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The Value of Research

Research is the backbone of science. It is the foundation upon which scientific knowledge of the human body is slowly pieced together to explain its inner workings. The goal of the *Journal of Chiropractic Clinical Pediatrics* is to provide a vehicle dedicated to the accumulation and dissemination of knowledge relating to chiropractic care for children, from conception through adolescence. The International Chiropractors Association, through its Council on Chiropractic Pediatrics, has undertaken as one of its tasks the fostering of pediatric research. This task of the Council is seen both as a responsibility to the Chiropractic profession and as a means by which chiropractic care for children can be explored and validated. Quality research is critical to this mission. Research studies must be well-designed, the variables controlled, the results must be accurately reported and all papers must be peer-reviewed.

Case studies are the building blocks that initiate the research process. Individual case reports identify areas for further study. It is vitally important in such reports that case data be accurately identified with respect to the patient history, the evaluation procedures, the care provided by all sources and the results of that care. Patient history should be thorough enough so that all previous diagnoses and therapies can be identified. In this respect, the pediatric history forms available through the International Chiropractors Association's website www.chiropractic.org provide an excellent standardized format for data collection. Evaluation procedures should identify all tests performed to determine the patient's condition which lead to the chosen course of care. The course of care should be accurately described to include all interventions and recommendations. A common problem seen in papers submitted for publication is the inclusion of multiple modes of care (adjustments) together with recommendations to manage chemical and stress situations. This makes it impossible to draw any conclusions from the data submitted and the paper loses much of its value. To avoid this problem, the patient's condition needs to be accurately identified, the specific intervention (spinal adjustment) identified precisely, together with the course of care (number of adjustments and period of time between adjustments), and the results (both short-term and long-term) should be stated.

When groups of patients have been identified with a similar problem (example: chronic earache) they can be reported as a case series. Here it is important that standardized forms be used to record the data so that history and interventions can be accurately summarized.

In this issue, submitted papers cover the resolution of a case of infertility, resolution of a case of uveitis which had been unresponsive to anti-inflammatory medication, the potential effects of subluxation at the lumbosacral spine in preventing pre-term labor and delivery, and exploration of the effects of craniosacral therapy in a case of infant plagiocephaly.

For the dedicated doctors of chiropractic who daily care for children through their practices, the health benefits of spinal adjustments in correcting and maintaining a child's health are no mystery. For the parents who see significant improvement in their children's health problems and their ability to maintain continued good health, the benefits of pediatric chiropractic care hold no mystery. However, the dissemination of this knowledge to the community-at-large is a slow and painstaking process. The dedicated few individuals who take the time to document and publish their clinical results play an important role in providing pieces of the puzzle which will ultimately define popular acceptance of chiropractic care for children.

PETER N. FYSH, DC, FICCP

The Effects of Chiropractic Spinal Adjustments in a Case of Bilateral Anterior and Posterior Uveitis

JACK E. MANUELE. DC, DICCP
PETER N. FYSH, DC, FICCP

ABSTRACT

Objective: A case report is presented to illustrate the effects of chiropractic spinal adjustments in a case of anterior and posterior uveitis in a male child, six years of age. Previous medical options for management of this child's condition had been ineffective. A hypothetical pathophysiological mechanism for the improvement of uveitis observed in this child is discussed.

Design: Case report

Outcome Measures: Resolution of the condition was determined by funduscopic examination as well as Snellen chart eye examination. Evaluation by a medical ophthalmologist at each occurrence was used to confirm the results.

Results: Progressive improvement occurred with chiropractic care. The patient was treated through eight exacerbations of his uveitis, each of which was associated with trauma to the head or neck. Complete resolution of each exacerbation was achieved while the patient was under chiropractic care. No complications were noted.

Conclusion: The authors present a case study of a six year old male with anterior and posterior uveitis. Following identification of the diagnosis of anterior and posterior uveitis, the child was evaluated and monitored by a medical ophthalmologist throughout a four month course of topical and systemic steroid therapy without significant improvement. The patient then underwent a course of chiropractic spinal care. Two weeks after commencement of the chiropractic program, significant improvement was recorded in both visual acuity and fundus detail. The patient's condition was closely monitored by both the chiropractor and the ophthalmologist for a period of two years, during which time several exacerbations of the condition occurred following sporting injuries involving blows to the head and neck. After each of these incidents, the exacerbations subsided following a course of chiropractic spinal adjustments. During a further five year follow-up period, the child had no further exacerbations of uveitis. This case is presented to provide a possible new approach to the management of uveitis in children. The potential for chiropractic spinal care to help maintain a child's sight in the face of advancing permanent visual loss is considered significant. Additional studies are required to confirm the applicability of these findings to a larger population of children with this condition.

Key Indexing Terms: child, chiropractic, uveitis, iridocyclitis, spinal adjustment, vertebral subluxation, vision, sight, ophthalmology

INTRODUCTION

Anterior uveitis is defined as an inflammatory condition of the iris and or ciliary body while posterior uveitis is an inflammatory condition of the choroid. Both conditions present with symptoms of blurred vision which is due to opacities within the intraocular fluid. Inflammatory lesions within the eye produce a cellular response extending into the vitreous that often cause reduced vision and increased awareness of "floaters" on the part of the patient. Such cells can be seen upon ophthalmoscopic examination as a haze, which if widespread, may greatly reduce the clarity of fundus detail. Uveitis is a condition in which inflammatory cells occur within the vitreous. Children with uveitis may complain of pain, photophobia, lacrimation and blepharospasm and may notice disturbances in vision, or alternatively, may be completely asymptomatic.

Several authors have identified a correlation between anterior and posterior uveitis and other conditions such as ankylosing spondylitis[1], sacroilitis[2], juvenile chronic arthritis[3], herpes simplex and connective tissue diseases of which sarcoidosis is an example. Correlation has been demonstrated between posterior uveitis and CNS disorders such

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as toxoplasmosis; however, in most cases the etiology is unknown[1]. It has also been demonstrated that one third of the patients with uveitis have no known association with any other diagnosed condition[1].

CASE REPORT

A male child, aged five years and nine months, was examined by an ophthalmologist and diagnosed with both anterior and posterior uveitis. Ophthalmological examination performed at that time revealed a visual acuity of 20/100 in the right eye and 20/30 in the left eye. Slit lamp examination of the anterior segments showed evidence of anterior uveitis with 2+ cells and flare in each anterior chamber. One broken synechia was identified in the right eye together with mild changes of the posterior capsule of each lens consistent with chronic inflammation. Examination of the vitreous showed dense cellular infiltration into the anterior, central and posterior vitreous, particularly of the right eye. A fundus examination could not be performed in the right eye and despite a somewhat hazy view in the left eye, normal architecture was noted. A complete blood count and serum chemistry panel were performed to rule out systemic diseases such as juvenile rheumatoid arthritis, collagen vascular disorders and tuberculosis as a possible cause of the uveitis. Results indicated an eosinophil count of 10.2% (0-3 normal reference range) and lactate dehydrogenase (LDH) of 257 U/mL (80-190 normal) as the most notable abnormalities. Ophthalmoscopic evaluation and monitoring continued throughout a four month course of topical and systemic steroid therapy, however no significant improvement in the patient's vision was detected, utilizing either the Snellen eye chart or by fundus examination. After the four month course of steroid therapy utilizing oral prednisone no detectable improvement in the patient's condition was noted and the steroid therapy was terminated at that time.

At this point, the child's mother decided to see if chiropractic care could help her son's condition. The patient presented as an alert, well nourished male, six years of age. His mother stated that for four months her son had suffered loss of vision in his right eye and constantly squinted and blinked with both eyes. The child's mother indicated that his birth was induced after a full term pregnancy of 40 weeks and a labor of 24 hours. Apgar scores were within normal limits and the patient was discharged from the hospital 2 days after birth. Health history indicated that the child had suffered from chronic bronchitis since infancy. At three years of age, the patient fell from a bed, striking his head and lacerating his left eyelid. The laceration was sutured and healed without complication. At the age of five years the patient had another fall and suffered leg and knee pain and leg cramps shortly thereafter. At the time of the child's first spinal examination, he complained of intermittent neck and back pain and leg, knee and ankle pain. He also complained of pain at the proximal interphalangeal joints of all fingers.

During a complete physical and spinal examination by the chiropractor, it was noted that the patient appeared to fidget and continuously moved his arms and legs. His complexion was slightly sallow, he had a left lid lag and the skin of the forearms, upper back, legs and ankles revealed psoriatic type lesions which the patient indicated were pruritic. Respiration rate was 23 breaths per minute and lungs were clear upon auscultation but it was noted that the patient coughed frequently throughout the examination. Fundus examination of the right eye was difficult due to intraocular haze. Testing with Snellen eye chart in a room illuminated by fluorescent lights revealed a visual acuity of 20/140 in right eye and 20/30 in left eye. Visual acuity further deteriorated when tested with the room lights off and with the Snellen chart illuminated. During the examination, the patient complained frequently

Visual Acuity Testing Data

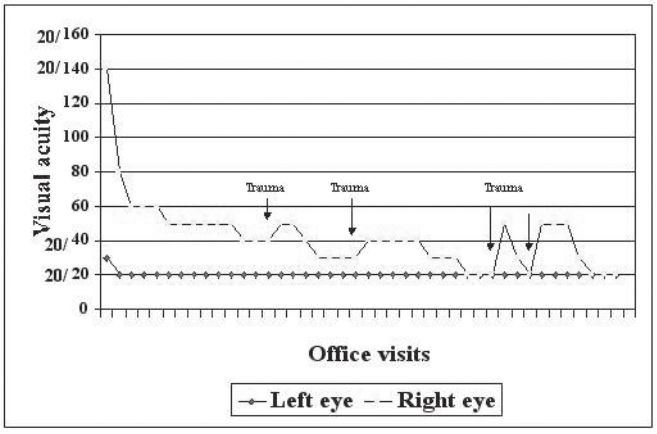
Visit #	Right eye	Left eye	Visit #	Right eye	Left eye
1	20/140	20/30	21	20/40	20/20
2	20/80	20/20	22	20/40	20/20
3	20/60	20/20	23	20/40	20/20
4	20/60	20/20	24	20/40	20/20
5	20/60	20/20	25	20/40	20/20
6	20/50	20/20	26	20/30	20/20
7	20/50	20/20	27	20/30	20/20
8	20/50	20/20	28	20/30	20/20
9	20/50	20/20	29	20/20	20/20
10	20/50	20/20	30	20/20	20/20
11	20/40	20/20	31	20/20	20/20
12	20/40	20/20	32	20/50	20/20
13	20/40	20/20	33	20/30	20/20
14	20/50	20/20	34	20/20	20/20
15	20/50	20/20	35	20/50	20/20
16	20/40	20/20	36	20/50	20/20
17	20/30	20/20	37	20/50	20/20
18	20/30	20/20	38	20/30	20/20
19	20/30	20/20	39	20/20	20/20
20	20/30	20/20	40	20/20	20/20
			41	20/20	20/20

of right eye pain and photophobia. Spinal examination revealed a mild dextro-scoliosis in the thoracic spine and a mild levoscoliosis in the lumbar spine. These findings were confirmed radiographically. His right leg appeared to be one quarter of an inch short although no anatomical leg length discrepancy could be measured. This finding suggested the leg length was physiological rather than anatomical. Cervical spine ranges of motion were within normal limits, however pain at C3 to C5 level was noted upon neck extension. Forward flexion and left lateral flexion of the neck produced pain at C7 while full neck rotation in either direction produced pain in the area of the contralateral trapezius muscle, in the vicinity of the base of the neck. Lumbar ranges of motion were within normal limits, however the patient described pain over the right iliac crest with right lateral flexion and over the left iliac crest with left lateral flexion and over each groin and also over the right iliac crest with extension. Ankle inversion was painful bilaterally and toe walking produced pain throughout the metatarsal region of both feet. Heel walk was pain free.

Static and motion palpation of the spine revealed segmental subluxations, identified by palpable tenderness, muscle induration and segmental restriction (fixation) and misalignment at the following spinal levels: Left C0-C1, left occiput anterior (+z, +_x), C1 right lateral (+z, -_x, -x), T1 right posterior (-_y), T4-T5 right posterior (-_y), L5 left posterior (+_y) and the right sacroiliac joint posterior and inferior (-_y, -_x).

A course of spinal adjustments was commenced using the diversified technique. High velocity, low amplitude spinal adjustments were delivered with the line of drive being directed from posterior to anterior and inferior to superior using the doctor's index finger in the cervical spine region, with a pisiform contact to the transverse processes in the thoracic spine, also with a pisiform contact to the sacral alar. The cervical and occiput adjustments were delivered in the supine position, the thoracic and lumbar adjustments were delivered in the prone position and the sacral adjustment was delivered in side posture with the patient lying on the left side. In areas where spinal scoliotic curvatures existed, the adjustive thrust was delivered in the direction of the convexity of the spinal curvature.

Spinal evaluation was repeated at each office visit and spinal adjustments delivered initially at a frequency of three times per week reducing later to twice per month, after improvement in visual acuity had been achieved. After the second visit for spinal evaluation and adjustment, visual acuity was 20/80 in the right eye and 20/20 in the left eye.



After the sixth visit, visual acuity was 20/50 in the right eye and 20/20, left eye, with fundus detail in the right eye being improved significantly.

During the course of chiropractic care, the patient experienced several exacerbations of his uveitis condition. Each of the exacerbations was associated with a sports injury involving either the head or neck. Each sporting injury could be associated with an almost immediate exacerbation of symptoms which included loss of visual acuity, increase in the presence of intraocular opacities, fundus obscurity and the presence of floaters. Each of these symptom exacerbations abated following several chiropractic spinal adjustments.

As the spinal adjusting program progressed, visual acuity continued to improve and the frequency of falls and other accidental injuries to his head and neck decreased. Injuries which occurred after this time caused less severe symptom exacerbations without re-occurrence of the low back or lower extremity symptoms. Also during this period of time the right eye visual acuity stabilized for periods at 20/20 and the left eye at 20/20.

One year following the commencement of chiropractic treatment, both the ophthalmologist and an optometrist who had been following this case verified improvement of fundus detail and visual acuity. Both tested right eye visual acuity and found it to be 20/30 using a darkened room with illuminated Snellen chart letters.

DISCUSSION

It is important, when treating children with deteriorating eyesight that objective findings be evaluated at each treatment and that concurrent and ongoing specialist ophthalmological evaluation be continued. Exacerbations of uveitis symptoms from injuries, however, do not necessar-

ily indicate a lack of treatment effectiveness but should encourage a re-examination and more intensive chiropractic treatment when indicated. Examination of fundus detail in a chiropractor's office using an ophthalmoscope, even without mydriatics can detect improvement of fundus detail in a cooperative child with intraocular opacities. This can also be confirmed by testing for improvement in visual acuity. Visual acuity testing when performed in an illuminated room will differ from testing in a darkroom with illuminated letters, therefore, only one method should be used consistently.

Improvement of neck and back pain with spinal adjustment may be an appropriate criterion for recovery from uveitis but the association may be incidental. Anecdotal evidence relates improvement of vision after spinal adjustments of the cervical spine in children[7]. Other studies support this contention by demonstrating a relationship between inflammatory diseases of the spine and inflammatory conditions of the eye such as acute uveitis [1,8] and rheumatic iridocyclitis [3,9].

The proposal that spinal adjustments may be an appropriate treatment for some cases of uveitis is supported by an examination of the neurological and internal anatomy of the eye. The origin of the nerve supply to the involved structures of the eye should be considered when attempting to understand the physiological link between a patient's uveitis symptoms and the use of spinal adjustment as a form of therapy. The superior cervical ganglion receives most of its preganglionic fibers from the first thoracic nerve and some from the upper thoracic spinal nerves. The superior cervical ganglion also supplies postganglionic fibers to the internal carotid and cavernous plexuses which inturn supply sympathetic fibers to the vasculature of the eye, the circle of Willis and to numerous other cranial structures. Alteration of the sympathetic nerve supply may cause tissue neovascularization, which in chronic cases can produce boggy and friable tissues which may easily rupture with trauma, releasing fluid, cells and perhaps histamines. Trauma to the head and neck in this case caused increased existing intraocular turbidity resulting in reduced vision. Correction of associated nerve irritation may reverse this process. As vertebral positioning can be dependent on spinal structures both above and below the involved level, all postural and structural spinal distortions should be considered relevant and evaluated accordingly.

CONCLUSION

The authors present a case study of a six year old male with anterior and posterior uveitis. Following identification of the diagnosis of anterior and posterior uveitis, by a medical ophthalmologist, the child was evaluated and monitored throughout a four month course of topical and systemic steroid therapy without significant improvement. The patient then underwent a course of chiropractic spinal care. Two weeks after commencement of the chiropractic program, significant improvement was recorded in both visual acuity and fundus detail. The patient's condition was closely monitored by both the chiropractor and the ophthalmologist for a period of two years, during which time several exacerbations of the condition occurred following sporting injuries involving blows to the head and neck. After each of these incidents, the exacerbations subsided following a course of chiropractic spinal adjustments. During a further five year follow-up period, the child had no further exacerbations of uveitis. This case is presented to provide a new and alternative approach to the management of uveitis in children. The potential for this form of chiropractic spinal care to help maintain a child's sight in the face of advancing permanent visual loss is considered significant. Additional studies are required to confirm the applicability of these findings to a larger population of children with this condition.

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The Role of Chiropractic Care in the Resolution of Migraine Headaches and Infertility

RONIT VILAN, DC, DICCP

ABSTRACT

Objective: The purpose of this case study is to discuss the chiropractic care of a patient who presented with a chief complaint of migraine headaches. The association between the patient's migraines and her medical history of infertility is discussed.

Design: A case study.

Setting: Private practice.

Patient: A 28-year-old Caucasian female.

Results: The resolution of the patient's migraines as well as her infertility occurred after three months of chiropractic care.

Conclusion: This case study details a 28-year-old female who received chiropractic care for migraines. The patient had complete resolution of the migraines and consequently infertility. Spinal etiology appears to be associated with headaches and infertility.

Key Words: migraines, infertility, chiropractic, vertebral subluxation complex, pituitary, spinal adjustments.

INTRODUCTION

Eleven million adults are affected by migraine headaches in the United States.[1] A migraine can be defined as "paroxysmal disorder characterized by recurrent attacks of headaches, with or without associated visual and gastrointestinal disturbance."[2] These headaches occur more commonly in women with onset between 10-30 years of age.[2] The pain pattern may be either generalized or unilateral and can last for a couple of hours or several days. While the etiology is unknown and complex, there is sufficient evidence linking involvement of the cervical spine.[3] Correcting the dysfunction of the cervical spine segments reduces the frequency and severity of the headaches.[4] Limited clinical trials and numerous anecdotal evidence supports that spinal adjustments are effective for migraines as well as cervicogenic and tension-type headaches.[3]

The following case study depicts a young woman who sought chiropractic care for migraines. The patient's headaches were eliminated. Additionally, her problem of infertility resolved as well.

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Infertility is defined as the inability to conceive after at least one year of trying.[5] In 40% of the cases, the male partner is responsible for the infertility while the female partner is accountable for the other 40% of the cases.[5] Twenty percent of the cases remain inexplicable. Some causes of female infertility include hormonal dysfunction, damaged or blocked fallopian tubes, endometriosis, and excessively thick cervical mucus.[6]

Current medical treatment offers a wide range of options from reproductive medications to gamete intrafallopian transfer. However, due to the cost, risks, and limited success rates of these procedures, chiropractic care offers a low cost alternative treatment for infertility. McNabb (1994) examined the association between spinal function and infertility.[6] This paper proposes the involvement of vertebral subluxation of the cervical spine as the cause of both migraines and infertility.

HISTORY

A 28-year-old Caucasian female presented for chiropractic consultation for migraines. The onset of headaches began when the patient was a teenager. No provocative incident could be recalled. The duration of the migraines

was described as lasting all day to a couple of days. The patient described the location of the pain as covering her whole head but especially in the frontal region above her eyes. The patient denied any neck pain or radiation of pain or paresthesia of the upper extremities. She reported the pain as stabbing in association with nausea and dizziness. While the patient stated an awareness of the impending onset of the migraines, she did not note any specific visual, sensory or auditory prodromal auras.

Past history revealed irregular menstrual cycles. The patient stated that she would usually menstruate no more than twice a year. She had not sought any medical advice or attention. After years of infertility, the patient and her husband sought help from a reproductive endocrinologist. They underwent the typical series of tests including blood, thyroid, pituitary, endocrinology and radiology. The patient had been first prescribed oral medication, Prevera and Clomid. The doses were increased steadily every month. She experienced side effects such as mood swings and weight gain. When the patient took the Clomid, she became pregnant. At nine weeks, the patient miscarried. Artificial insemination was not successful and was discontinued. She then reported getting pregnant without any medical intervention and carrying to full-term. The pregnancy was uneventful. Following the pregnancy, the irregular menstrual cycles resumed. At the time the patient presented for chiropractic care, she had not had a menstrual cycle for three months.

EXAMINATION

Upon presenting for chiropractic care, a complete physical, orthopedic, neurological, and chiropractic examination was performed. The physical examination revealed the patient to be normocephalic and of a normal somatotype. Pulse was 74 bpm and regular. Blood pressure was 100/60 bilaterally in the seated position. Cardiac ausculation revealed no murmurs and the lungs were clear. Examination of the abdomen revealed no masses, tenderness, rigidity, or bruit. Palpation of the cervical, axillary, supraclavicular, and inguinal lymph nodes revealed no enlargement or tenderness. Arterial pulses were equal bilaterally at the femoral, posterior tibial, and dorsalis pedis sites. Carotid pulsations were equal bilaterally. There were no carotid or subclavian bruits.

Neurological assessment revealed cranial nerves 1-XII to be intact and fully functional. Cerebellar function testing revealed no dystaxia and rapidly alternating movements as well as heel to shin testing were performed quickly and accurately. Deep tendon reflexes of biceps, triceps, brachioradialis, patella and achilles were all grade 2 and symmetric. There was no motor loss or sensory deficit in either the upper or lower extremities. The toes were downgoing, bilaterally.

The orthopedic examination revealed cervical spine ranges of motion moderately restricted and painful in extension, right lateral flexion, and right rotation. The cervical compression test was positive in extension for local neck pain. Dorsolumbar ranges of motion were full and pain-free. Straight leg raising was full and pain-free. Kemp's test was negative. Fabere Patrick test was negative. The valsalva maneuver failed to reproduce symptoms. Static palpation revealed muscle spasm of the suboccipital muscles, paraspinal muscles overlying the entire cervical range, and upper trapezius muscles. There was articular fixation and tenderness at C0-C1 bilaterally, C1-C2 on the right, C4-C5 on the left, T4-7 bilaterally, and L5-S1 on the right.

At initial presentation, spinal radiographs were not taken due to the uncertainty of the patient's menstrual cycle. Cervical spine anterior to posterior (AP), cervical lateral, anterior to posterior open mouth (APOM), thoracic anterior to posterior, and thoracic lateral views were taken approximately one month later when the patient was menstruating. Upon examination of the cervical spine radiographs, there appeared no evidence of osseous or periosteal injury. A congenital block vertebra was noted at C2-C3. There was also a narrowed disc space at C4-C5. In addition, there was rotation of atlas to the left in the APOM. Thoracic spine views revealed no osseous or periosteal injury. No degenerative changes were noted. The spine was midline.

TREATMENT METHODS

The initial treatment interval was twice a week for four weeks. At each visit the patient was palpated for spinal misalignment and muscle spasm. The visits consisted of applying moist heat fomentations for 5 minutes to the cervical and thoracic spine while the patient was prone. Following this, trigger point manual therapy was performed over the trapezius muscles, bilaterally. The patient was then adjusted utilizing Diversified specific spinal adjustments. The mid-thoracic spine adjustments were done with the patient prone with the contact points being the thoracic transverse processes moving in a posterior to anterior direction with an inferior to superior line of drive. The doctor's stance was a toggle stance with shoulder centered over the patient's involved spinal segment. The thrust was delivered through the pisiform of the doctor's hands. For

the upper thoracic spine adjustments, the contact points and direction of thrust remained the same and the doctor's stance changed to a one line fencer stance with the shoulders centered over the involved segment.

Cervical adjustments were performed with the patient supine and the doctor standing at the head of the patient in a two line fencer stance. For a cervical subluxation on the right, the thrust was delivered through the knife edge contact of the doctor's hands with the patient's head in slight lateral flexion. The doctor then delivered a thrust to the patient's articular pillar in a posterior to anterior and right to left rotation direction. For a cervical subluxation on the left, the thrust was delivered in a posterior to anterior direction with left to right rotation. A right occipital lift adjustment was performed with the doctor's right hand using a knife edge contact at the occipital base while the left hand contacted the zygomatic arch. A simultaneous thrust was delivered with the left hand in a direction towards the right hip. A sub-occipital stretch was then performed with the patient in the supine position and the patient's head resting in the palms of the doctor's hands. The patient was asked to take a breath in and then exhale. While the patient exhaled, the doctor flexed the patient's neck in neutral and lateral rotation. Additionally, the doctor pressed her thumbs over the patient's frontal and maxillary sinuses to facilitate drainage. The above procedures were performed at each visit.

After one month of care, the patient's treatment interval was reduced to once a week. Three months after beginning care, the patient began to receive lumbar spinal adjustments utilizing the Cox flexion-distraction procedure without straps. The patient was prone on a flexion-distraction table with the doctor standing in a toggle stance. The doctor's superior hand would contact the spinous process of each segment of the lumbar spine and distract while the inferior hand would contact the caudal section of the table (the part the legs lie on) to flex the spine.

RESULTS

A re-examination was performed one month after care began. The patient reported her headache symptoms to be approximately 80% of their original intensity. There was also objective improvement in the patient's clinical picture. Cervical spine ranges of motion were mildly restricted and painful only in flexion and extension. The cervical compression test was negative. The paraspinal muscle spasm overlying the cervical range had dissipated. There was articular fixation at C0-C1 on the right, C6-C7 on the left, and T2-4 bilaterally.

Two months following the re-examination, the patient reported no headaches during the preceding month. In addition, she noted after not having a menstrual cycle for three months, a regular menstrual cycle was established seven weeks into care. Within six months of beginning care, the patient became pregnant.

DISCUSSION

The proposed mechanism of migraine and infertility in this case study involves the vertebral subluxation complex. According to Lantz's model, the vertebral subluxation complex consists of several componets — kinesiopathology, neuropathology, myopathology, and biochemical abnormalities.[7] Signs and symptoms of migraine correspond with this model. In this patient, the kinesiopathology of migraine was articular fixations and tenderness at various levels in her cervical spine. Joint restriction in turn can lead to spasticity and muscular contracture.[7] The myological component in this case was indicated by the sub-occipital and cervical spine paraspinal muscle spasm. In addition, other muscle spasms may have been present but difficult to assess. Vernon has reported that afferent connections from cervical joints can produce referred head and facial pain as well as muscle dysfunction in the cranio-vertebral region.[8]

The effects of aberrant physiology of the musculoskeletal system could also be related to the patient's infertility. It is postulated that contracture of the medial and lateral pterygoid muscles could affect the sella turcica which is made up of the body of the sphenoid bone. Physiologically, Wolff's Law states that bone is laid down where stresses require its presence and bone is resorbed where stresses do not require it. For example, the growth of a pituitary adenoma causes so much pressure that it changes the amount of growth hormone secreted and produces dramatic bodily changes.[9] Because of the attachment of the pterygoid muscles to the pterygoid plates, they could produce sizeable bending movements on the sphenoid. The pituitary gland, situated within the sella turcica, would be affected structurally and consequently a change in function could result.

Normally, the pituitary secretes LH(luteinizing hormone) which plays an important part in development of ovarian follicles, ovulation, and maintenance of the corpus luteum of pregnancy.[2,10] If there was a change in pituitary function, then there could be a change in the secretion of LH. Cahill, et al showed impaired LH secretion as a cause for unexplained infertility and endometriosis associated infertility.[11]

Therefore, it is possible for a causal relationship to exist between spinal dysfunction and hormones. In addition, it is interesting to note that the patient's migraines corresponded with the onset of her irregular menstrual cycles when she was a teenager. Resolution of the migraines corresponded with the onset of her regular menstrual cycle after the first month of care. Subluxation of the cervical spine can potentially alter the function of the pituitary which can have a significant impact on the reproductive system. The proposed hypothesis is that by correcting the underlying cause, the vertebral subluxation complex, with chiropractic adjustments, the patient's migraines as well as the infertility resolved.

CONCLUSION

This case study details a 28-year-old female who received chiropractic care for migraines. The patient had complete resolution of the migraines and her infertility. Spinal etiology appears to be associated with the resolution of her headaches and infertility.

It is proposed that treatment options for some infertile couples should include chiropractic care. While many chiropractic patients have reported similar clinical experiences, few have resulted in published cases and studies. Further research needs to be conducted into the association between migraines, infertility and chiropractic care to further evaluate the extent to which the vertebral subluxation complex can affect these conditions.

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Chiropractic Care of an Infant with Plagiocephaly

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ABSTRACT

Objective: The purpose of this case study is to discuss the chiropractic care of a child diagnosed with cranial plagiocephaly due to intrauterine constraint and developmental delay of unknown etiology. This article will also discuss the subsequent rapid progression of developmental skills as craniosacral therapies were administered.

Design: A case study.

Setting: Private Practice

Patient: A Caucasian male, 8 months of age, presented with a large posterior bilateral prominence of the occipital bone. His developmental milestones were predominantly equivalent to those of a three-month old and cranial facial asymmetries were detectible. He fussed or screamed if his head was touched or if placed to sleep in the supine position due to pressure on the back of his head. His sleep and feeding habits were also abnormal.

Results: With chiropractic care, this infant's developmental milestones progressed to match his age, and his cranial facial symmetries improved even though the shape of his occipital bone changed minimally. He was able to eat normally and sleep through the night in the supine or side-laying positions. He also allowed his head to be touched and caressed without fussing.

Conclusions: This is a case where attempts to remold the occipital bone were made using Upledger and Sacro-occipital Techniques. Although changes in the shape of the occipital bone were minimal, the child benefitted by experiencing a rapid progression of developmental skills bringing him from grossly delayed to current. His facial features, sleeping and feeding patterns normalized, and he would allow his head to be touched.

Key Words: posterior plagiocephaly, chiropractic, adjustment, craniosacral therapy, birth trauma, vertebral-cranial subluxation complex, cranial facial asymmetry.

INTRODUCTION

The purpose of this case study is to discuss the chiropractic care of a child diagnosed with non-synostotic plagiocephaly due to intrauterine constraint and developmental delay of unknown etiology. This paper will discuss the chiropractic care and subsequent reduction of pain and behavioral abnormalities accompanied by rapid progression of developmental skills as craniosacral therapies were administered.

The usage of the term plagiocephaly is changing in the literature; however, the term connotes an asymmetrically oblique or twisted head[1] (from Greek: plagio = oblique/aslant, kephale' = head). [2] Originally the word was used to describe a head malformed due to fusion of one half of the coronal suture.[2] Today it includes deformations caused by stenosis of one side of various sutures, metabolic bone disorders, depressed skull fracture, excessive intracranial volume (hydrocephalus and tumors), decreased intracranial volume (microcephaly), and non-synostotic causes. The non-synostotic, deformational, causes include extrinsic factors, brain anomalies, cranial base malformations (prolapse, asymmetry), congenital torticollis, vertebral abnormalities, and idiopathic.[1-5] Extrinsic factors include a restrictive intrauterine environment, the birthing process, and gravitational forces as the child continues to rest the head on the flat side.[4-6]

Although the actual incidence of occipital plagiocephaly is unknown,[7] between 1979 and 1992, the incidence of plagiocephaly without synostosis (PWS) was estimated to be between one in 300 live births,[4,8,10] and 48% of otherwise healthy newborns.[4,9,10] Since 1992, the journals have reported a significant increase in the incidence of PWS.[4,6,7,11-13] The increase correlates with the 1992 recommendation of the American Academy of Pediatrics (AAP) that infants be placed on their backs to sleep (the Back to Sleep Campaign) to reduce the risk of sudden infant death syndrome (SIDS).[4,6,10,11]

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Management of neonates with non-synostotic occipital plagiocephaly has been controversial, and there has been a lack of uniformity concerning its treatment.[10,14,15] Current medical treatments include positional molding with or without physical therapy, Dynamic Orthotic Cranioplasty (DOC), otherwise known as a cranial remolding helmet, and for persistent or severe cases, surgery.[7,10,13,16,17] Chiropractic care usually consists of positional molding with or without inversion therapy, training the primary care giver in head massage, craniosacral adjustments such as Upledger or Sacro-occipital Techniques, and cervical adjustments when needed. While allopathic treatments seem to primarily concern themselves with aesthetic appearance, chiropractic care focuses on reduction of articular restrictions, reduction of membranous restriction patterns, improved circulation, reduction of the potential for neural entrapment from exit foramen in the cranial base, and increased vitality of the cranial rhythmic impulse.[18] Besides aesthetics, the overall goals of the chiropractor are to improve the patient's level of wellness by restoring optimum cerebrospinal fluid (CSF) physiology, and to restore balance to the reciprocal membranous tension within the cranial system, thus improving neurological function.[18]

HISTORY

The Caucasian male infant was brought in by his mother for examination when he was 7.5 months old. The malformation of his head was grossly obvious and he kept his head in a slightly forward flexed position. There were minor facial asymmetries. He was fussy and clinging to his mother, which she reported he had been since birth. His physical appearance was otherwise normal. His vaccinations were current.

The mother reported that he slept in 20-minute increments, then woke fussing or wanting to breast-feed. She had adopted a co-sleeping arrangement with the child attached to her breast while sleeping so he could automatically feed upon waking; otherwise she was unable to sleep. She alternated which side they slept on, changing during the night. The infant slept on his side or prone. He refused to sleep on his back, screaming and attempting to move off the back of his skull. Even during the day, he did not like his head touched and would pull hands away from his skull. If this did not stop his being touched on the head, he would cry and fight to get away.

The infant had a history of colic, which had resolved. He took the breast well but would only eat 3-3.5 ounces of pumped breast milk at a feeding. He also refused to eat cereals or solid (mashed) foods. The mother also reported that the baby hated a pacifier and certain types of bottles. When not feeding, he rarely sucked on anything other than his own fingers. He was breast-fed for 8 months.

The mother estimated his development to be equivalent to that of a 3-month-old for most milestones except height, weight, and head circumference, which were appropriate for his age group. He would smile, laugh, gurgle, and make "raspberry sounds." He could hold his head up, with slight forward flexion, when sitting. When lying prone, he did not like to lift his head but could raise his trunk with his arms. He would reach for objects handed to him and bring them to his mouth but rarely reached for objects on a table or placed near him. He could hold a rattle briefly and follow objects. On occasion, he rolled from side or back to front, but had only rolled from front to back once. He was able to squeal and delighted in seeing his mother's return from an absence. His other language skills were minimal. He did not imitate "bye-bye," sit alone without support, pass objects from hand to hand, use thumb opposition, or imitate sounds, and he was also still non-weight bearing.

The pregnancy was fairly uneventful medically but the mother was under a lot of stress due to a family break-up.

Delivery was induced using ptocin. Labor was approximately 4 hours long resulting in an unassisted vaginal delivery. An epidural was attempted but did not take effect. APGAR scores were unknown to the mother, but the newborn was stressed and had an elevated heart rate. He was taken away briefly for special care outside the delivery room.

Family history is significant in that the mother and sister have similarly shaped occipital bones, but neither are as severe as the patient, nor have obliquity of the calvarium.

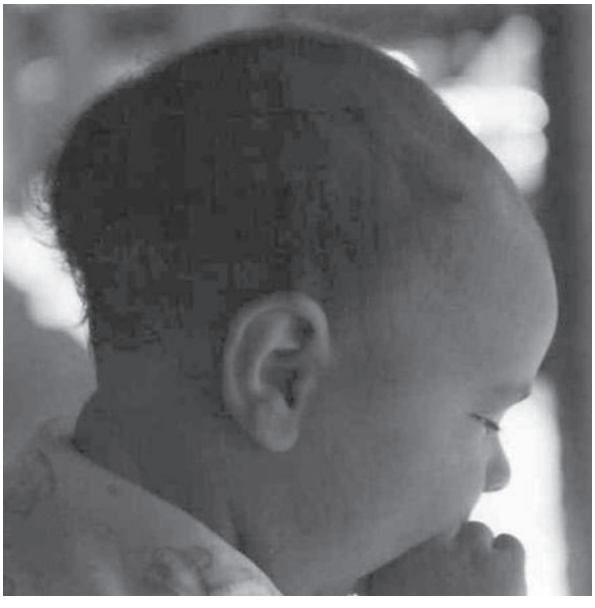
The child's pediatrician had recommended Dynamic Orthotic Cranioplasty (DOC). This treatment is not covered by Medical, and the $4500 cost for the helmet and re-fittings was prohibitive for the mother. The mother was also concerned about the pain her son would have to endure with DOC since he could not tolerate touch to his head. She decided to try another alternative.

RADIOGRAPHIC AND CT EVALUATION

Plane film x-rays and a CT scan were provided for review. X-rays were taken on January 10, 2000 at the Fountain Valley Regional Hospital. They demonstrated an elon-

PATIENT AT 8 MONTHS — PRIOR TO CHIROPRACTIC CARE

Even at 8 months of age the infant had difficulty holding his head up on his own. The posterior protrusion of the occiput is visible.



Notice the prominence of the temporal bone on the left and the posterior protrusion of the occipital bone.

gated AP diameter of the skull with malformation of the occiput. No sutural stenosis was noted. The CT scan was taken on January 18, 2000, at the same facility. It revealed a malformation of the occiput with obliqueness to the oval of the cranial vault. No sutural stenosis was described in the accompanying report.

CHIROPRACTIC EXAMINATION

On the day of the initial examination, cervical subluxations were present at C1 (anterior superior right posterior (ASRP)), C5 (spinous posterior left (PL)), and C7 (PL). It was observed that the child held his head in a slightly forward flexed position without signs of right or left torticollis. Cranial subluxations included: occipital bone in exhalation, parietal overlap with non-palpable sagital suture, parietal bones external to the temporal bones and superior to the frontal bones. There was also tenderness at the right sphenoid wing with decreased motion from right to left. The infant refused to suck on a finger. During examination of the craniosacral rhythm, the

PATIENT AT 11 MONTHS — AFTER CHIROPRACTIC CARE

Notice the improved ability to hold his head up even though the posterior prominance of the occiput is still present.

infant cried, screamed, became red in the face, and sweated profusely on his head. The mother felt that he appeared to be extremely angry, rather than in pain.

Examination for facial symmetry revealed drooping of the right side of the mouth, a right chin slant, elevation of the right eyebrow with the right eye fissure larger than the left, a scooping of the right temporal bone, flaring of the right nostril, and a shallow right nasolabial fold.

The remaining examination was normal except observation of the developmental milestones, which were consistent with the mother's reports. Photographs were taken for future comparison of the cranial shape.

A diagnosis of developmental plagiocephaly due to intrauterine constraint with cervical-cranial syndrome and cervical and cranial subluxations was rendered.

CARE AND INTERVENTION

The patient was adjusted first using the Sacro-occipital technique (SOT), and later the Upledger technique. Cervical adjustments were made using the Diversified technique modified for the pediatric patient. The mother was instructed in light cranial massage and in inversion therapy. She was also advised not to put the child to sleep on the flat spot on the back left side of his head, although, he would not sleep in that position anyway.

Cranial massage consisted of light brushing strokes toward the flat spot. All strokes were to be done using a light touch like a mother uses to caress her newborns head. At first the child would not allow the touch so the mother did what she could, working within the child's limitations.

Inversion therapy was to be performed a minimum of 3 times per day by gently suspending the child head down while grasping his calves. The mother was instructed to be sure to be above the ankles so as not to cause injury. She was also told not to swing the child, but to just let him hang and uncurl his body. After the first chiropractic adjustment, the child loved this part of his care and laughed and cooed during these sessions.

The patient was monitored and the cranium adjusted twice a week, except during the 6th , 7th and 9th weeks of care when visits were not kept due to the mother's schedule. Cervical alignment was examined on each visit and subluxations adjusted when subluxations were found present. Treatment was discontinued after 12 weeks (examination plus 18 cranial adjustments with cervical adjustments on 6 visits), when the child was 10 months old, due to the mother being severely injured in an automobile accident rendering her unable to bring the child for care.

RESULTS AND FOLLOW-UP

During the course of care, this infant's developmental milestones rapidly progressed to match his age, and his cranial facial symmetries improved even though the shape of his occipital bone changed minimally. He was able to eat normally and sleep through the night in the supine or side-lying positions. He also allowed his head to be touched and caressed without fussing.

The mother reported that her son slept for 6 hours each night during the 2 nights between the first and second adjustment to his skull. His day care teacher also informed the mother that he was less fussy while at day care and ate better from a bottle.

After 5 adjustments the child fell and hit his head on a swing, on the frontal bone near the coronal-saggital junction. Within the hour, he started hitting his head with his hand, on the right side. He would hit himself then slide his hand down the right side of his face. Mom had to hold his hand to keep him from hitting himself. Upon examination, using SOT protocols, the right parietal bone was found to be inferior with both temporal bones rotated so their mastoid processes were anterior. The frontal bone was also posterior on the right. After one session of cranial therapy, the child stopped trying to hit his head.

One week later, the child fell again and hit his head on the left posterior side on a cement floor, barely padded by a commercial carpet. He immediately became fussy and did not want to eat for almost 2 days. He also had difficulty sleeping and woke frequently. During the first visit following this fall, the child kept trying to pull the doctor's hand away from the left side of his head during adjustment. The left temporal bone was restricted in all ranges. There was a gap in the frontoparietal suture that had previously been overlapped. The pterion fossa was palpable and the sphenoid was shifted to the right. Following adjustment, the child immediately ate for approximately 5 minutes. He slept better that night and was less fussy in day care the next day. The child continued to have intermittent increase in sleeping and eating problems for the next 3 weeks, but by the 14th visit these difficulties seemed to return to pre-fall status.

On the 13th adjustment, the mother reported that her son seemed to be rapidly catching up on his developmental milestones. She thought he may have had the two falls because he was quickly progressing from barely tuning over by himself to easily rolling over, crawling, and pulling himself up to a standing position by using furniture for support.

The child developed a double ear infection between the 14th and 15th adjustments and was given erythromycin as prescribed by his pediatrician. He was very squirmy on the day of his 15th adjustment and would not allow his temporal bones to be adjusted. However, on his next visit he actually took my hands and placed them on his temporal bones. The temporal bones were then adjusted using SOT. There was also a significant release of the parietal bones/dura using the Upledger technique.

On the day before his 18th and last adjustment, the child fell off the bed and hit his head near the right eye. Even after the fall he slept normally and was not overly fussy. His face was more symmetrical but the right corner of his mouth was still minimally drooped and he had a right chin slant. There was also tension in the muscles of the forehead. Photographs were taken for comparison. Also, mom was given coaching in child injury prevention.

Comparison of the pictures taken at the initial visit with those take on the final visit display a minimal change of the cranial shape. The later pictures show the child holding his head in a face forward position rather than looking down as he did in the original photos. Facial symmetry was improved in the later photos with the remaining asymmetry noted above.

Follow-up with the mother by telephone was made when the child was 18 months old. During the telephone interview, the developmental milestones were reviewed and indicated that the child was current for 18-23 months in all listed milestones except "2-word phrases understandable." [19] The mother also reported that when her son was healthy, he ate well and slept better. He was still a light sleeper, but without disturbance, usually slept through the night. He would sleep on his back and turn his head to both sides during the night. He no longer showed a preference for sleeping on the flat side of the back of his head. He did not mind having his head touched. His head was still misshapen with "an egg on the back of his head, but it looked normal now along the top, and his hair mostly covered the shape.

DISCUSSION

Early diagnosis and treatment of developmental plagiocephaly is essential. Treatment started after 6 months of age is often less effective, and Pollack and colleagues (1997) reported little benefit in infants who began positional or helmet therapy after 1 year of age.[12,14]

Dr. Upledger, the developer of the Upledger craniosacral therapy, emphasizes proper cranial alignment and mobility. Any negative changes in the structure or function of the craniosacral system can adversely influence normal development and/or function of the nervous system, and would directly affect overall health.[20] Dr. Carol Phillips states that the first year of life is "a critical period of susceptibility when craniosacral strain patterns may contribute to aberrant neuromusculoskeletal growth and development."[18] If an infant presents with possible neuromusculoskeletal (NMS) dysfunction, uncorrected it can allow developmental anomalies of the central nervous system to manifest as a result of an alteration of the basilar bones and membranes of the cranium.[18] These abnormalities may manifest as retardation of an infant's developmental milestones.

Additionally, the literature search concerning plagiocephaly uncovered two articles that focused on motor development in infants placed in the supine versus prone positions.[21,22] Jantz, et al., studied the age at which infants rolled over and reported that infants who slept in the side or supine positions were less likely to roll over at the 4-month checkup than infants who slept primarily in the prone position.[21] Davis, et al., in a study of 351 infants, reported that prone sleepers attained several motor milestones earlier than supine sleepers; however, all infants achieved all milestones within the accepted normal age range.[22] This study suggests that since the infant in this case insisted on sleeping on his stomach or side, that his developmental milestones should have been progressive instead of delayed.

Another study on plagiocephaly outcomes concentrated on long-term developmental outcomes in patients with deformational plagiocephaly. A telephone survey of patients was conducted at the Craniofacial Center of the Children's Hospital and Regional Medical Center in Seattle, Washington, from 1980-1991. 39.7% of the families contacted reported that children with persistent deformational plagiocephaly had received special help in primary school including: special education assistance, physical therapy, occupational therapy, and/or speech therapy. Only 7.7% of these children's siblings required similar services, and the percentage of children qualifying for special services on an Individual Education Plan (IEP) in the state of Washington for 1997 was 11.9%. Of those children who had developmental delays at the time of the initial evaluation, 75% (3 of 4) required some sort of special education assistance. Furthermore, the greatest risk group was found to be males with plagiocephaly caused by intrauterine constraint (present at birth).[10]

The infant in this case was born with plagiocephaly. His developmental milestones, which should have been progressive were delayed, therefore, he was a prime candi-

date for special educational assistance. Even with the aberrant shape of this baby's occipital bone, the craniorhythmic impulse (CRI) was restored. After correction of the CRI, his developmental abilities improved rapidly, and became normal for his age. They have remained normal since.

CONCLUSIONS

No generalized conclusions can be drawn from a single case study, but the results in this case add to the growing body of cases wherein an infant has been assisted in his/her development by freeing the CRI.

This is a case where attempts to remold the occipital bone were made using Upledger and Sacro-occipital Techniques. Although changes in the shape of the occipital bone were minimal, the child benefitted by experiencing a rapid progression of developmental skills bringing him from grossly delayed to current. His facial features, and sleeping and feeding patterns also normalized and he would allow his head to be touched. Additional studies need to be conducted to see if long-term outcomes can be altered for the increasing number of children developing and being treated for cranial plagiocephaly.

Throughout the medical literature on plagiocephaly, the success of treatment has been measured, in part, by the satisfaction of the parents. If they were satisfied with the results, the treatment was considered a success. In this case, the mother was very pleased to have her son progress developmentally and felt his head shape now appeared normal enough to not attract attention or teasing. Even more important to her than the now acceptable aesthetics is watching her son grow, play and progress normally.

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Chiropractic Evaluation and Treatment of Musculoskeletal Dysfunction in Infants Demonstrating Difficulty Breastfeeding

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ABSTRACT

Objective: Breastfeeding during the first year of an infant's life is currently supported and promoted by lactation consultants, midwives, naturopaths, chiropractors and allopathic physicians. In 1997, the American Academy of Pediatrics[1] and in 1998, the World Health Organization[2] published their position papers that advocated breastfeeding as the optimal form of nutrition for infants. This study was to investigate problems interfering with a successful breastfeeding experience and to see if proper lactation management, with the chiropractor acting as a member of a multidisciplinary support team, can help to assure a healthy bonding experience between mother and infant.

Methods: 25 infants demonstrating difficulties breastfeeding were evaluated for biomechanical dysfunction potentially resulting in an inability to suckle successfully. The biomechanics of 10 breastfeeding infants without complaint were also evaluated for comparison.

Results: An overview of the infants with breastfeeding difficulty revealed imbalanced musculoskeletal action as compared to the infants without difficulty breastfeeding.

Utilization of soft tissue therapies and chiropractic adjustments of the cranium and spine resulted in improved nursing in over 80% of the patients.

Conclusions: The results of this study suggest that biomechanical dysfunction based on articular or muscular integrity may influence the ability of an infant to suckle successfully and that intervention via soft tissue work, cranial therapy and spinal adjustments may have a direct result in improving the infant's ability to suckle efficiently

Keywords: chiropractic, subluxation, vertebral subluxation complex, spinal manipulative therapy, chiropractic adjustment, craniosacral therapy, myofascial release, massage therapy, breastfeeding, lactation, latch, suckle, breastfeeding dysfunction

INTRODUCTION

Breastfeeding during the first year of an infant's life is currently supported and promoted by lactation consultants, midwives, naturopaths, chiropractors and allopathic physicians. In 1997, the American Academy of Pediatrics[3] and in 1998, the World Health Organization[4] published position papers that advocated breastfeeding as the optimal form of nutrition for infants. In an attempt to alleviate problems interfering with a successful breastfeeding experience, biomechanical as well as organic (including genetic and congenital) causes should be investigated. Early lactation management, with the chiropractor acting as a member of a multidisciplinary support team can help to assure a healthy bonding experience between mother and infant.

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The ability to suckle in a newly delivered, full term infant, may be impaired or disorganized due to neurologic immaturity (gestational age) or a mild to severe neurologic or musculoskeletal problem[5] as a result of several possible situations:

1. Injury (as a result of traction/manipulation/intervention either manually or with forceps or vacuum suction).
2. Asphyxiation (premature placental separation/cord entanglement/etc.).
3. Congenital deformities like a high palatal arch, cleft palate, ankyloglossia or an anatomically short tongue.
4. A genetic developmental disorder like Pierre Robin or Down Syndrome.
5. Pharmacologic suppression by drugs administered to the mother during childbirth.

6. Invasive procedures to clear meconium, gastric lavage, or insertion of an airway which could result in oral aversion.

A fetus may also create a neurologic imprint in the uterus by sucking his or her own thumb, fist, arm or leg thus creating nipple confusion. Any of a number of delays in putting the baby to breast immediately after delivery (unresponsiveness of a mother who has been anesthetized, procedural delays, i.e. stitching an episiotomy, medical interventions for the infant) or the introduction of plastic nipples or formula supplementation due to nursery mismanagement may interfere with the nursing couple getting off to a good start. [6 7 8] And last but not least, there may exist a number of biomechanical or muscular problems.

These biomechanical or neuromuscular problems could include:

1. A decreased excursion of the mandible preventing the neonate from opening widely enough to encompass the nipple and areola.
2. A decrease in the cervical range of motion, which controls their ability to position themselves comfortably in their mother's arms or at the breast.
3. A neurologic deficit manifesting as a lack of suckling or rooting reflexes.
4. An ineffective latch due to altered lip or tongue action.
5. Impaired respiration (restriction in thoracic excursion or diaphragmatic action or lack of patent airway).
6. A rapid milk ejection reflex (MER) or overabundant milk supply might result in compensatory muscle action (clenching, etc.) to modulate milk flow.

A literature review reveals case studies by Cuhel and Powell, Vallone, Krauss, Hewitt and Scheader [9 10 11 12 13] describing biomechanical dysfunction of the cranium and spine potentially resulting in dysfunctional nursing and associated symptoms. Chiropractic management demonstrated an improvement or resolution of the majority of complaints.

This paper presents an overview of 25 cases of infants presenting with breastfeeding issues at the referral of their lactation consultant (LC), midwife or physician, or in some cases, referred by parents who were chiropractic patients themselves.

BACKGROUND

Extensive research, especially in recent years, documents diverse and compelling advantages to infants, mothers, families, and society from breastfeeding and the use of human milk for infant feeding. These include health, nutritional, immunologic, developmental, psychological, social, economic and environmental benefits.

Table 1

HX	Well Baby 1	Well Baby 2	Well Baby 3	Well Baby 4	Well Baby 5
Prenatal	N	N	N	N	N
L&D	N	N	N	N	N
Intervention	Vacuum	NONE	NONE	NONE	NONE
Perinatal	N	N	N	N	N
APGARS	10/10	8/9	UNK	UNK	10/10
Rooting	N	N	N	N	N
Suckling	N	N	N	N	N
1st bstfd	Birth	Birth	Birth	Birth	Birth
Latch	N	N	N	N	N
Supplementation	NONE	NONE	NONE	NONE	NONE
Age at Presentation	2 wks	5 days	5 days	8 days	6 wks
Referred by	midwife	Parent (patient)	friend (patient)	Parent(patient)	Parent (patient)
CC: Infant	NONE	NONE	NONE	NONE	NONE
CC: Mother	NONE	NONE	NONE	NONE	NONE

Table 2

Physical Findings	Well Baby 1	Well Baby 2	Well Baby 3	Well Baby 4	Well Baby 5
Assymetrical facial creasing					
Mandibular excursion (w/ or w/o deviation)					
Musculature					
a. orbicularis oris					
b. Depressor anguli oris					
c. pterygoid					
d. digastric		Hypertonic	Hypertonic		
e. omohyoid		Hypertonic	Hypertonic		
f. scalenes					
g. SCM					
h. occipital					
i. temporalis					
j. masseter					
k. other					
Cranial dysfxn:					
a. parietal					
b. glabella					
c. temporal					
d. frontal					
e. sphenoid					
f. occiput		Flexion			Flexion
g. maxilla					
h. mandible					
i. hyoid		Elevated	Elevated		
j. nasal/vomer/ethmoid					
k. TMJ				Arched	
l. palate					
Subluxation (VSC/Extremity)					
a. C1-7					C1-R Lateral translation
b. T1-12					
c. L1-5					
d. sacrum					
e. ribs/clavical/sternum					
Tongue		tongue thrust	short excursion		
Dural Tension		X	X		
Total # of Treatments	1	1	1	1	1
Outcome		Resolved	Resolved	Resolved	Resolved

Epidemiologic research shows that human milk and breastfeeding infants provide advantages to general health, growth, and development, while significantly decreasing risk for a large number of acute and chronic diseases. There are also a number of studies that indicate possible health benefits for mothers as well as prevent the negative emotions (anger, guilt, failure, and disappointment) around an unsuccessful breastfeeding or bonding experience. [14]

Hewitt recounts a 1980 study of 239 breastfeeding mothers in which 59% of the mothers who ceased to breastfeed at 22 weeks related that it was associated with the infant's ability to nurse properly[15]. Hewitt, like this author was interested in examining a variety of potential neuromusculoskeletal causes for this breastfeeding dysfunction.

METHODS

Ten successfully breastfeeding neonates were examined during their well baby visit. There was no complaint of difficulty breastfeeding (infants demonstrated a secure latch, appropriate flanging of the lips, appropriate number of swallows/minute and a lack of deformation of the mother's nipple after nursing), nor any associated cranial or cervical dysfunction. Mothers of 25 neonates were self referred or referred to the chiropractic office by other health care professionals when other intervention measures failed to resolve breastfeeding difficulties.

Evaluation of the neonates as performed by the lactation consultant, midwife or allopathic physician was preliminary to their referral to our office[16]. Briefly, it involved a visual and digital examination of the infant's mouth and palate as appropriate, as well as assessing the mobility and action of the tongue and upper lip (neurologically as well as if they are limited by the length of their frenula) and the infant's reflexive response to stimulus, including, but not limited to the suckling and rooting reflexes.[17]

The chiropractic evaluation involved specific questions (Appendix A) for each of the mothers about their prenatal and postnatal history, history of labor and delivery including medications and interventions employed, the neonate's perinatal history including APGAR scores, assessment of intact infantile reflexes (rooting and suckling) at birth, when and where the neonate was first breastfed (and the conditions and assistance as appropriate), description of the neonate's latch , the anatomy of the mother's breast/nipple and whether any supplementation has been used. Mothers were also asked to identify their referral source. The final question involved the chief complaint as it pertained to the neonate and the mother. This included, but was not limited to the neonate's inability to latch well or to flange lips, shape of the mouth at rest and when open (yawning, crying), inability to open the mandible far enough to encompass the nipple, inability of tongue to work the nipple towards the palate efficiently (for example, the tongue would push the nipple out of the mouth instead of drawing it into the mouth), noise (clicking, slurping), strength of suction, frequency of swallow, how frequently the neonate pull's off the nipple during the latching process or during a feeding, and preference for one

Table 3

HX	Well Baby 6	Well Baby 7	Well Baby 8	Well Baby 9	Well Baby 10
Prenatal	N	N	N	N	N
L&D	N	N	N	N	N
Intervention	NONE	NONE	Suction	NONE	NONE
Perinatal	N	N	N	N	N
APGARS	10/10	8/9	9/9	UNK	10/10
Rooting	N	N	N	N	N
Suckling	N	N	N	N	N
1st bstfd	Birth	Birth	Birth	Birth	Birth
Latch	N	N	N	N	N
Supplementation	NONE	NONE	NONE	NONE	NONE
Age at Presentation	2 wks	15 days	3 wks	18 days	4 wks
Referred by	LC	Parent (patient)	friend (patient)	Parent(patient)	Parent (patient)
CC: Infant	NONE	NONE	NONE	NONE	NONE
CC: Mother	NONE	NONE	NONE	Pinching pain	NONE

Table 4

Physical Findings	Well Baby 6	Well Baby 7	Well Baby 8	Well Baby 9	Well Baby 10
Assymetrical facial creasing	X				
Mandibular excursion (w/ or w/o deviation)	Deviates left				
Musculature					
i. orbicularis oris					
j. Depressor anguli oris					
k. pterygoid	Hypertonic R			Hypertonic B	
l. digastric					
m. omohyoid					
n. scalenes					
o. SCM					
p. occipital					
i. temporalis					
j. masseter					
k. other					
Cranial dysfxn:					
a. parietal					
b. glabella					
c. temporal	Extension on R				
d. frontal					
e. sphenoid					
f. occiput			Flexion		
g. maxilla					
h. mandible				Retracted	
i. hyoid					
j. nasal/vomer/ethmoid					
k. TMJ					
l. palate					
Subluxation (VSC/Extremity)					
a. C1-7					
b. T1-12					
c. L1-5					
d. sacrum			Counternutation		
e. ribs/clavical/sternum					
Tongue					
Dural Tension	X		X	X	
Total # of Treatments	1	1	1	1	1
Outcome	Resolved		Resolved	Referred out	

breast over the other. The mother was asked questions concerning abrasions or anatomical deformation of the nipple (flattening, curving, bending) after breastfeeding. As noted earlier, problems may be compounded or created after the first week for a mother with an overactive milk ejection reflex (MER) or an over abundant milk supply. Either might secondarily interfere with the neonate's ability to nurse and result in compensatory changes in muscle tone to modulate milk flow.

It was hypothesized that an alteration in the function of the nervous system, musculature or joints might result in biomechanical dysfunction, potentially resulting in an inability to suck successfully. All the infants were examined for neurologic integrity (as measured by the use of infantile automatisms[18]), osseous integrity (ruling out fracture of the skull, mandible, clavicle, etc), muscular tone and strength as well as joint function and subluxation. The term *subluxation*[19] is used in this context to refer to a joint of the body whose movement is limited in one or multiple planes of motion and this fixation has neurologic, vascular and lymphatic implications on its own and on the surrounding tissues and organs.

Assessment of the symmetry of the facial structures, mandibular excursion (with or without deviation), tone of facial and cervical musculature, craniosacral assessment[20,21] of cranial bones and dural tension or torque, motion palpation[22] of individual vertebral segments for subluxation, and tongue action (ability to move the tongue forward sufficiently to support and cup the nipple and areola in order to form it into a teat untethered by a shortened

Table 5

HX	1	2	3	4	5
Prenatal	N	N	In utero constraint	N	N
L&D	N	N	Fetal distress	Rapid delivery; umbilical cord around neck; tethered placenta	Posterior Presentation
Intervention	Vacuum	None	C-section; Anesthesia	Cut cord in utero	None
Perinatal	NICU/CPAP/ jaundice	N	N	N	N
APGARS	UNK	8/9	UNK	UNK	10/10
Rooting	N	ABN	N	N	N
Suckling	N	ABN	N	N	N
1st bstfd	Birth	Birth	Birth	Birth	Birth
Latch	ABN	ABN	ABN	ABN	ABN
Supplementation	NONE	NONE	NONE	NONE	NONE
Age at Presentation	5 wks	5 days	5 days	8 wks	6 wks
Referred by	LC/LLL	LC	Parent (patient)	Parent(patient)	Parent (patient)
CC: Infant	Inability to latch well; preference for one side only; cries when laid down	Slow latch; disorganized suckling: suck and tongue thrust delayed; no bowel movements; small urine output; failure to gain wt	Disorganized suckling; poor excursion of the tongue; vomiting; head only turns left	Poor latch; discomfort nursing; depressed shoulder and winged scapula; arching spine	Constipation; congestion; inability to latch
CC: Mother	NONE	NONE	NONE	NONE	NONE

Table 6

Physical Findings	1	2	3	4	5
Assymetrical facial creasing	X				
Mandibular excursion (w/ or w/o deviation)	Decreased; R/L deviation		Decreased on the right	Decreased; L oblique deviation	
Musculature					
q. orbicularis oris	Hypotonic				
r. Depressor anguli oris	Hypotonic				
s. pterygoid	Hypertonic	Hypertonic R		Hypertonic (L)	
t. digastric	Hypertonic	Hypertonic R			Hypertonic
u. omohyoid	Hypertonic	Hypertonic R			Hypertonic
v. scalenes		Hypertonic R			
w. SCM		Hypertonic R			
x. occipital				Hypertonic	Hypertonic
i. temporalis	Hypertonic			Hypertonic	
j. masseter				Hypertonic	
k. other					
Cranial dysfxn:					
a. parietal	bilaterally				
b. glabella					
c. temporal	Compression R				Compression R/L
d. frontal					
e. sphenoid					Extemsion
f. occiput		R condyle; medial excursion	Extended bilaterally	Extended bilaterally	Extended bilaterally
g. maxilla	R/L: rt lat shift				
h. mandible	Retracted; sup				
i. hyoid	X			X	
j. nasal/vomer/ethmoid					Compression
k. TMJ					
l. palate					
Subluxation (VSC/Extremity)					
a. C1-7		C1 RR	C1 LR	C1	C1 R Lateral translation
b. T1-12					
c. L1-5					
d. sacrum		LR	Apex posterior	Extension	AI R
e. ribs/clavical/sternum					
Tongue		Thrust delayed	Short excursion		
Dural Tension	X	X	X	X	X
Total # of Treatments	3	1	1	3	3
Outcome	Resolved	Tx dc'd: med emergency	Resolved	Resolved	Resolved

frenulum or other soft tissue restriction[23]) were performed on each infant.

CLINICAL PRESENTATION

Of the 10 infants examined who presented without complaint, mothers related in their history that there were minimal complications prenatally or during labor and delivery, minimal medication and interventions employed, minimal musculoskeletal abnormalities were detected and those detected did not appear to interfere with breastfeeding.

One mother, who did not realize that pain during breastfeeding was not normal, was referred for treatment of yeast infection and her infant referred for chiropractic evaluation. (TABLES 1-4)

An overview of the cases demonstrating dysfunctional nursing revealed an imbalanced musculoskeletal action predominantly associated with mandibular excursion and oral manipulation of the nipple (TABLES 5-14). The infants could not open their mouths wide enough to encompass the breast tissue, could not close their mouth to form the appropriate suction or use their tongue effectively to milk the nipple for nourishment.

In a majority of the cases, there was detected an imbalance in tone of musculature of the jaw and neck and/or dysfunctional motion of the hyoid and the temporomandibular joint, cervical vertebrae, most frequently at the occipitoatlantal complex, or the bones of the skull.

Of the patients reviewed in this study, the most significant prenatal problem may have been in-utero con-

Table 7

HX	6	7	8	9	10
Prenatal	N	N	Infertility; Clomid Hospitalized 32 wks	Gestational Diabetes	In utero constraint; septum – heart shaped uterus
L&D	N	Fetus failed to descend into the birth canal	33 wks gestation		N
Intervention	None	C-Section; Vacuum; Anesthesia	Incubator/ separation	Epidural	None
Perinatal	N	N	N	N	N
APGARS	UNK	UNK	UNK	UNK	UNK
Rooting	N	N	N	N	N
Suckling	N	N	N	N	N
1st bstfd	Birth	Birth	2 weeks	Birth	Birth
Latch ABN	ABN	ABN	N	ABN	
Supplementation	NONE	NONE	FF 2 wks (1F/1B)	Formula	Formula
Age at Presentation	4 wks	6 days	12 wks	8.5 wks	4 wks
Referred by	Parent(patient)	LC	Naturopath	LC	LC
CC: Infant	Poor latch; gulping air; hyperextension of spine; vomiting; gassy	Hard latch; chewing on L; clicking; tongue thrust; hyperextending spine	Gasping, sputtering, "snuffling" while breastfeeding; breaking latch; deviated septum; colic; not sleeping	Won't nurse right breast or lie on L side; otitis media – 2 wks old; swollen abdomen; constant crying	Poor latch; rejecting breast, arching away from breast
CC: Mother	NONE	NONE	Rapid let down reflex	NONE	Large areola cracked bruised, painful nipples

Table 8

Physical Findings	6	7	8	9	10
Assymetrical facial creasing					Small L eye
Mandibular excursion (w/ or w/o deviation)		Decreased on L; lateral glide on L	Decreased on the R		
Musculature					
a. orbicularis oris					
b. Depressor anguli oris					
c. pterygoid		Hypertonic on R			Hypertonic
d. digastric		Hypertonic		Hypertonic	Hypertonic
e. omohyoid		Hypertonic		Hypertonic	Hypertonic
f. scalenes					
g. SCM		Hypertonic on L			
h. occipital			Hypertonic		Hypertonic L
i. temporalis					Hypertonic
j. masseters					Hypertonic
k. other	Hypertonic LS PS	Hypertonic CS PS	Hypertonic PS Erectors		
Cranial dysfxn:					
a. parietal				Compression	Elevation R
b. glabella			Compression		
c. temporal				Anterior	Compression R
d. frontal					
e. sphenoid					Left lateral shift
f. occiput	R condyle medial excursion	Extension L; L condyle medial	Extended bilaterally	Extended bilaterally	Extension L
g. maxilla					
h. mandible					
i. hyoid			X	X	
j. nasal/vomer/ethmoid			compression		
k. TMJ					
l. palate				High/arched	
Subluxation (VSC/Extremity)					
a. C1-7		RR/Extension C1	C1 extended	C1 RR	C1 R Lateral translation
b. T1-12					
c. L1-5	L2 LR				
d. sacrum	Posterior		Posterior	Extension	
e. ribs/clavical/sternum					
Tongue				Frenulum–tight/ant	
Dural Tension	X	X	X	X	X
Total # of Treatments	4	5	3	9	12
Outcomes	Resolved	Resolved	Latch improved; Inspir. clearer; sleeping; con't crying; Tx dc'd – surgery (undesc testicle)	Resolved	Resolved

straint due to multiple in-utero residents, a septal defect causing a heart shaped uterus, and the presence of fibroids. Other hypothesized causes of in utero constraint could be adhesions from previous surgeries or traumas (seat belt injuries in motor vehicle accidents), pelvic subluxation . 10 of 25 mothers received anesthesia during labor and delivery and 10 of 25 interventions were performed including Caesarean Section, forceps, vacuum suction and gross manipulation due to shoulder dystocia and cord entrapment.

Twenty-five infants presented between the ages of 1 day and 3 months with the chief complaint of dysfunctional breastfeeding. In all but 2 cases, the infant's ability to latch onto the breast appeared to be impaired due to dysfunction in oral excursion or lip and tongue action. In 2 cases, the problem appeared to be associated with cervical spine dysfunction.

Of the 25 infants, 24 were put to breast at birth (one premature infant was not put to breast for 2 weeks). Mothers were counseled in proper latch, tongue training techniques and exercises, positioning and ergonomic correction as appropriate for their complaint by their lactation consultant, midwife, La Leche League leader or physician. Despite these efforts, the infant's breastfeeding was still impaired.

Five infants were supplemented with formula (bottle fed) at the recommendation of their pediatrician who feared

Table 9

	11	12	13	14	15
Prenatal	Breech; twins – in utero constraint	Breech; twins – in utero constraint		Antidepressant Rx throughout pregnancy	Fibroids;sress; Drove >200 mile/ day for work
L&D			43 hour labor; oblique lie	47 wks gestation induced	
Intervention	C Section; Anesthesia	C Section; Anesthesia		C-Section; Anesthesia; Vacuum after 24 hrs	C-Section; epidural; forceps delivery
Perinatal	N	N	Caput succedeneum	9/9	8/9
APGARS	UNK	UNK	UNK	UNK	UNK
Rooting	N	N	ABN	ABN	N
Suckling	N	N	ABN	ABN	N
1st bstfd	Birth	Birth	Birth	Birth	3 hrs after Birth
Latch N	ABN	ABN	ABN	ABN	
Supplementation	NONE	NONE	NONE	NONE	Formula
Age at Presentation	4 wks	4 wks	1 wk	3.5 wks	4 wks
Referred by	LC	LC	Lay Midwife	LC	LC
CC: Infant	No LR of the CS; crying at R breast (cradle hold); sleep in arms, wake/cry if laid down in crib	Misshapen cranium; no LR CS; inability to grasp nipple and latch; lethargic/ disinterested in nursing	Lethargic; poor latch; falling asleep at the breast right away	Chomping on the nipple instead of sucking	Unable to flange lips therefore poor latch; very strong suck; failure to gain weight
CC: Mother	NONE	NONE	Rapid let down reflex; hard aereola even after expressing milk	NONE	Yeast infection of nipples; painful and cracked

Table 10

Physical Findings	11	12	13	14	15
Assymetrical facial creasing		X			
Mandibular excursion (w/ or w/o deviation)		Decreased bilaterally	Decreased bilaterally	R Deviation	R deviation
Musculature					
a. orbicularis oris		Hypertonic		Hypertonic	Hypertonic
b. Depressor anguli oris		Hypertonic		Hypertonic	Hypertonic
c. pterygoid		Hypertonic		Hypertonic	Hypertonic
d. digastric		Hypertonic		Hypertonic	
e. omohyoid		Hypertonic		Hypertonic	
f. scalenes					
g. SCM					
h. occipital					
i. temporalis		Hypertonic	Hypertonic		
j. masseters		Hypertonic	Hypertonic		
k. other					
Cranial dysfxn:		Reduced CSR			
a. parietal			Compression L	Elevation L; Flare	
b. glabella					
c. temporal		Compression on R			Compression bilaterally
d. frontal	(taut anterior fontanelle)		Compression	Compression	
e. sphenoid		L lateral shift	R lateral shift	Elevation L	
f. occiput	Extension L		Medial shift R condyle	Elevated L	Extended bilaterally
g. maxilla					
h. mandible		Posterosuperior		Posterosuperior L	
i. hyoid			Compression	Depressed	
j. nasal/vomer/ethmoid					
k. TMJ			Edematous L		
l. palate				Assymetric	
Subluxation (VSC/Extremity)					
a. C1-7	C1 (neutral)				Extension C1
b. T1-12					
c. L1-5					
d. sacrum		Base posterior			
e. ribs/clavical/sternum					
Tongue			Short extension		
Dural Tension					
Total # of Treatments	4	4	3	2	4
Outcomes	Resolved	Resolved	Resolved	Resolved	Latch resolved; dc'd bstfd per MD due to lack of weight gain and low milk supply

weight loss or dehydration. Six infants were finger fed with formula or breast milk in an attempt to provide nourishment while maintaining skin to skin contact to avoid nipple confusion until the baby could be placed at the breast. In several cases, problems were compounded by incompatible nipple to mouth size, inversion and damage to the mother's nipple as a result of poor breastfeeding technique and rapid let down reflex.

Musculoskeletal assessment revealed 18 out of the 25 infants evaluated demonstrated restriction and/or deviation in mandibular excursion. In general, evaluation of associated musculature demonstrated hypertonic changes although there was one documented incident of hypotonia of the associated musculature (Case 1). A predominance of hyperactive muscle activity occurs involving the occipital muscles (10:25; all associated with occipital subluxation), the internal pterygoids (14:25) and the submandibular muscles (15:25 involving the digastric and omohyoid muscles). Other muscles intimately associated with the oral manipulation of the nipple are the obicularis oris and the depressor anguli oris muscles and 7 of 25 infants had hypertonic activity of this muscle group. Likewise, temporalis (6:25) and masseter muscles (5:25) may affect mandibular excursion preventing the infant from opening the mouth wide enough to encompass the nipple.

In several more infants, hypertonicity of the scalenes (1:25), sternocleidomastoid (1:25), and the erector muscles of the spine (3:25) might be involved in restricted range of motion and or hyperextension of the spine while nursing.

Although tongue action was altered in several infants (8:25), only one infant demonstrated a short frenulum but

Table 11

HX	16	17	18	19	20
Prenatal	N	N	N	N	N
L&D	7 hours	7 hours Brow Presentation	Short umbilicus; wrapped around neck	LOP; shoulder dystocia	induced
Intervention	N	N	N	Forceps	N
Perinatal	N	N	N	Jaundice	N
APGARS	UNK	10/10	UNK	8/9	UNK
Rooting	ABN	N	ABN	N	ABN
Suckling	ABN	N	ABN	N	ABN
1st bstfd	Birth	Birth	Birth	Birth	Birth
Latch ABN	ABN	ABN	ABN	ABN	
Supplementation	NONE	FF breastmilk	NONE	FF breastmilk	FF breastmilk
Age at Presentation	5 wks	2 days	3 wks	12 days	5 days
Referred by	LC	Lay midwife	LC	LC	LC
CC: Infant	Poor latch; failure to flange lips; disinterested and lethargic; clicking	Poor excursion of mandible, unable to grasp nipple	"O" shaped pucker; unable to latch properly	Nasal congestion; unable to latch onto breast; disinterested in breast (rejects breast) – switched to bottle per MD during tx; unable to rotate CS into	Tongue thrust; clamping on nipple while attempting to latch on
CC: Mother	Very little increase in breast mass during pregnancy and lactation	Abraded, bleeding nipples	NONE	Very large nipple/ areola	Minimally everted nipples (R>L)

Table 12

Physical Findings	16	17	18	19	20
Assymetrical facial creasing					
Mandibular excursion (w/ or w/o deviation)	Deviation R	Decreased		Decreased	Decreased; L/R deviation
Musculature					
a. orbicularis oris	Hypertonic				
b. Depressor anguli oris	Hypertonic				
c. pterygoid			Hypertonic	Hypertonic	Hypertonic R
d. digastric			Hypertonic	Hypertonic	Hypertonic R
e. omohyoid			Hypertonic	Hypertonic	Hypertonic R
f. scalenes					
g. SCM					
h. occipital			Hypertonic	Hypertonic	Hypertonic
i. temporalis			Hypertonic		
j. masseters					
k. other					
Cranial dysfxn:					
a. parietal		Overlapped saggital suture	Flexion bilaterally		
b. glabella					
c. temporal			Compression bilaterally		
d. frontal		Overlapped mectopic suture			
e. sphenoid		Extension	Extension bilaterally		
f. occiput	Extended	Extension	Extension	Edematous	Extension
g. maxilla	Anterior portion inferior; posterior portion superior				
h. mandible			Posteriosuperior draw	Retracted	
i. hyoid					
j. nasal/vomer/ethmoid		compression			
k. TMJ	Lateral deviation R condyle		Compresson bilaterally		
l. palate					
Subluxation (VSC/Extremity)			Decreased CS lordosis		
a. C1-7	Reduced LR/ LLF/RLF	Extension C1	Extension C1	C1 RR	Extension C1
b. T1-12					
c. L1-5					
d. sacrum					
e. ribs/clavical/sternum					
Tongue					Tongue Thrust
Dural Tension	X	X	X	X	X
Total # of Treatments	8	3	3	3	5
Outcomes	Better latch; still clicking	Resolved	Resolved	Not resolved; dc'dtx & went to MD/LC	Resolved

did not require surgical intervention once the mandibular excursion was improved.

Evaluation of cranial and vertebral motion utilizing craniosacral technique[24 25] and motion palpation [26] revealed dysfunction of the parietals (8:25), glabella (1:25), temporals (8:25), frontals (5:25), sphenoid (8:25), occiput (23:25), maxilla (3:25), mandible (6:25), hyoid (8:25), nasal/vomer/ethmoid complex (2:25). The temporomandibular joint was the site of condylar deviation and edema in 4 of 25 cases and the hard palate was either malformed (high arch) or asymmetrical in 3 cases.

In this group, cervical dysfunction was limited to C1 and presented as a subluxation in 18 of 25 infants with the predominance into extension. There were no presenting thoracic subluxations and only one lumbar subluxation. The integrity of sacral motion was disrupted in 9 of 25 infants with an associated increase in dural tension detected in all 25 infants utilizing craniosacral methods of evaluation cited earlier.

TREATMENT

Treatment consisted of manual therapies including craniosacral therapy[27 28], Logan Basic[29] to reduce dural torque, myofascial release[30] and massage to reduce hypertonic muscle activity and gentle manual diversified chiropractic adjustments of associated subluxated cranial bones and vertebral segments. Massage is described as effleurage

Table 13

HX	21	22	23	24	25
Prenatal	Low amniotic fluid; in utero constraint	N	Increased amniotic fluid; transverse	Suspected incompetent cervix	N
L&D	48 hours Induced at 36.5 wks	2 hours	Attempted version C- Section	$1^{1}/_{2}$ hours Induced	6 hours
Intervention	Pitocin; Stadol; Epidural	N	Stadol; Epidural; Suction	Pitocin; Demoral	N
Perinatal	N	N	N	Jaundice	N
APGARS	9/9	9/9	9/9	7/8	9/10
Rooting	N	N	N	ABN	N
Suckling	N	N	N	ABN	N
1st bstfd	Birth	Birth	Birth	Birth	Birth
Latch ABN	ABN	ABN	ABN	ABN	
Supplementation	FF breastmilk/ formula	FF breastmilk	NONE	NONE	NONE
Age at Presentation	4 wks	14 days	3 wks	1 day	6 days
Referred by	LC	LC	LC/MD	self	LC
CC: Infant	Poor latch; decreased mandibular excursion; falls asleep clamping and grinding nipple with her lower gum; few bowel movements	Stops suckling (appears that the tongue tires) after 3-4 sucks and falls asleep; unable to burp; abdominal distention; colic like cry	Neonate only latches onto the right side; pinching latch; infrequently nursed until 2 weeks old then frequency increased	Unable to arouse; clamping, painful latch; failure to flange lips	Poor mandibular excursion; Tongue thrust; clamping on nipple while attempting to latch on; clicking
CC: Mother	Sore, blistered, painful nipples	Milk came in late (4 days) hypothetically due to lack of stimulus	Vomiting/spinal headache after surgeryNipples pink and sore; yeast infection; deformed nipple after nursing; rapid MER	Rapid MER; overproduction of milk	Painful, flattened nipples

and manual lymphatic drainage to improve circulation and metabolic balance within the muscle and inhibit pain and reflexogenic guarding[31]. Further discussion of massage techniques are discussed in Appendix I.

Treatment number ranged from 1 to 12 sessions with an average of 3 treatments/infant.

RESULTS

Greater than 80% of the presented infants experienced improvement in latch and ability to breastfeed (23:25). One continued to experience "clicking" indicating the intake of air during nursing, one experienced improvement but was discharged for surgical intervention of an unrelated problem, and one discontinued nursing at the suggestion of the pediatrician who felt mother's milk supply was insufficient to provide adequate nourishment for the infant. 2 infants were eliminated from treatment: one due to a medical emergency and one due to the mother's decision to seek the assistance of a medical physician specializing in lactation management.

These 4 mothers were polled 6-8 weeks after termination of treatment and none of their infants were breastfeeding.

DISCUSSION

Methods of intervention have been implicated in injury to infants at birth[32 33]. Manual manipulation of an entrapped cord or lodged extremity can inadvertently result in traction injury or fracture. Consider case #4, when, during a rapid delivery, the umbilical cord was found to be around the infant's neck and had to be severed in utero. This infant demonstrated a depressed shoulder and winging scapula most likely from the traction forces applied to the cervical spine, shoulder and the dorsal scapular nerve (C 4/5) during this procedure.

Forceps and vacuum suction have been implicated in simple cranial molding as well as more extreme injuries like fractures or subdural bleeding. In the cases presented here, several cranial faults might be causally related to manual or mechanical intervention. For example, case #15, where forceps applied to the temporal area might be implicated in bilateral temporal bone compression.

It is conceivable, that constraint in the uterus can cause mechanical derangement resulting in ineffective breastfeeding mechanics as illustrated in the case of twins (where the crown of one twin's head abutted the temporomandibular area of the second twin) and the cranial faults of the infants born to mothers with a septal defect causing a heart shaped uterus or fibroids which alter the diameter and contractility of the uterus.

As previously noted, although anesthesia has been implicated in pharmacologic repression of suckling instinct, the effect appeared to be minimal in this sampling (potentially 1:25).

In this study, the infants' mothers received counseling from lactation consultants, midwives,La Leche League leaders or medical physicians. The infants were not brought for chiropractic evaluation until all customary methods of resolution had been attempted. This made it possible to evaluate the premise that biomechanical or neuromuscular problems could interfere with successful breastfeeding.

In most cases, chiropractic evaluation revealed the presence of an alteration in muscle tone and neurologic integrity (loss of suckling and rooting reflexes; inefficient action of the tongue) or an alteration in muscle action across a subluxated joint due to altered range of motion (i.e. reduced mandibular excursion secondary to derangement of the temporomandibular joint.). In certain cases, subluxation of cervical segments were associated with a decreased ability to range the cervical spine which prevented the neonate from maintaining an efficient position latch at the breast.

In an attempt to understand the mechanism of injury and resultant dysfunction, Arcadia observed 1,000 infants in a clinical setting and 800 or 80% demonstrated problems with breastfeeding caused directly from "cranial imbalances from the birth trauma. The pressure on the cranium before crowning is in a cephalad to caudad direction. The temporal bone, sphenoid, maxilla and mandible are pushed caudad, possibly causing severe spasm in all muscles of mastication (temporalis, masseters, internal and external pterygoids). Range of motion of the temporomandibular joint is significantly reduced, and the baby is unable to latch on and open the mouth with proper nipple placement without gagging and choking. Temporalis muscles spasm may cause painful headaches in a newborn which causes excessive crying. Such problems of breastfeeding can be directly caused by temporomandibular imbalances.[34]

Under traumatic circumstances, the origin of pain may be arthrogenic. As delineated in the majority of the cases, there is, for example, hypertonic muscular activity associated with most restrictions in mandibular excursion. We must consider if the joint itself was injured (traction injury/compression) or were the associated muscles the injured party? Whether as a direct result of injury or re-

Table 14

Physical Findings	21	22	23	24	25
Assymetrical facial creasing			X		
Mandibular excursion (w/ or w/o deviation)	Deviation R Decreased excursion	Decreased	Decreased excursion	Decreased	Decreased
Musculature					
k. orbicularis oris				Hypertonic	Hypertonic
l. Depressor anguli oris				Hypertonic	
m. pterygoid	Hypertonic		Hypertonic	Hypertonic	
n. digastric		Hypertonic	Hypertonic	Hypertonic	
o. omohyoid		Hypertonic	Hypertonic	Hypertonic	
p. scalenes					
q. SCM					
r. occipital		Hypertonic		Hypertonic	
s. temporalis	Hypertonic				
t. masseters	Hypertrophied				
k. other		cervical lymph nodes		UE/CS mm hypotonic	
Cranial dysfxn:					
a. parietal				Bossing of suture	
b. glabella					
c. temporal			Compression bilaterally	Compression bilaterally	
d. frontal					
e. sphenoid			Extension bilaterally		
f. occiput	Extended	Flexion	Extension	Edematous: Extension	Extension
g. maxilla					
h. mandible				Retracted	Retracted
i. hyoid		Elevated	Elevated	Elevated	Elevated
j. nasal/vomer/ethmoid					
k. TMJ	Lateral deviation R condyle				
l. palate					
Subluxation (VSC/Extremity)					
a. C1-7	Decreased flexion; decreased RR & RLG C1	Decreased extension Flexion C1	Extension C1	C1 Extension Hyperextended	
b. T1-12					
c. L1-5					
d. sacrum				Nutation	
e. ribs/clavical/sternum					
Tongue	Not extending to lip	Extends just to lip			Extends to gumline
Dural Tension	X	X	X	X	X
Total # of Treatments	3	3	5	3	1
Outcomes	Improved latch; more alert; increased wt. Gain and	Strong continuous suckling and swallowing; full extension of CS	Improved latch; decreased nipple pain; normal nipple shape	Improved latch w/ decreased pain; hypotonia persisted	Resolved

flexogenic spasm, metabolism of the muscle is disturbed due to hypertonic or hypotonic activity, both affecting the flow of nutritive substances into the muscle and removal of metabolic byproducts or waste material into the vascular or lymphatic system through regular, unsustained, contractions. Muscular hypertonicity due to reflexogenic guarding (possibly in response to the original arthrogenic or muscular assault) will result in ischemia and pain. This plays a role in establishing a dysfunctional nursing pattern because of a cycle of pain resulting from repeated attempts to open the mouth to breastfeed. The infant is more likely to resist normal muscular action in anticipation of the pain. In the case of the infant with hypertonic mandibular attachments or temporomandibular joint injury, he will be less likely to open his mouth to accommodate the nipple because the motion of opening the jaw (and possibly closing the jaw) is painful.

Esch wrote a case report of a 2-day-old-infant who presented with an atlas subluxation presumably resulting from the biomechanical stress of prolonged labor with an oblique lie, with a presumably associated loss of rooting reflex. She demonstrated a quick restoration of the reflex immediately following the adjustment of atlas.[35] Esch also related a case in which nasal subluxation resulted in dyspnea, interfering with successful latch. The patient responded well to an adjustment of the nasal bones with immediate improvement in nasal breathing.

Neurologic integrity of the Glossopharyngeal nerve (CN IX), the Vagus (CN X) and the Hypoglossal Nerve (CN XII) are responsible for the innervation of the anatomical structures utilized in suckling. CN IX controls the muscles of the pharynx, CN X controls the muscles of the soft palate and CN XII controls the tongue muscles. The cranial nerves arise from the medullary portion of the brainstem and exit through the jugular foramen (CN IX and X) and the hypoglossal canal (CN XII). Disruption in the innervation to any of the associated structures would potentially interfere with the suckling process. For example, John Upledger, DO proposed that the hypoglossal nerve might be subject to injury or irritation by cranial subluxation as the nerve exits the hypoglossal canals high in the foramen magnum above the occipital condyles. Their exits are just lateral to the condyles. Dysfunction of the hypoglossal nerve will probably be secondary to problems of the occipital condyles and the atlanto-occipital joint.[36]

Hewitt [37] reviews three proposed mechanisms for altered cranial nerve function: (a) direct compression of the cranial nerves or medulla by abnormal cranial bone motion. Nerve compression has been shown to decrease nerve conduction velocities, decrease axoplasmic flow and create motor disturbances in related muscles.[38 39 40] This would be in concert with Upledger's [41] proposed mechanism; (b) somato-autonomic reflexes caused by cervical subluxation could cause a change in vascular supply to the contents of the cranial vault affecting cranial nerve function or it may directly affect the superior cervical ganglia which communicate directly with the CN IX, X and XII, potentially altering their function resulting in abnormal suckling, and (c) cranial and cervical subluxation result in increased traction and tension in the dura mater potentially resulting in constriction of the dural sheath of the cranial nerves altering nerve and end organ function.

CONCLUSION

Observation of breastfeeding infants early in the neonatal period allows the chiropractor to determine the infant's ability to root, latch onto and suckle the breast. Chiropractors may serve as effective members of an interdisciplinary team to identify and ameliorate biomechanical dysfunction before inappropriate imprinting or a disorganized suck is established. Cross professional education and communication will facilitate early referral and help establish a network of support for the new mother and infant.

Craniocervical subluxation is one of the most important conditions to rule out when addressing difficulties with breastfeeding whether manifesting as neurologic (rooting or suckling reflex, hypertonic musculature) or mechanical (reduced mandibular excursion, decreased cervical range of motion) dysfunction.

Chiropractic adjustments in the early stages of neurologic imprinting appear to safely and effectively address the craniocervical dysfunction and help restore natural, efficient suckling patterns for infants who are unable to successfully latch.

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APPENDIX A
EVALUATION AND TREATMENT OF NEONATE WITH BREASTFEEDING DIFFICULTIES

History:

- Prenatal, labor and delivery and postnatal history
- Complications of pregnancy?
- In utero constraint?
- Induction of labor? Vacuum suction? Forceps? Dystocia?
- Length of labor and delivery?
- APGARS
- First attempts at nursing (first day of neonate's life?…lethargy? Jaundice? etc.)
- Consultations? Nurses at hospital? MD? Lactation consultants? La Leche League?
- Help patient sort out any "bad information" or conflicting information
- History of others breastfeeding in family (or friends) — does the patient have support or belong to a support group (La Leche League)
- Knowledge about breastfeeding (how in depth? Where did it come from? Why do they want to? How badly do they want to?)
- Any confusing or conflicting activities (bottles in the nursery? Currently supplementing with bottles, finger feeding? Cupping? Supplementer?)
- Was mother under care (chiropractic) during pregnancy or now? Does she need to be? (poor ergonomics can result in pain and a poor breastfeeding experience; neurologic interference with MER, production or recurrent mastitis secondary to VSC)
- Yeast infection (mother's breast? baby's mouth?) —
  - Protocols:
  - MD: nystatin and diflucan
  - ICBLC: gentian violet and herbs, garlic, grapefruit seed extract

Examination of the neonate:

- Infantile automatisms: rooting, suckling, stroke lip and tongue should extend past lower lip, Moro, Perez
- Spinal evaluation: VSC with emphasis on evaluating Cervical range of motion; thoracic excursion, hyperextension of the spine, position of sacrum
- Integrity of the temporomandibular joint including excursion, subluxation or dislocation
- Muscle hypertonicity:
  - Masseter
  - Temporalis
  - Obicularis oris and associated muscles (depressor, elevator)
  - Submandibular muscles
  - Pterygoids — internal assessment performed by putting small finger between gums and checking the resistance right and left; visually, do you see a retracted jaw or a deviated jaw at rest or on dropping the lower jaw (yawning, crying)
- Position and mobility of the hyoid bone
- Excursion of the tongue — rule out ankyloglossia (tongue tied), does it reach past the lower gum or the lower lip?
- Palate — arched? Domed? Flat? Cleft?
- Any indication of hypotonia?
- Any indication of congenital anomaly or developmental anomaly or delay?
- Cranial molding? Compression from forceps or haematoma from vacuum suction
- Torticollis? Evaluate SCM, etc.
- Clavical? R/o fracture or subluxation expecially in cases of dystocia
- Are any diagnostic studies necessary?
- Observe latch — poor flanging of upper and lower lip?
  - Tight labial frenulum?
  - Clicking?
  - Swallowing?
  - Difficulty turning head to one side or the other (favoring one breast over another)?
- Check mom's ergonomics:
  - Her seated and support posture?
  - How is she "holding" the baby to the breast?
  - Forcing the head to the breast?
  - Flexing the head and neck?

continued next page

APPENDIX A *(continued)*

Treatment:

Once determined that the delay to suckle is due to soft tissue or articular injury, techniques are employed to reduce inflammation and muscle spasm. The use of topical agents like arnica, cool compresses and gentle, soft tissue release and light massage to the area are utilized to reduce inflammation, spasm of associated hypertonic muscles and promote lymphatic drainage of the injured area.

Explain these home care techniques to parents. Teach parents how to do all of them, including the soft tissue therapy, small circular massage of all the external muscles to relax the action on the jaw (see Appendix B). The internal pterygoids can be relaxed by gently placing the small finger between the gums and letting the child use the finger as a fulcrum to stretch the muscle by moving their jaw back and forth

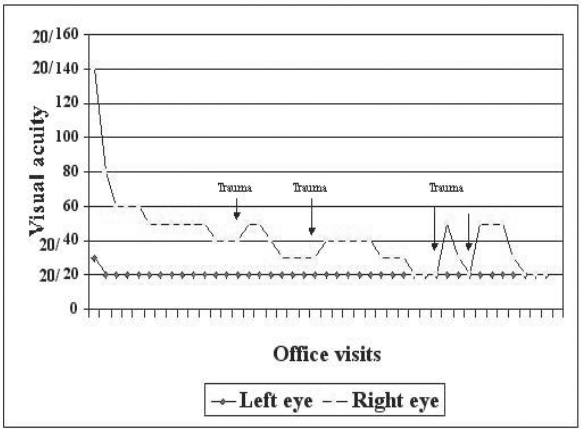
Torticollis: teach parents ROM exercises to do at home. Instruct them on positioning the baby's head with support to rest or in the car seat or swing.

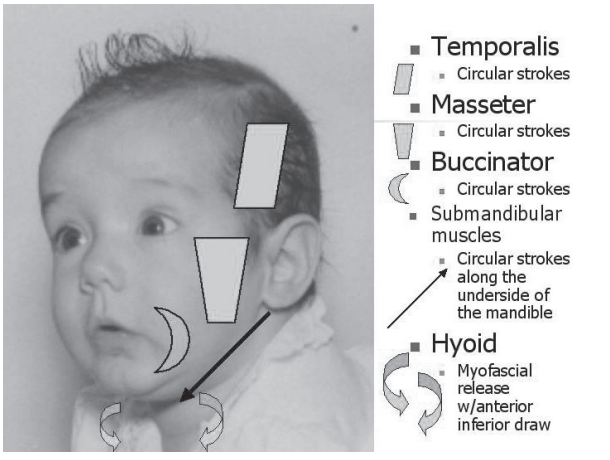
Adjustment of spinal segments with dysfunctional motion:

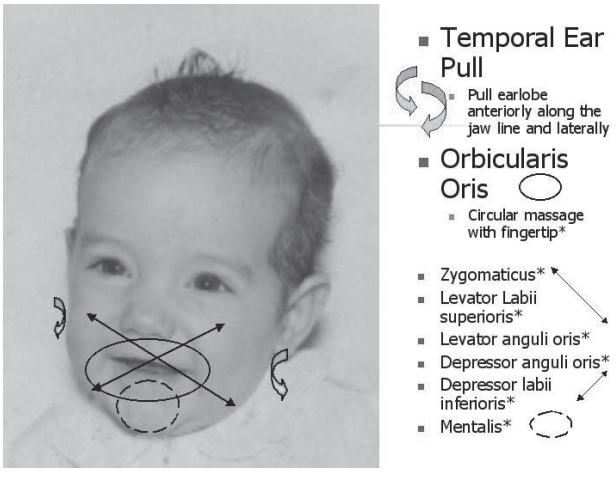
- cervical spine — specific exam of the upper cervicals at the C01 junction
- check the condylar approximation. If they have migrated medially, spread them gently with your fingertips)
- cranial evaluation and appropriate treatment (ex: arched palate — spread maxilla)
- all techniques utilized should be low force and specific
- all techniques should be modified for use on a neonate

■ Observe latch and positioning post adjustment and make corrections as indicated in mother's ergonomics and hold.

APPENDIX B







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Abstracts

COMMENTARY BY JOAN FALLON, DC, FICCP

Sleep Med. 2003 Nov; 4(6):569-77.

Autonomic responses to sighs in healthy infants and in victims of sudden infant death.

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Objective: Sigh, defined as an isolated breath with an increased tidal volume, can be associated with abrupt changes in heart rate (HR) or blood oxygenation. Sigh may be followed by a central apnea. As impairment of autonomic control was postulated in future SIDS victims, we hypothesized that their autonomic responses to sighs were different from those of healthy control infants.

Methods: Sighs followed by central apnea were studied in the sleep recordings of 18 infants who eventually died of SIDS and of 18 control infants. The infants of the two groups were matched for sex, gestational age, postnatal age, weight at birth and sleep position during sleep recording. HR autoregressive power spectral analysis was performed on RR intervals preceding and following sighs.

Results: In all infants, most sighs followed by an apnea were found in NREM sleep. Compared to the control infants, the future SIDS victims were characterized by a greater sympathovagal balance and a lower parasympathetic tonus before the sighs. Following the sighs, no more differences were found in NREM sleep.

Conclusion: Based on the present findings, it can be postulated that sighs contribute to reset autonomic tonus during NREM sleep.

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COMMENTARY

Some of the current thinking about chiropractic is that in certain instances of disease states, especially in children, an underproduction of sympathetic supply and an overabundance of parasympathetic supply are present. This is true in asthma and in other conditions where the final common pathway is the neurological system. In this paper it is determined that a true imbalance between the parasympathetic and sympathetic supplies is present and that a sigh will reset that imbalance. These findings should begin to outline a whole line of research for the chiropractic profession with respect to these types of imbalances.

Pediatrics. 2003 Oct;112(4):951-7.

Computed tomography and radiation risks: what pediatric health care providers should know.

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Computed tomography (CT) is an extremely valuable diagnostic tool. Recent advances, particularly multidetector technology, have provided increased and more diverse applications. However, there is also the potential for inappropriate use and unnecessary radiation dose. Because some data indicate that low-dose radiation (such as that in CT) may have a significant risk of cancer, especially in young children, it is important to limit CT radiation by following the ALARA (as low as reasonably achievable) principle. There is a variety of strategies to limit radiation dose, including performing only necessary examinations, limiting the region of coverage, and adjusting individual CT settings based on indication, region imaged, and size of the child. The pediatric health care provider has a pivotal role in the performance of CT and may be the only individual

who discusses these important CT radiation issues with the child and family. For this reason, this article will summarize the issues with CT patterns of use and radiation risk, and provide dose reduction strategies pertinent to pediatric health care providers.

COMMENTARY

An interesting article with respect to a routine test utilized for children. Very often tests such as these are taken for granted with respect to their side effects. The doctor of chiropractic should not take these findings for granted and should provide basic counseling to their patients with respect to the use and overuse of ionizing radiation no matter what the form.

Pediatr Dent. 2003 Sep-Oct;25(5):449-58.

Pacifier use in children: a review of recent literature.

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Pediatric dentists are generally well aware of the oral implications of nonnutritive sucking (NNS). NNS via digit or pacifier can effect changes in the occlusion, including openbite, excessive overjet, and possibly posterior crossbite. Skeletal changes have also been attributed to NNS. There is some evidence that pacifiers may do less harm to the dentition, particularly because pacifier habits are often spontaneously shed at about 2 to 4 years of age. Digit habits are more likely to persist into the school-age years and can require appliance therapy for discontinuation. Thus, some authorities suggest that pacifiers be recommended for infants who engage in NNS. While pediatric dentists understand the oral and perioral effects of pacifiers, they may be less well versed in other aspects of pacifier use that have been reported in the medical, nursing, chemical, and psychological literature. This paper provides reviews of literature concerning the role of pacifier NNS in 4 areas: (1) sudden infant death syndrome; (2) breast-feeding; (3) otitis media and other infections; and (4) safety. Knowledge of current literature in these areas may assist pediatric dentists with their decisions of whether to recommend or discourage pacifier use in infants.

COMMENTARY

While chiropractors are well versed in the importance of sucking for the neonate and very young infant, the use of pacifiers to accomplish this task is often more controversial. This article examines the role of the pacifier in some common pediatric scenarios. While this article is directed toward the dentist, the doctor of chiropractic can take valuable information from it.

Pathol Int. 2003 Nov;53(11):769-74.

Identification of neurons responding to hypoxia in sudden infant death syndrome.

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The pathogenesis of sudden infant death syndrome (SIDS) is still not understood, although one of the most credited current hypotheses is the respiratory theory. Considerable evidence has been assembled suggesting that hypoxia in human infants produces an initial increase in ventilation, after which respiration is rapidly inhibited. We investigated the expression of the c-fos proto-oncogene, a marker of activated neurons, particularly by hypoxia, in the medulla oblongata nuclei involved in breathing after birth, with special reference to SIDS. We utilized c-fos protein immunohistochemistry on serial transverse sections of medulla oblongata from 22 SIDS victims. In 60% of the analyzed cases, we observed numerous positive c-fos neurons in the dorsal motor nucleus of the vagal nerve. In control cases, the immunohistochemical labeling was negative or very low. The c-fos protein was expressed in the rostral-intermediate portion of the dorsal motor vagal nucleus, where motoneurons with respiratory-related activity are located. The positive c-fos immunoreactivity observed in SIDS suggests that the neurons of the dorsal motor vagal nucleus involved in the regulation of breathing are able to yield an intense, immediate ventilatory response to hypoxia. Our results support the respiratory theory of SIDS

COMMENTARY

The role of the nervous system in many pediatric conditions is well-known, while in some conditions little connection has been made between the nervous system and disease. In the case of SIDS many potential causes have been postulated. The chiropractic profession has proposed many hypotheses with respect to the role of subluxation in the etiology of SIDS. This paper examines direct evidence of the role of the dorsal motor nucleus or the vagus nerve as being involved in respiration, and in the

body's response to hypoxia. The paper further demonstrates that there is a potential breathing dysfunction in the etiology of SIDS.

Vestn Otorinolaringol. 2003;(6):52-4.

[Soft palate muscles electrostimulation in treatment of children at different stages of exudative otitis media]

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We studied efficacy of electrical stimulation of soft palate muscles in 180 patients (292 ears) with various stages of exudative otitis media (EOM). The analysis of the results covered 172 patients. 8 patients withdrew because of the 4th (fibrous) stage of the process (n=4) and incomplete treatment course (n=4). Normalization of audibility thresholds and tympanometric parameters was observed after 10 sessions of electrostimulation in 129 (75.0%) patients with early EOM stages. The effect persisted for 1 year. 3 (1.7%) patients with EOM stage II and 40 (23.3%) patients with stage III failed the treatment. For them bypass operation was recommended. Postoperative electrostimulation of the acoustic tube muscles and standard manipulations were made. Faster recovery of audiometric and tympanometric parameters were recorded in all the patients. Thus, electric stimulation of acoustic tube muscles can be recommended for children with EOM stage I, for most of the children with stage II and for children at stage III in postoperative period after tympanostomy with insertion of the bypass.

COMMENTARY

The role of mechanical stimulation other than the adjustment has been rarely reported in the literature.In this study, elecrostimulation was used on the soft palate which directly correlated with the tensor veli palatine muscle of the Eustachian tube. This mechanical electrical stimulation was shown to be efficacious in children with Exudative (acute) otitis media, especially in the early stages. This continues to lend credibility to the chiropractic approach of the adjustment for acute otitis media, which among other things may dilate the cartilaginous portion of the Eustachian tube by stimulating the tensor veli palatini muscle.

Int J Pediatr Otorhinolaryngol. 2004 Jan;68(1):101-10.

Eustachian tube gland tissue changes are related to bacterial species in acute otitis media.

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Background and Objective: Prior investigations have shown that the number of mucus producing goblet cells in the middle ear and Eustachian tube (ET) mucosa is highly increased during and up to at least six months after experimental acute otitis media (AOM) caused by Streptococcus pneumoniae (SP). Further, the volume of the mucus producing paratubal gland components is increased up to 3 months after the acute infection. These changes may in conjunction with a deteriorated ET function predispose a subsequent development of secretory otitis media. The present investigation compares changes in goblet cell density and gland structures of the ET during and after AOM caused by various bacteria typically encountered in this disease, with emphasis on potential differences due to bacterial species.

Methods: Rat models of AOM caused by SP, non-typeable or type b Haemophilus influenzae (NTHI/HIB) or Moraxella catarrhalis (MC) were studied longitudinally up to 6 months after bacterial challenge. The ET was dissected and decalcified, paraffin embedded and serially sectioned, followed by PAS/alcian blue staining. The goblet cell density and the paratubal gland composition and volume were determined morphometrically in every 20th section, using a light microscope.

Results: Regardless of bacterial species, the ET goblet cell density was increased from day 8 and peaked day 16, followed by some degree of normalisation, although not reaching normal numbers within the 6 month period, except for MC. The highest increase was seen in AOM caused by the non-typeable Haemophilus strain, followed by HIB, SP and MC. Except with MC, pathological intra-epithelial glands formed and goblet cells were found in mucosal areas normally devoid of these. In all species but MC, the volume of the paratubal glands progressed to peak 16 days post-inoculation, followed by a gradual normalisation. The volume was still increased 3 months after the acute infection, but completely normalised after 6 months. The increase was primarily due to hypertrophy of the mucous gland components

and highest in AOM caused by the Haemophilus species, followed by SP.

Conclusion: The Eustachian tube goblet cell density is increased during and up to at least six months after AOM regardless of bacterial species, except when employing MC, by which the density was increased for a few weeks only. Except in AOM caused by MC, the volume of the ET glands increases during and up to at least 3 months after infection, primarily due to hypertrophy of the mucous gland components. The non-typeable Haemophilus strain induced the highest increase of both goblet cell density and mucous gland volume. The increased secretory capacity of the ET following AOM may by excessive mucus secretion contribute to the deteriorated ET function found after AOM and thus predispose, sustain or aggravate middle ear disease.

COMMENTARY

These findings may be extremely important in examining the causes of acute otitis media. It is apparent that the volume of the ET glands increases during and up to at least 3 months after infection, primarily due to hypertrophy of the mucous gland components. This demonstrates that the primary etiology in RECURRENT Otitis media is a drainage condition. The lack of drainage from the Eustachian tube may be due to this initial hypertrophy of cells which preclude the drainage. Chiropractic adjustments which promote drainage of the Eustachian tube is therefore essential for the child especially with recurrent otitis media. Other nutritional strategies which preclude mucous producing foods are also essential in the scenario of the child with recurrent otitis media.

Caries Res. 2004 Jan-Feb;38(1):29-33.

Is attention-deficit hyperactivity disorder a risk factor for dental caries? A case-control study.

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Experience in practice has suggested that children with attention-deficit hyperactivity disorder (ADHD) tend to have higher numbers of diseased, missing and filled teeth (DMFT score) than children without the condition. To date, however, this impression has not been systematically investigated. A case-control study of children in Otago, New Zealand (case DMFT >/= 5; control DMFT <5; case status determined from School Dental Service dental records) was conducted by postal survey and reference to the School Dental Service records. Cases and controls were matched on age, sex, ethnicity, and school socio-economic status. The purpose of the study was to assess whether having ADHD was associated with higher odds of having high caries experience. Questionnaires were returned for a total of 128 case-control pairs. Conditional logistical regression analysis showed that, after controlling for fluoride history, medical problems, diet, and self-reported oral hygiene, children with ADHD had nearly 12 times the odds of having a high DMFT score than children who did not have ADHD (OR = 11.98; 95% CI 1.13, 91.81). No other factors were significant predictors. Dental practitioners and parents should consider ADHD to be a condition that may affect children's dental caries experience.

COMMENTARY

These findings suggest that there is significant indication that there is some type of genetic or inborn problem either with enamel formation or the actual growth and development of teeth in children with ADHD. With the controlling factors for diet, hygiene etc. it is unlikely that this high incidence of caries could be due to chance. New theories about the etiology of ADHD could potentially be spurred by these findings. It is important for the doctor of chiropractic to be aware that the child they see with ADHD may require significant dental care, and may experience subluxations due to pain and or changes in the oral environment.

NZ Med J. 2003 Aug 8;116(1179):U539.

Chiropractic manipulation for non-spinal pain – a systematic review.

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Aims: Chiropractic manipulation is mostly used for spinal problems but, in an increasing number of cases, also for non-spinal conditions. This systematic review is aimed at critically evaluating the evidence for or against the effectiveness of this approach.

Methods: Five electronic databases were searched for all randomised clinical trials of chiropractic manipulation as a treatment of non-spinal pain. They were evaluated ac-

cording to standardised criteria.

Results: Eight such studies were identified. They related to the following conditions: fibromyalgia, carpal tunnel syndrome, infantile colic, otitis media, dysmenorrhoea and chronic pelvic pain. Their methodological quality ranged from mostly poor to excellent. Their findings do not demonstrate that chiropractic manipulation is an effective therapy for any of these conditions.

Conclusions: Only very few randomised clinical trials of chiropractic manipulation as a treatment of non-spinal conditions exist. The claim that this approach is effective for such conditions is not based on data from rigorous clinical trials.

COMMENTARY

Yet another self proclaimed review of chiropractic cites the lack of studies, and especially the lack of randomized studies. It is important that the doctor of chiropractic begins to identify areas of specific research especially in pediatrics. Non-spinal pain occurs often in children and should be examined properly by those who see children on a regular basis.

Am J Perinatol. 2003;20(8):477-484.

Factors influencing initiation of breast-feeding among urban women.

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The objective of our study was to identify factors associated with the initiation of breast-feeding in a poor urban area. One hundred postpartum, nonadolescent, non-drug using mothers, 50 breast-feeding and 50 formula feeding, were consecutively interviewed. Breast-feeding women were more likely to be born outside of the United States (42 versus 14%, p = 0.002), have more years of education (12.1 +/- 1.9 versus 10.9 +/- 1.7, p = 0.002), be employed either prior to or during pregnancy (38 versus 16%, p = 0.000), be married (46 versus 26%, p = 0.037), be a nonsmoker (86 versus 64%, p = 0.011), have more prenatal visits (8.4 +/- 7.3 versus 5.0 +/- 5.9, p = 0.010), or have a breast-feeding mother (48 versus 26%, p = 0.023). There were no differences in age or ethnicity. The father of the breast-feeding baby was more likely to be better educated (12.0 +/- 2.8 versus 10.5 +/- 3.6 years, p = 0.022) and to work full-time (68 versus 40%, p = 0.005). Eighty-four percent of formula feeders knew that breast milk was better for their babies but decided not to breast-feed due to concerns of pain, smoking, and work. Sixty-three percent of women made the choice to breast-feed prior to the pregnancy, 26% during the pregnancy, and 11% after delivery. Significantly more multiparas decided prior to the pregnancy compared with primaparas. We recommend that breast-feeding education should be started prior to the first pregnancy and tailored to the concerns of the women.

COMMENTARY

This is another paper which identifies the various factors which influence breastfeeding. It is important for the doctor of chiropractic to know these factors so they can counsel their patients. One significant finding in this study is that 84% of the formula feeding moms knew that breast feeding was better for their child and still chose to formula feed.

Pharmacotherapy. 2003 Dec;23(12):1524-30.

Epidemiology and possible causes of autism.

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Objectives: To review the recent literature on possible causes of the increase in frequency of diagnosed autism reported from three countries, and to compare the medical diagnoses and drug therapy from a new series of autistic boys and their mothers with that of comparable nonautistic boys and their mothers.

Design: Case-control evaluation.

Participants: Members of over 250 general practices in the United Kingdom.

Measurements and Main Results: Frequency of exposure to drugs and presence of preexisting clinical illnesses in autistic children and their mothers were compared with nonautistic children and their mothers over time. According to published studies, the incidence of boys diagnosed with autism rose dramatically in the 1990s. Numerous published studies have concluded that the measles-mumps-rubella vaccine is not responsible for the large rise in diag-

nosed autism. In our study, boys diagnosed with autism had medical and drug histories, such as vaccines, before diagnosis, that were closely similar to those of nonautistic boys, except that developmental and sensory disorders were far more common in autistic boys. No material differences during pregnancy were found between the mothers of autistic boys and those of nonautistic boys in relation to illness or drug therapy. In the early 1990s, boys with diagnosed developmental disorders were infrequently diagnosed with autism. In the later 1990s, such boys more often were diagnosed with autism.

Conclusion: A major cause of the recent large increase in the number of boys diagnosed with autism probably is due to changing diagnostic practices.

COMMENTARY

The authors of this paper makes many assumptions, and ignores the literature which appears to contradict their position. Since Wakefield's findings of live measles in the GI tracts of autistic children, much time and energy has gone into "debunking" his findings. This paper is another one which makes generalizations about the diagnostic abilities of those looking at autistic children, and the changes in criteria. It is important for the doctor of chiropractic who sees children with autism to read all the literature on this subject, especially that coming out of UC Davis which directly contradicts these findings.

J Insur Med. 2003;35(1):51-6.

Attention deficit hyperactivity disorder (ADHD) – life insurance implications.

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Attention deficit hyperactivity disorder (ADHD) is the most common neurobehavioral disorder in youth. About one-half of these youngsters continue to have symptoms as they enter their 20s. Of these, some also have comorbid conditions such as conduct disorders, psychiatric problems and substance abuse. The medical director must be able to recognize the small subset of affected individuals whose mortality due to ADHD is greater than that of the standard population.

COMMENTARY

Very often changes in certain aspects of our lives are directly affected by changes in other areas. With the advent of so many children with ADD and ADHD taking medication, many of those things which youths of the past were able to accomplish are no longer true. For example, the rate of auto accidents is up significantly, so much so that New York State has decided to change the driving age and the time it takes to get a license after a learner's permit is issued. It is important for the doctor of chiropractic to be aware of these findings. We may find that those taking medication for ADHD will have altered health insurance and auto premiums due to their increased potential for accidents.