioning options.

CAUSE

Throughout the literature, the etiology of gastroesophageal reflux remains unclear. Much of the theoretical focus has revolved around episodes of increased intraabdominal pressure, and/or relaxation of resting tone of the lower esophageal sphincter. The lower esophageal sphincter serves as a barrier to keep gastric contents from moving upwards into the esophagus. Normal relaxation of basal sphincter tone occurs with swallowing and also occurs spontaneously for short periods during the day, especially after large meals.[3,12,13] Transient relaxations of sphincter tone and increases of intraabdominal pressure have occurred more frequently and with greater acidic reflux in people who have GER than in controls.[13] Reasons for the greater frequency of such episodes are unclear, although delayed gastric emptying has been considered as one possible factor.[13]

Many suggest that immaturity of the lower esophageal sphincter might be involved in GER among infants.[6,11,14,15] Others have looked at a possible causal relationship between reflux and respiratory conditions. Vicious cycles might then occur when respiratory symptoms and their treatments may induce episodes of GER, while complications of GER such as esophagitis may provoke laryngospasm or bronchospasm.[4,10,15–17]

Several authors make note of vagus nerve influence on lower esophageal sphincter tone[3,6,10,15] with some suggesting that reflux into the esophagus may trigger asthma through a vagally mediated reflex.[3,18] Cunningham et al discuss at length associations between abnormal vagal reflexes arising from the pharynx, larynx, and esophagus, and occurrences of common cardiorespiratory responses.[8]

CST practitioners have long suspected vagus nerve involvement in conditions of GER of unknown etiology. The vagus nerve is a complex one to follow, with all of its sensory and motor pathways; multiple target organs; and interconnections with cardiac, pulmonary, and gastrointestinal plexuses. Of significance to CST practioners is the passage of the vagus nerve through the jugular foramen. The jugular foramen is basically a widening of the sutures between the occiput and the temporal bones.[19] Because the jugular foramen is an opening between separate bones, it can be subject to forces and impacts that might create misalignment of the bones. Such an occurrence can irritate any of the nerves and circulatory structures that pass through the foramen.

Literature related to CST has suggested that GER is often the result of impingement on the vagus nerve where it passes through the jugular foramen and at the cranial base.[19–22] Arbuckle supported this concept over 40 years ago when she addressed the need to relieve congestion at the jugular foramen and to realign bones near the foramen magnum in order to correct problems of regurgitation and the sucking mechanism.[20] Upledger indicates that jugular foramen dysfunction can underlie not only digestive disorders, but respiratory problems

through vagal interactions with the pulmonary plexuses.[19] Thus, CST theory concurs with the idea that the vagus nerve may be implicated in GER and considers the jugular foramen and cranial base as points of potential dysfunction.

Weissbluth has stated that torticollis can be among the presenting symptoms in children who have GER.[17] The spinal trunk of the accessory cranial nerve innervates the sternocleidomastoid muscle, the main muscle usually involved in torticollis. Because the accessory nerve travels through the jugular foramen, and because it communicates with the vagus nerve at the inferior vagal ganglion, it seems likely that forces that can affect the vagus nerve at either the jugular foramen or at the occipital base can also affect the accessory nerve.[19] It does not seem surprising, then, to think that a vagally influenced condition of GER might also include symptoms of torticollis if there is congestion at the jugular foramen.

Of further interest is the idea that the carotid sheath, a fascial sleeve through which the vagus nerve passes into the thorax, can be considered an extension of the fibrous pericardium up into the neck and skull. Thus, there is fascial continuity between the fascia of the respiratory diaphragm, which blends with the fibrous pericardium, and the temporal and occipital bones to which the carotid sheath attaches. A fascial restriction at the respiratory diaphragm can result in restrictions at the temporal bones, which in turn can affect the vagus and spinal accessory nerves.[19]

TREATMENT

The usual course of conservative treatment for GER consists of positioning and thickened feedings. The recommended position for preventing reflux has been prone on a 30° incline.[23] Many efforts have been made to suggest ways of fabricating special harnesses to keep infants from sliding down their sloped mattresses.[1,4,7,15] However, a study by Orenstein showed no significant difference in the occurrence of GER when the flat prone position was compared with the elevated prone position.[24] Supine and upright positions, especially in infants not yet capable of holding themselves upright, have been discouraged, as GER appears to occur more frequently in these positions. The recommended prone position presents a dilemma when one considers that, in 1992, the American Academy of Pediatrics advocated supine or side-lying sleeping positions for infants because of associations between the prone position and sudden infant death syndrome.[6]

Thickened feedings have routinely been recommended as a method for dealing with GER, but their value has been questioned through several controlled studies.[25-27] Thickened feedings have been found to produce increased sleep, less crying following meals, and less emesis, but no significant changes in the amount of scintigraphically detected reflux, or non-regurgitant reflux.[26] In addition, increased coughing has been observed following the use of thickened feedings.[26,27]

The next level of treatment includes medications when GER is believed to be pathological.[1,6,10] Specific medications are determined by symptomatology and may include metoclopramide, ranitidine, cimetidine, and cisapride as well as antacids.[1,6,10] Side effects of the medications range from dizziness and mild rashes (cimetidine) to diarrhea and abdominal cramping (cisapride) to irritability (metoclopramide).[5] These side effects are often of concern to parents.

When positioning, thickened feedings, and medications are not successful, consideration is often given to surgery. This type of intervention is more common in children with bronchopulmonary dysplasia, neurological problems, or those with severe complications such as reflux-related apnea.[1,10] A Nissen fundoplication is the most common type of surgery in which part of the fundus is wrapped around the esophagus and sutured to prevent contents from moving back up. Postoperative problems can include gas bloat and dumping syndromes, and watery diarrhea, among others.[5]

CST, an approach that is rapidly becoming more widely recognized for its therapeutic benefits, may prove over time to be the most effective tool for

treating GER of unknown etiology. CST consists of very gentle mobilization of bony structures through the release of restricted fascial tissues, and through attention to subtle rhythmical pressure shifts within the cerebrospinal fluid. For a more complete overview of CST, the reader is referred to Upledger's article within this issue of *Infants and Young Children*.

It is a frequent observation among those who practice CST, that infant reflux symptoms either disappear or become greatly reduced following CST intervention. Caregivers often report that they notice marked improvements after a relatively short number of treatments. On occasion, one or two treatments is sufficient, whereas, at other times, significant change is noted after four or five treatment sessions, usually spaced at 1-week intervals. Through efforts to ensure freedom of movement at the occipital-cranial base, at the jugular foramen, and throughout the fascial system, CST appears to have a positive impact on the vagus nerve and all of its functions, including status of cardiorespiratory and gastrointestinal systems, both of which can be symptomatic in infants with GER.

CASE EXAMPLE

CST practitioners have many anecdotal stories to share about the success of their approach to treating infants with GER. We have chosen to write about one case because of the very clear progress shown by that individual. Kristen's story is presented here following a brief introduction to the early intervention program that served her.

Valley Infant Development Service (VIDS), located in Western Massachusetts, is a program of Child and Family Services of Pioneer Valley, Inc. The program has been serving a diverse ethnic and socioeconomic population for approximately 17 years. VIDS is a transdisciplinary program with primarily home-based contacts and some center-based services. In addition to its traditional early intervention teams, the VIDS program has always used a variety of specialists to assist families and children in achieving their highest potentials. These have included teachers of those with low vision, autism specialists, and educators of deaf children.

Over the past 2 years, children served by VIDS have had access to CST through referral to a pediatric occupational therapist who has advanced training in this form of manual therapy. Some other early intervention programs are currently offering CST to children from therapists who include CST as part of their overall treatments. The arrangement at VIDS is rather unique in that the occupational therapist was contracted specifically to provide CST services. Thus, it would not be unusual for a child to receive services from two occupational therapists, one who might focus on more traditional approaches, such as sensory–motor integration or neurodevelopmental treatment, and the other who would provide CST. Although the methods of treatment may be different, the desired outcomes are usually the same or complementary. An agency that has long been proud of its innovative thinking, VIDS has found that providing CST within this framework has worked extremely well and that CST is viewed as a supportive and important adjunct to other services and therapies within the program.

Kristen

Kristen was initially referred to VIDS by her mother, Rachel, due to concerns regarding Kristen's development. She was 6 months old at the time of referral, and Rachel was concerned that Kristen was not developing as quickly as her peers. An initial developmental assessment was done in her home by an occupational therapist, physical therapist, and a developmental educator. Of significance in Kristen's birth history is that Rachel reported a long labor of 46 hours. Kristen was delivered vaginally at 41 weeks gestation, weighing 8 lbs, 7 oz. Her Apgar scores were 6, 7, and 7. No significant health problems were observed until 6 weeks of age when Kristen's parents became concerned about her feeding. Because Kristen was vomiting frequently and refusing to eat, she was referred to a pediatric gastroenterologist for evalu-

ation. A videoesophagram performed at 3 months of age confirmed a diagnosis of gastroesophageal reflux. Kristen was placed on cisapride and cimetidine. During this time, her mother also switched her formula from a milk-based product to a soy-based product, added cereal to her formula, and kept Kristen upright following feedings. Rachel reported that all of these measures decreased the reflux but did not stop it completely. When Kristen was 5 months old and had been taking the medications for approximately 6 weeks, Rachel stopped giving the medications to her, because she was concerned about their possible side effects. The reflux returned 4 to 5 days after the medications were stopped.

Kristen presented as an alert, cautious little girl who enjoyed looking at/studying faces and books. Developmentally, Kristen was age appropriate in her social/cognitive skills. She was initially shy with unfamiliar adults but warmed up easily and tolerated handling during the evaluation. Kristen was visually alert, exploring people and toys with her eyes. She mouthed and shook toys and showed a beginning awareness of object permanence by looking to the floor when toys fell. Rachel reported that Kristen initially had difficulty sucking from a bottle but that bottle feeding had improved, and she had begun to eat baby food fruits and cereal by spoon. Kristen was very attentive to voices and turned immediately to sounds in her environment. She was generally quiet, which her mother reported was typical, and only vocalized a grunting or "ah" sound.

Kristen showed delays in her motor skills. She appeared to have good static postural control, and her muscle tone was low normal. Control of major muscle groups appeared to be generally stronger in extensor muscles with the flexor muscle groups noted to be less active. When placed in prone, Kristen did not demonstrate any movement (such as weight shifting, pivoting, or scooting) and became very upset after 30 to 60 seconds in this position. She did not assist in rolling prone to supine and appeared to dislike the movement. Kristen was able to ring sit and hold a toy and play with it. When a desired toy was out of her reach, Kristen would change the focus of her attention or cry until an adult attended to her needs, rather than attempt to move to get the object. She enjoyed linear movement, such as bouncing up and down, and would fall asleep in the baby swing. Kristen was calmed by music or looking at books but did not yet have a clear self-calming mechanism.

Following the developmental assessment, Kristen was enrolled in the VIDS program and started to receive weekly home visits from her service coordinator, who was an occupational therapist. Visits focused on improving her sensory processing and motor development, including gross, fine, and oral motor skills, in addition to providing overall developmental stimulation. Her mother, father, and/or grandmother were always present for the home visits and were active participants, learning positioning and handling techniques as well as information about general child development. During this time, Kristen's reflux persisted, and her parents remained very concerned as her oral–motor skills and food intake began to decrease. Because improvements had been observed in the GER status of other children who had received CST, Kristen's service coordinator offered her parents the option of trying CST. They responded favorably and Kristen was referred for CST.

CST

At 8½ months of age, Kristen began to receive CST at the center, and over the course of 4 months received a total of 12 CST treatments. During the first four sessions, significant changes in her GER occurred (Fig 1). Although efforts were made to schedule weekly appointments, the first four sessions were spaced at varying intervals (5 days, 9 days, and 12 days) to accommodate the schedules of Kristen's family and the treating therapist. One hour was allotted for each CST session, with hands-on contact usually consisting of 45 to 50 minutes. With Rachel's assistance to distract and entertain Kristen, the first few treatments occurred with Kristen in a supine position on a massage table. As

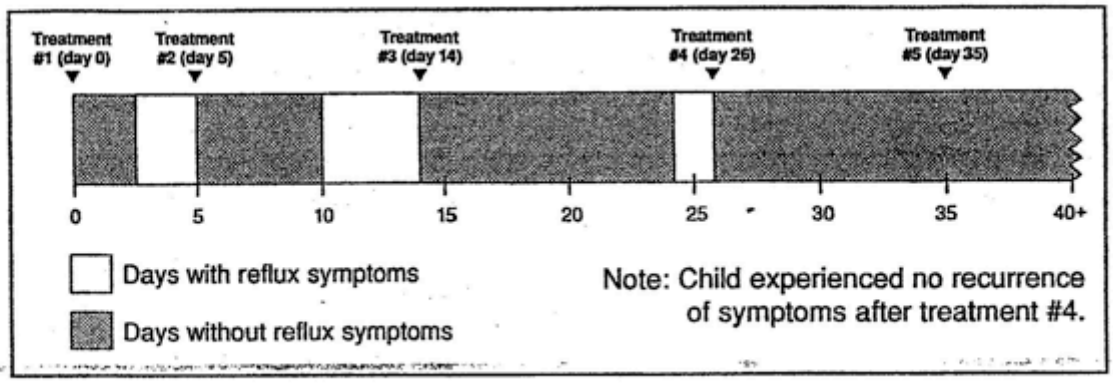

Fig 1. Effects of CranioSacral Therapy on 8-month-old child with gastroesophageal reflux.

Kristen's motor development progressed, and her interest in actively exploring her environment increased, treatment sessions occurred in a greater variety of positions, including prone, sitting, and standing.

Kristen tolerated the initial CST session well. It was early afternoon, and Rachel reported that Kristen had been spitting up all morning. She stated that it was not unusual for Kristen to need five or six changes of clothing per day due to the frequent occurrence of GER. Diaphragm release techniques were used as were cranial components of the Ten Step protocol presented in the Upledger Institute's curriculum. Because of the possibility that vagus nerve impingement at the occipital base might be a contributing factor to her GER, particular attention was given to the base of the occiput. Through palpation and visual observation, Kristen's occiput was found to be somewhat flattened. It is important to note that the amount of manual pressure used at the occipital base was far less than that customarily used during this technique with adults, when the weight of the adult's head usually rests on the practitioner's extended fingertips. For Kristen, the pressure applied at the occipital base was extremely light or barely touching.

When Kristen and her mother returned 5 days later, her mother was delighted to report that the reflux had stopped for a period of 2½ days immediately following the initial session. Rachel stated that when the reflux began to reappear, the volume was much less than it was prior to the CST session. The second CST session was handled in a manner similar to the first, with attention to the occipital base, sphenoid and temporal bones, and dural membranes that surround the spinal cord. Following this second session, the reflux disappeared completely for 5 days. When the reflux reoccurred toward the end of the week, it was very "minor" according to Rachel.

By the third visit, which took place 9 days after the second one, the back of Kristen's head was beginning to look and feel less flat and more rounded. Her mother indicated that Kristen's father had also noticed the change in head shape. During the third session, in addition to treatment techniques used previously, an effort was made to ensure freedom of movement where the vagus nerve passes through the jugular foramen by stabilizing the occiput with one hand and then gently mobilizing each temporal bone separately. The session also included diaphragm releases with particular focus on the thoracic and hyoid areas to prepare further the fascial tissues for release at the cranial base.

A 12-day period elapsed before Kristen was seen again for the fourth session. This time, she had been without any signs of reflux for the first 10 days following the previous CST treatment. Once again, when the reflux returned, it was of relatively small

quantity. During the fourth session, efforts to ensure freedom of movement at the jugular foramen were repeated, and standard protocol techniques were used. Tremendous heat emanated from the back of Kristen's head, near the region of the lambdoidal suture, suggesting that a significant release had taken place during this session.

Results

Kristen was seen for CST at weekly intervals over the next 2 months to continue to address subtle motor concerns. *The reflux never returned after the fourth session.* This significant change occurred within 1 month from the CST start date. Although the primary focus of this case study is the condition of reflux, some other important changes were observed in Kristen during this time period. Kristen initially presented as a child who had limited ability to transition in and out of sitting and other positions due to difficulties with sensory processing and motor planning skills. Within a month of commencement of CST, she was pushing herself onto her hands and toes and occasionally onto her hands and knees. In the hands and knees position, she was experimenting with weight shifting, frequently picking up one arm or one leg. Over the next 2 months, trunk rotation and crawling became well established, and she began to use the half-kneel position to pull to stand. Kristen was no longer afraid of movement and began eagerly to seek ways to use her developing skills. A developmental reevaluation of Kristen's skills indicated that she was within normal limits for her age and no longer eligible for early intervention services. She received her final CST treatment session at 1 year of age and was subsequently discharged from VIDS. At this writing, Kristen is 18 months of age, and according to reports from her mother, has experienced no further episodes of reflux.

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The success shown in this case study offers great promise for the use of CST as a highly effective treatment for gastroesophageal reflux in infants and young children. CST is a gentle and noninvasive approach that should be explored prior to considering more invasive treatment methods. Measurable improvements often occur fairly quickly in response to CST, and therapists and families will usually know within four to five treatment sessions whether or not CST is a useful tool for a particular child. It is our pleasure to offer to families through this presentation the hope of an effective alternative treatment and to invite our colleagues to examine the potential benefits of using CST to treat infants and children with gastroesophageal reflux.

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