

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 Pediatrics¹ and in 1998, the World Health Organization² 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 Pediatrics³ and in 1998, the World Health Organization⁴ 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.

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 problem⁵ 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.

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- 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:

- A decreased excursion of the mandible preventing the neonate from opening widely enough to encompass the nipple and areola.
- 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.
- A neurologic deficit manifesting as a lack of suckling or rooting reflexes.
- An ineffective latch due to altered lip or tongue action.

- Impaired respiration (restriction in thoracic excursion or diaphragmatic action or lack of patent airway).
- 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
1 st 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 properly¹⁵. 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 office¹⁶. 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
1 st 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			Counterrotation		
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 automatism¹⁸), osseous integrity (ruling out frac-

ture 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 assessment²⁰ of cranial bones and dural tension or torque, motion palpation²² 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
1 st 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					Extension
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 restriction²³) 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
1 st 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; sleep- ing; 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; stress; 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 succedaneum	9/9	8/9
APGARS	UNK	UNK	UNK	UNK	UNK
Rooting	N	N	ABN	ABN	N
Suckling	N	N	ABN	ABN	N
1 st 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 areola 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 sub-

luxation), 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
1 st 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			Posterosuperior 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 palpation²⁶ 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 Basic²⁹ to reduce dural torque, myofascial release³⁰ 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
1 st 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 surgery Nipples 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 guarding³¹. 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

Hewitt³⁷ 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's⁴¹ 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 especially 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.

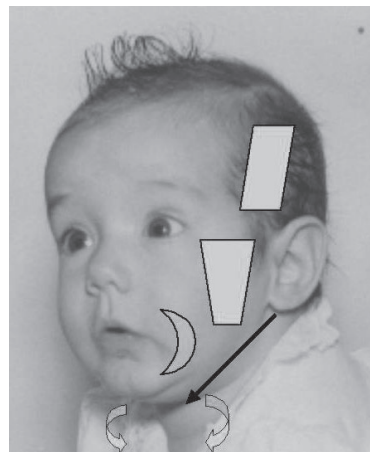
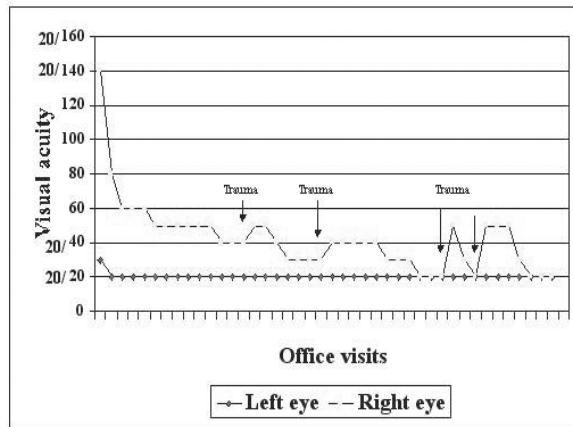
Explain these home care techniques to parents. Teach parents how to do all of them, including the soft tissue therapy, small circular massage of all the external muscles to relax the action on the jaw (see Appendix B). The internal pterygoids can be relaxed by gently placing the small finger between 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.

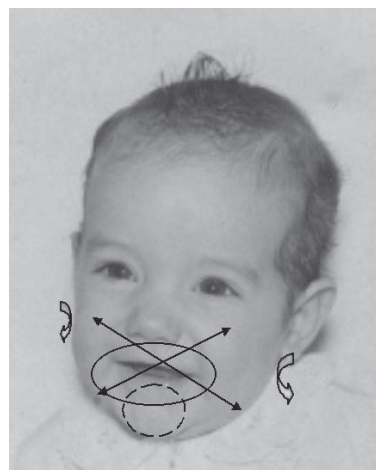
Adjustment of spinal segments with dysfunctional motion:

- 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



- **Temporalis**
 - Circular strokes
- **Masseter**
 - Circular strokes
- **Buccinator**
 - Circular strokes
- **Submandibular muscles**
 - Circular strokes along the underside of the mandible
- **Hyoid**
 - Myofascial release w/ anterior inferior draw



- **Temporal Ear Pull**
 - Pull earlobe anteriorly along the jaw line and laterally
- **Orbicularis Oris**
 - Circular massage with fingertip*
- **Zygomaticus***
- **Levator Labii superioris***
- **Levator anguli oris***
- **Depressor anguli oris***
- **Depressor labii inferioris***
- **Mentalis***

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