ICS

Lora Tanis, DC, DICCP

FOOT LEVELERS

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Intrauterine Constraint, Birth Biomechanics, and Newborn Assessment: A Chiropractic Approach to Infant Conditions

Dr. Lora Tanis, DC, DICCP, FPAC, FICA

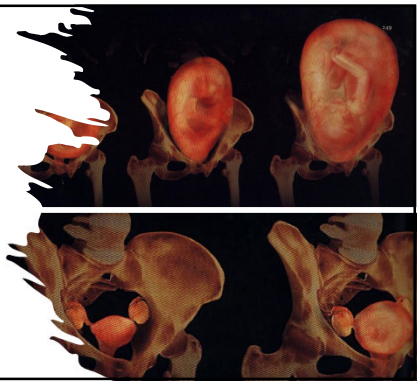
drloratanis@gmail.com



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Why Chiropractic For Pregnancy…

- Decrease discomfort, aches and pains
- Improve circulation
- Improve neurologic function
- Improve ability to breathe
- Improve ability to eliminate waste
- Increase sense of physical well being
- Improve fetal position
- Improve Birth Process



3

Next Four Hours

Identify	Explain	Discuss	Recognize
• Identify maternal, fetal, and environmental factors that could contribute to intrauterine constraint.	• Explain common fetal positioning patterns and their biomechanical implications in the maternal patient.	• Discuss the effects of birth biomechanics and delivery interventions on the newborn musculoskeletal system.	• Recognize clinical signs associated with intrauterine constraint in newborns and infants.
Perform	**Assess**	**Discuss**	**Educate**
• Perform an age-appropriate chiropractic history and examination of newborns and infants.	• Assess cranial, cervical, spinal, and extremity asymmetries associated with constraint patterns.	• Discuss evidence-informed chiropractic management strategies for infants presenting with musculoskeletal dysfunction.	• Educate parents regarding positioning, tummy time, feeding ergonomics, and developmental support.

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Identify

- Identify maternal, fetal, and environmental factors that could contribute to intrauterine constraint.

5

History

Age, LMP

Planned Pregnancy

Number prior pregnancies, Number of births

Health Conditions, Diseases, Family history

OB/midwife

Testing, Blood, US

Injuries, Accidents, Falls, MVA

Surgeries-Pelvic abnormalities or surgery

Medications, OTC, Recreational, Tabacco, Alcohol. Vitamins, topicals

Complaint

Onset, Location, Duration

Characteristics, Aggravating factors, Relieving factors. treatment



6

Question the Question



- Age, greater 35
  - Twins
  - Gestational diabetes
  - blood pressure problems
  - Chromosomal abnormalities
  - Lower birth weight
  - Miscarriage
- LMP/Due date
- Gravidity: number of pregnancies
- Parity: number of births beyond 24 weeks
- Miscarriage/Abortion
- OB/Midwife

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Important For Appropriate Care

- In spite of all of the technology available today, the history is still the mainstay of diagnosis. The impact of social, environmental, hereditary and behavioral factors on patient well-being and illness must be realized in the patient's history
- The accuracy and completeness of the information contained in a patient's history is essential for optimal patient care. A complete and accurate history is the foundation for all future patient care—whether preventive care, diagnosis and treatment of acute or chronic illness, or prescription of medication.

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History

Details acquired from medical history and patients' experience of empathy – two sides of the same coin

Friedemann Ohm,[1] Daniela Vogel,[1] Susanne Sehner,[2] Marjo Wijnen-Meijer,[3] and Sigrid Harendza

History taking and empathetic communication are two important aspects in successful physician-patient interaction. Gathering important information from the patient's medical history is needed for effective clinical decision making while empathy is relevant for patient satisfaction.

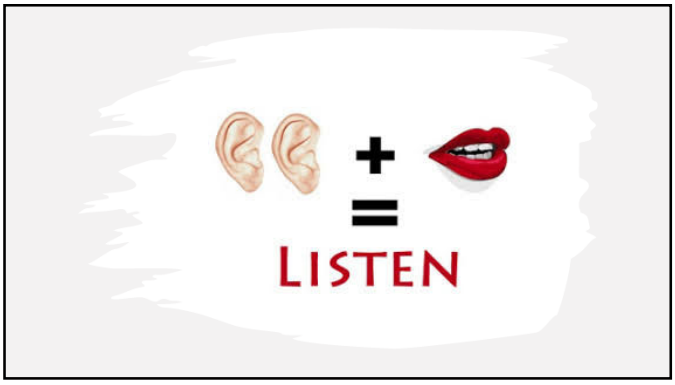
Skilled history taking is still regarded to be of fundamental importance for clinical decision making

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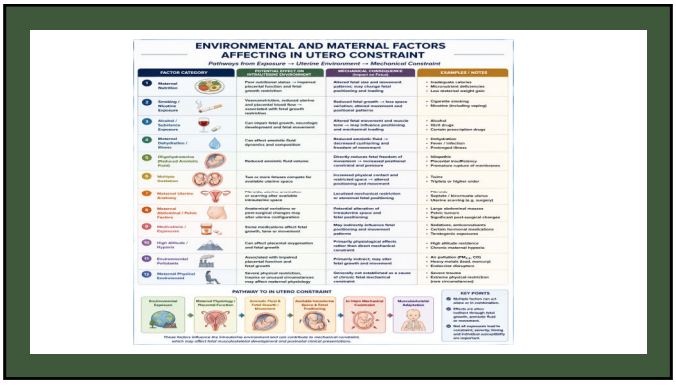
Epstein, Perkin, Cook, et al. Clinical Examination 4th Ed. (2008). Mosby, Ltd.

- The medical interview or consultation influences the precision of diagnosis and treatment, and studies have indicated that over 80 percent of diagnoses in general medical clinics are based on the medical history."

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Medication and drugs



13



Depression-Anxiety

- A 2015 Centers for Disease Control (CDC) study found that some birth defects occur about two or three times more frequently in babies born to women who took the SSRI medications Paxil and Prozac early in pregnancy
- One consequence of SSRI use during the third trimester of pregnancy, which has been confirmed in many studies, is a neonatal syndrome that may include irritability, poor feeding, sleep disturbance, and other symptoms. This syndrome usually lasts only a few days to a week.

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Smoking, Alcohol, Caffeine

- **smoking** – a woman who smokes during pregnancy increases her risk of miscarriage and stillbirth. Babies have a greater risk of low birth weight, prematurity and sudden unexpected death in infants (SUDI).
- **alcohol** – frequent and heavy use of alcohol is known to cause fetal alcohol spectrum disorder, which includes a range of defects such as facial abnormalities, heart problems and retarded growth.
- **caffeine** – an association between caffeine use during pregnancy and the incidence of birth defects, miscarriage and other adverse pregnancy outcomes has not been found. However, heavy use (greater than seven cups of coffee per day) may be associated with an increased risk of low birth weight.

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Alcohol consumption during Pregnancy

- Alcohol is the leading known teratogen.
- The consequences of alcohol use in pregnancy range from subtle neurological disturbances, reduced birth weight, prematurity and stillbirth to severe abnormalities such as Fetal Alcohol Syndrome.
- The risk of spontaneous abortion increases twofold, particularly with heavy drinking (>3 drinks/day)
- Decreased birth weight is the most reliable indicator of prenatal alcohol exposure, with the average birth weight of such newborns estimated to be about 2.0 kg (4.4 lbs) (average healthy term birth weight is 7.3lbs)

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Drugs

- cannabis – increased risk of growth retardation, sleep problems, behavioral problems
- cocaine – increased risk of miscarriage, pre-term birth, growth retardation, stillbirth and birth defects (of the brain, heart, genitals and urinary system)
- heroin – increased risk of low birth weight, prematurity, fetal distress, stillbirth, blood-borne viral disease such as hepatitis, infant withdrawal after birth



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- Some pregnant women view cannabis use as harmless in pregnancy [32]; however, it has been linked with several deleterious effects, including preterm labor, low birthweight, small-for-gestational age, and admission to the neonatal intensive care unit [33]. Prenatal cannabis use has also been linked with adverse consequences for the growth of fetal and adolescent brains [32], reduced attention and executive functioning skills, poorer academic achievement and more behavioral problems
- *Increased use in recent study shows 2% of pregnant women use cannibus (Canadian J public health) Nov 1 2018 online*

- Warner TD, Roussos-Ross D, Behnke M: It's not your mother's marijuana: effects on maternal-fetal health and the developing child. *Clin Perinatol.* 2014;41(4):877–894.10.1016/j.clp.2014.08.0
- Jaques SC, Kingsbury A, Henshcke P, et al. : Cannabis, the pregnant woman and her child: weeding out the myths. *J Perinatol.* 2014;34(6):417–424. 10.1038/jp.2013.180
- Hayatbakhsh MR, Flenady VJ, Gibbons KS, et al. : Birth outcomes associated with cannabis use before and during pregnancy. *Pediatr Res.* 2012;71(2):215–9. 10.1038/pr.2011.25

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http://www.cdc.gov/ncbddd/features/birthdefects-Opioid-Analgesics-keyfindings.html

- Treatment with opioid analgesics was linked with the following birth defects:
  - Spina bifida (a type of neural tube defect)
  - Hydrocephaly (build up of fluid in the brain)
  - Glaucoma (an eye defect)
  - Gastroschisis (a defect of the abdominal wall)
  - Congenital heart defects
    - Conoventricular septal defect hole below pulmonary valve
    - Atrioventricular septal defect
    - Hypoplastic left heart syndrome
    - Atrial septal defect
    - Tetralogy of Fallot
    - Pulmonary valve stenosis
- Treatment with opioid analgesics just before or during early pregnancy was reported by 2% to 3% of the mothers.
- Codeine and hydrocodone were the most frequently reported medications, representing 69% of all reported opioid analgesics used.

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Tylenol/Acetaminophen

- The authors gave 3 possible reasons why long-term use of acetaminophen by mothers in pregnancy could be linked to ADHD:
- Based on experiments with mice, it might alter levels of neurotropic factors, lower fear responses and reduce learning abilities in adulthood
- It can interfere with maternal hormones related to fetal development
- It could interrupt brain development by bringing on oxidative stress, causing neuron death



- Prenatal Exposure to Acetaminophen and Risk of ADHD
  - Eivind Ystrom, Kristin Gustavson, Ragnhild Eek Brandlistuen, Gun Peggy Knudsen, Per Magnus, Ezra Susser, George Davey Smith, Camilla Stoltenberg, Pål Surén, Siri E. Håberg, Mady Hornig, W. Ian Lipkin, Hedvig Nordeng, Ted Reichborn-Kjennerud, Pediatrics/ November 2017, VOLUME 140 / ISSUE 5

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Pain medication use during pregnancy

Use of acetaminophen (paracetamol) during pregnancy and the risk of attention-deficit/hyperactivity disorder in the offspring. J Clin Psychiatry. 2016 Mar;77(3):e312-4. doi: 10.4088/JCP.16f10721.

Prenatal Exposure to Acetaminophen and Risk for Attention Deficit Hyperactivity Disorder and Autistic Spectrum Disorder: A Systematic Review, Meta-Analysis, and Meta-Regression Analysis of Cohort Studies Reem Masarwa Hagai Levine Einat Gorelik Shimon Reif Amichai Perlmanılan Matok,*American Journal of Epidemiology*, Volume 187, Issue 8, 1 August 2018, Pages 1817–1827, https://doi.org/10.1093/aje/kwy086

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Traumas, Injuries, Accidents, Falls

Motor vehicle accident during the second or third trimester of pregnancy.
Acta Obstet Gynecol Scand. 1997 Apr;76(4):313-7. Aitokallio-Tallberg A¹, Halmesmäki E

- Trauma/ MVA
  - 3.4-38% miscarriage rate highest non obstetrical death
  - A large cohort study investigating 2147 car crashes between 2000 and 2007 found that the most common complications of MVA in pregnancy include placental abruption (1.6% vs. 0.5% in general population), unspecified antepartum hemorrhage (4.7% vs. 3% in general population), and preterm birth (8.3% vs. 6.4% in general population). APRIL JOGC AVRIL 2013

- **CONCLUSION:** Frontal collisions are associated with lower vehicular speed, less trauma and no acute or later effects on pregnancy, whereas broadside collisions and high speed (> 80 km/h) cause more symptoms. The latter type of accidents are associated with high risk of placental abruption and of fetal and maternal death. Fortunately, the symptoms are evident immediately after the accident, and early hospital discharge is possible if no abnormalities are present during the first hours.

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Maternal trauma due to motor vehicle crashes and pregnancy outcomes: A systematic review and meta-analysis

Amezcua-Prieto C, Ross J, Rogozińska E, et al., BMJ Open

19 Studies (3.2 million pregnancies)

Increased risk of

- Placental abruption
- Preterm birth
- Cesarean delivery
- Fetal death
- Maternal mortality

Even apparently minor crashes may warrant obstetric evaluation.

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Perinatal implications of motor vehicle accident trauma during pregnancy: identifying populations at risk

Tomas Luley, DO[a] et al

- MVA is also the most common cause of traumatic fetal death.
- unrestrained women were significantly more likely to experience a perinatal death after an MVA.
- Placental abruption has been reported to be of concern after major and minor trauma and is the primary reason for the observation and fetal and uterine activity monitoring criteria advocated by the American College of Obstetricians and Gynecologists.

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Cord blood toxins

- **Environmental Working Group (EWG) "Body Burden: The Pollution in Newborns" study (2005)**. Researchers tested umbilical-cord blood from 10 U.S. newborns and detected **287 different industrial chemicals and pollutants across the samples**, with **154–231 chemicals detected in an individual newborn**. The study reported an average of roughly 200 compounds per newborn.

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Maternal Health Concerns Associated with Intrauterine Constraint

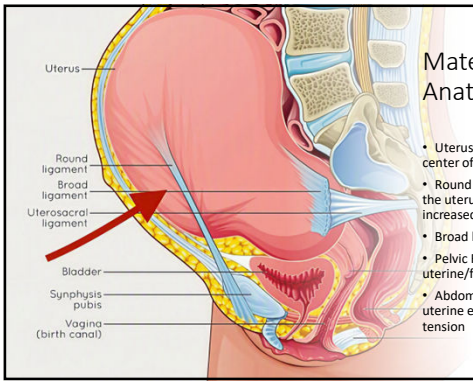
Maternal Condition	Mechanism of Constraint	Potential Fetal Outcomes
Oligohydramnios	Reduced amniotic fluid limits fetal movement	Torticollis, DDH, clubfoot, craniofacial molding, limb contractures
Uterine fibroids (Leiomyomas)	Occupy uterine space and distort the uterine cavity	Breech presentation, fetal malposition, plagiocephaly, torticollis
Congenital uterine anomalies (bicornuate, septate, unicornuate uterus)	Abnormal uterine shape restricts fetal positioning	Breech, DDH, cranial molding, limb deformities
Primigravida (first pregnancy)	Increased uterine and abdominal wall tone may reduce available fetal space	Breech presentation, torticollis, plagiocephaly
Multiple gestation (twins, triplets)	Shared uterine space limits fetaReduced available space late in pregnancyl movement	Plagiocephaly, torticollis, DDH, foot deformities
Macrosomia (large fetus)	Reduced available space late in pregnancy	Shoulder dystocia, torticollis, cranial molding
Maternal pelvic abnormalities	Narrow pelvis may influence fetal position	Persistent malpresentation and molding
Placental abnormalities	Mechanical reduction in uterine space	Fetal malposition and asymmetric positioning
Maternal obesity	May be associated with fetal macrosomia and malpresentation	Indirect increase in mechanical constraint
Maternal diabetes mellitus	Increased risk of fetal macrosomia	Increased uterine crowding and malposition

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Explain

- Explain common fetal positioning patterns and their biomechanical implications in the maternal patient.

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Maternal Anatomy

- Uterus: expands and changes center of gravity
- Round Ligament: Helps support the uterus and experience increased tension
- Broad ligament: Uterine support
- Pelvic Floor: Supports increasing uterine/fetal load
- Abdominal Wall: Accommodates uterine expansion and changing tension

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Hormones of Pregnancy

Relaxin is produced during gestation

→ Relaxin contributes to the relaxation of "all" the joints of the body including vertebral and pelvic joints.

- **The Pelvic Girdle**, Diane Lee

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Starting in 1st trimester the body begins to produce increasing amounts of the hormone Relaxin.
This natural chemical softens the connective tissues between the skeletal bones.
Ligament laxity and hypermobile joints along with changing center of gravity from the growing uterus and breasts leads to an impairment of agility, coordination and balance which increase the likelihood of fall and injury.
A Pregnant woman's risk of falling is the same as a woman who is 70 years old

Goodwin, T. Cain Crew Maternity Policy :Health and Safety Issues. Aviation Medicine

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- **Association Between Pregnancy-Related Hormones and Lumbopelvic Pain Characteristics in Pregnant Women: A Scoping Review**

Catherine Daneau; Marlène Houle; Mégane Pasquier; Stephanie-May Ruchat; Martin Descarreaux
J Manipulative Physiol Ther. 2021 Sep;44(7):573-583.
doi:10.1016/j.jmpt.2021.10.001. Epub 2021 Dec 9.

- **Abstract**

Objectives: The objectives of this scoping review were (1) to document and quantify the potential associations between lumbopelvic pain characteristics and pregnancy-related hormones, and (2) to identify research approaches and assessment tools used to investigate lumbopelvic pain characteristics and pregnancy-related hormones. **Methods:** The literature search was conducted in six databases (MEDLINE, Academic Search Complete, Cumulative Index to Nursing and Allied Health Literature, SportDiscus, PsycINFO, and Cochrane) from inception up to March 2020 and completed using search terms relevant to pregnant women, pregnancy-related hormones, and lumbopelvic pain. The risk of bias was assessed using the characteristics recommended by Guyatt et al. for observational studies. **Results:** The search yielded 1,015 publications from which nine met the inclusion criteria. Relaxin was the most studied pregnancy-related hormone. An association between relaxin levels and lumbopelvic pain presence or severity was found in 4 studies, while five studies did not report an association between them. One study reported an association between relaxin and lumbopelvic pain presence or severity while two studies reported no association and were considered as having a low risk of bias. One study reported measures of estrogen and progesterone levels. It showed that progesterone levels were found to be significantly higher in pregnant women with lumbopelvic pain compared to those without, while estrogen concentrations were similar in both groups. **Conclusion:** The literature showed conflicting evidence regarding the association between pregnancy-related hormones and lumbopelvic pain characteristics in pregnant women. The assessment tools used to investigate lumbopelvic pain characteristics and pregnancy-related hormones are heterogeneous across studies. Based on limited and conflicting evidence, and due to the heterogeneity of assessment tools and overall poor quality of the literature, the association between pregnancy-related hormones and lumbopelvic pain characteristics is unclear.

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Postural alignment is also altered significantly by weight gain and shifts in the center of gravity.

This causes increased areas of pain and discomfort all over the body.



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Neuromusculoskeletal pain is exceedingly common, with 45% to 70% of patients reporting back and or pelvic pain during pregnancy

Wang SM, Dezinno P, Maranets I, et al. Low back pain during pregnancy: prevalence, risk factors, and outcomes. Obstet Gynecol. 2004;104:65–70.
Tailor Y, Preston-Hsu E. Back pain: clinical updates in women's health care primary and preventive care review. Obstet Gynecol. 2019;134:664



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Maternal Health, Biomechanical Changes And Chiropractic



- Considerations
  - **Uterine expansion** changes the center of gravity for the mother causing the pelvis to shift forward. This causes an increase in lumbar lordosis, creating increased tension in the hip flexors and erector spinae muscles.
  - **Lumbar Lordosis**; Increase may contribute to facet joint compression, lower back pain, increase load/stress to intervertebral disc and ligamentous structures.
  - **Ligamentous Laxity** is impacted by increase hormone levels, (Relaxin, Estrogen, Progesterone) that soften connective tissue that may lead pelvic instability, altered gait and general discomfort of movement

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Maternal Health, Biomechanical Changes And Chiropractic



SI Joint Mechanic experience increased mobility that can lead to pelvic, buttock and leg pain. Sustained postures may contribute to asymmetry.

Pubic Symphysis pain or dysfunction may be impacted by late term weight distribution and pregnancy waddling gait. (altered stride width causing strain of the IT band, gluteal muscles, feet and ankles)

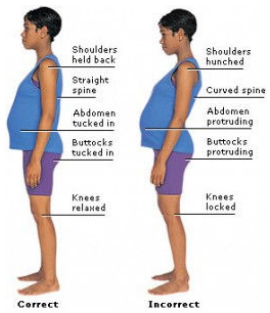
Thoraco-Lumbar pain may be associated with kyphotic posture changes. Rib pain may also be a presenting complaint

Core Stability decreases as abdomen increases; diastasis recti contributes to overuse of paraspinal muscles

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Postural Changes and Complaints

- Anterior pelvic tilt (increased lordosis)
- Rounding of the shoulders
- Forward head posture
- Shifted center of gravity



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Functional Movement

- Sit to Stand
- Forward bending
- Lifting

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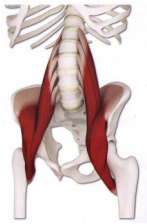


Back Pain

- Gravitational stress
- Posture
- Bio mechancical changes
- Hormonal Changes
- Position of the Baby
- Ligamentous changes

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As pregnancy progresses…



The iliopsoas shortens (decreasing the superior/inferior diameter of the abdominal cavity as well as the A-P diameter by increasing the lumbar lordosis)

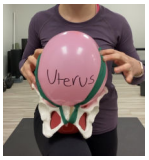
The piriformis remains contracted maintaining the external rotation of the legs to create balance compensating for the shifting center of gravity.

Round Ligament: Contracture causes patient to present with groin pain

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Common Palpation Findings

- Tenderness SI Joints
- Asymmetry iliac crest
- Abdominal pain
- Rib Flaring

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Subluxation's Role in Common Conditions of Pregnancy

Low back pain w or w/o sciatica
- Psoas and piriformis imbalance and the abdomen enlarges

Meralgia Paresthetics
- Obesity? Sitting a lot? Tight pants?

Pubic Symphysis Pain
- The pelvis has a joint in the anterior as well

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Illiopsoas & Piriformis

A band of pain across the low back?	• Most frequently, bilateral piriformis spasm and psoas weakness
Cause?	• Posterior traction on sacrum resulting in band-like pattern instead of sciatica
Treatment?	• Adjust any detected subluxation of the lumbar spine, sacrum or sacroiliac joints • Soft tissue manipulation of the piriformis and illiopsoas and strengthening the psoas as indicated

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Illiopsoas & Piriformis

Sciatic Pain?
- Usually unilateral piriformis spasm

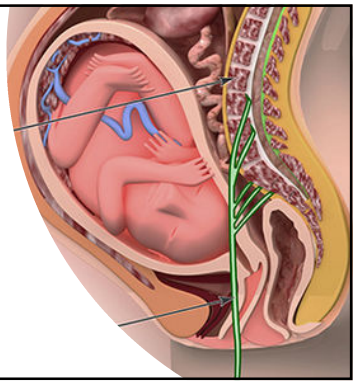
Cause?
- Spasm is usually on the opposite side. As the muscle spasms and contracts, the sacrum is pulled to the side of contraction, and the opposite piriformis tractions down onto the sciatic nerve

Treatment?
- Adjust any detected subluxation of the lumbar spine, sacrum or sacroiliac joints
- Soft tissue manipulation of the piriformis opposite the side of pain (and ipsilateral illiopsoas) and strengthening the psoas as needed

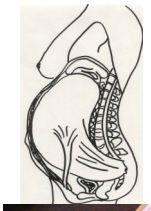
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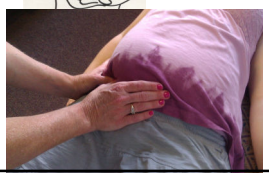
Sciatic Neuralgia

- Most common condition seen in pregnancy
- Increased muscular activity of the piriformis and iliopsoas due to biomechanical stress of gravid uterus
- The entire pelvis is capable of increased movement due to hormones of pregnancy resulting in
  - relaxed joint capsules
  - increased lumbar lordosis
  - opening of the pelvic outlet
- Compression of the Lumbar plexus resulting in irritability and pain into the buttocks and down the leg
  - Chiropractic & Pregnancy
  - Joan Fallon



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Round Ligament Contractures

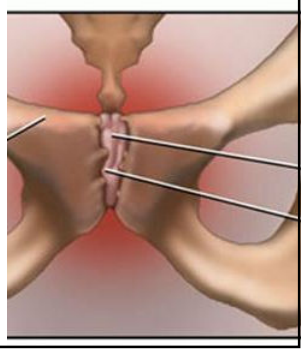
- Patient Complaint
- pain in the anterior groin
  - First felt twisting to get out of bed
- Cause?
  - Round ligament contracture
- Treatment?
  - Soft tissue release, massage and stretching

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Pubic Symphysis

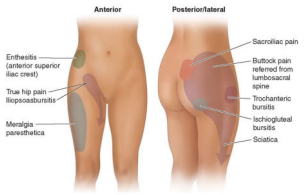
- A sharp and sometimes overwhelming pain in the region at the front of the pubic area.
- Stabbing, shooting, or a burning type of pain which can also be felt into the hip bones, the back, the perineum and the backs of the legs.
- A waddling walking gait.
- Knee pain which may extend down to the ankles and the feet. This is generally a result of alignment problems further up in the pelvis.
- When lifting one leg in front of the other or when standing on one leg e.g. when climbing stairs, getting out of bed or twisting, the pain can be felt more acutely.
- Often the pain is worse at night when lying on the back. Turning over in bed and lifting the legs to get out of bed can exacerbate the pain.
- A grating, clicking or grinding noise may be heard or even felt in the region of the pubic bone.
- Difficulty walking especially after standing still for a period of time.
- Some women experience urinary incontinence.

Huggiea international



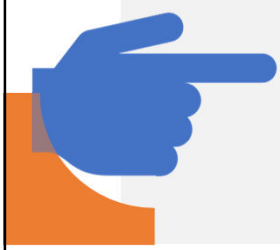
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Meralgia Paresthetica



- Meralgia paresthetica is a condition characterized by tingling, numbness and burning pain in your outer thigh. The cause of meralgia paresthetica is compression of the nerve that supplies sensation to the skin surface of your thigh. (Lateral femoral cutaneous)
- Tight clothing, obesity or weight gain, and pregnancy are common causes of meralgia paresthetica. However, meralgia paresthetica can also be due to local trauma or a disease, such as diabetes.

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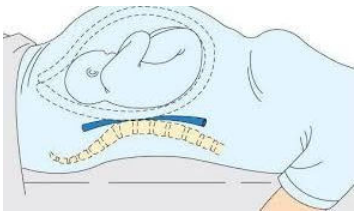
Buckled Sacrum

- CC:
  - premature contraction
  - anterior thigh pain
  - anterior abdominal pain
- Examination:
  - Performed with patient standing with arms outstretched balancing on the wall. Apply anterior/caudal pressure to sacral segments to detect angular buckling of one or more segments
- Possible Cause of pain:
  - is the anterior shift of the uterus onto the inguinal canal with pressure on the cervix
- Treatment:
  - have patient "assume the position" on all fours
  - Apply caudal pressure to sacral segments until angulation smoothes
  - the examiner may feel the uterus shift anterior and superior as the sacrum relaxes and all pain resolves

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Supine Hypotension Venal Cava Syndrome

- Dizziness
- Shortness of breath/air hunger
- Nausea



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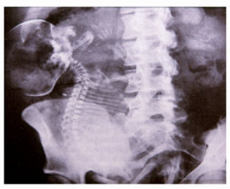
In - Utero Constraint

- Physical forces on a fetal spine have biomechanical implications
- The fetus has nine months in utero for aberrant forces to occur prior to birth. These assymetric forces alter the development of the cartilaginous spinal column and its soft tissue support structures
- Effects preparation for labor and delivery by impeding engagement of the head of the baby in the pelvis
- Unfavorable labor has affects on mother's pelvis
- Unfavorable fetal position is often the reason for intervention and the resulting birth trauma
- Birth trauma is an under reported event with lifetime consequences
- Birth trauma is a leading cause of the VSC
- Chiropractors can effectively evaluate and have the tools to influence outcomes

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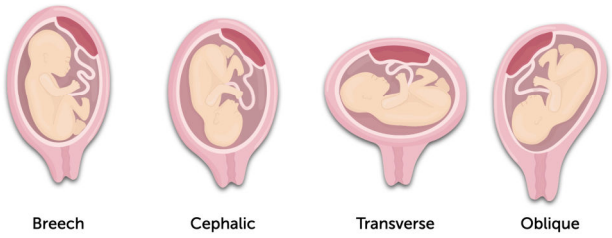
Be Aware

- Complaints in the third trimester of rib pain, chest pain, indigestion and generally not feeling that the baby is right can be symptoms of In-Utero Constraint.

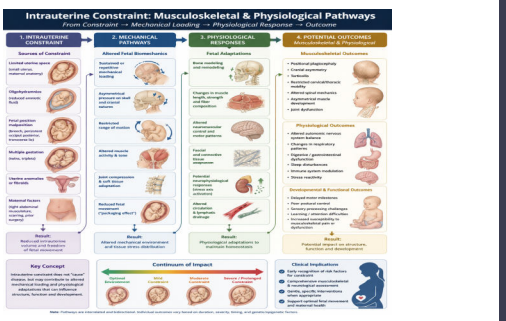


51

Fetal position

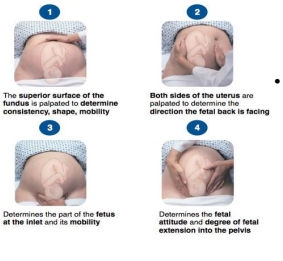


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53

Leopold's Maneuver

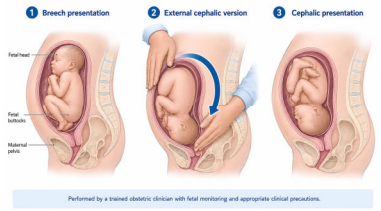


- **4th maneuver**
  - The examiner is now facing the feet of the patient and placing both hands on either side of the lower abdomen just above the inlet.
  - Determine head flexion or extension

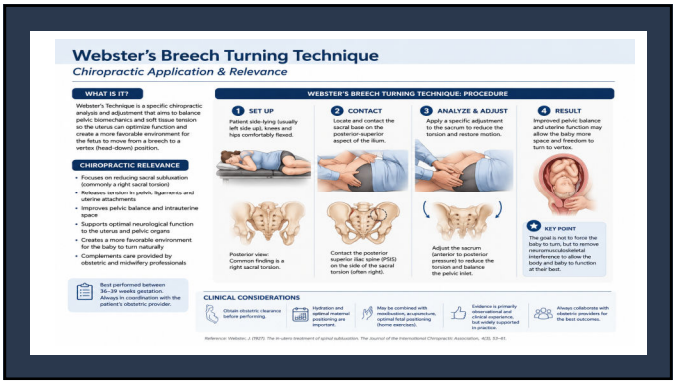
54

Medical Model for breech turning External Cephalic Version

- Performed in hospital 36-42 wks.
- Medication (terbutaline) used to relax uterus.
- Ultrasound exam to determine location of baby and placenta and amniotic fluid
- Heartbeat monitored
- Risks
  - Twisting or squeezing cord
  - Rupture amniotic sac
  - Placenta abruptio
  - Labor-emergency section
  - Rh negative mothers



55



56

Smith's Recognizable Patterns of Human Deformation 5th ed

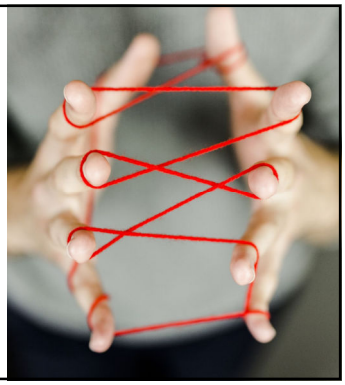
Explains:

- Mechanical uterine compression
- Oligohydramnios
- Breech positioning
- Twin gestation
- Restricted fetal movement
- Musculoskeletal consequences

57

Chiropractic Care

- Modify techniques (both massage and chiropractic) and adjustive force based on stage of pregnancy
- Utilize appropriate supports as necessary
  - Sacroiliac
  - Abdominal/lumbar
    - "Reduction of posterior pelvic pain by a non elastic pelvic support was experienced by 82% of the women with posterior pelvic pain"
      - Ostgaard, et al, Spine 1994



58

Alignment is Important

59

Careful, Careful, Careful

60

What Does research say about Chiropractic care during pregnancy?

61

Possible Benefits From Chiropractic Care in Literature

- ✓ Improved maternal comfort
- ✓ Better mobility during labor
- ✓ Reduced back and pelvic pain
- ✓ Improved pelvic biomechanics
- ✓ Potentially fewer mechanical obstacles to fetal descent
- ✓Shorter Labor

- Hawk C, et al. *Best Practices for Chiropractic Care of Pregnant and Postpartum Patients.* **Journal of Manipulative and Physiological Therapeutics.** 2023.
- Stuber KJ, Smith DL. Chiropractic treatment of pregnancy-related low back pain and pelvic girdle pain: A systematic review. **Journal of Manipulative and Physiological Therapeutics.** 2022.

62

Pregnancy and chiropractic:

A narrative review of the literature
Cara L. Borggren, J Chiropr Med. 2007 Spring; 6(2): 70–74.

- Chiropractic evaluation and treatment during pregnancy may be considered a safe and effective means of treating common musculoskeletal symptoms that affect pregnant patients.
- Shaw reports the results of a chiropractic and medical collaborative study indicating that 75% of pregnant patients who received chiropractic care during their pregnancies stated that they found relief from pain.

63

Pregnancy Research Articles

- Lumbopelvic presentations in pregnancy through the lens of Sacro Occipital Technique. Ramneek S. Bhogal, DC, DABCI and Stephanie O'Neill Bhogal, DC,DICCP
- Forces involved with labor and delivery-a biomechanical perspective. Grimm MJ.Ann Biomed 2021 Aug;49(8):1819-1835. doi: 10.1007/s10439-020-02718-3. Epub 2021 Jan 11.
- Review of: Forces involved with labor and delivery—a biomechanical perspective. Sue A. Weber DC, MSc

64

Spinal Manipulation and adverse event pregnant patient limits estimation of relative risk: a narrative review J Man and Manip ther 2022, Sep

- Back Pain 68%
- Back pain, pelvic girdle 76%
- Upper back 42%
- Neck 20%
- HA 17%

- 2 studies mild/not adverse SI distraction
- 6% soreness after lumbopelvic manipulation (Petersen)
- Thoracic no adverse
- Cervical 5 major events, 2 non chiropractic

65

Spinning babies web site

- *Penny Simkin brought it up this summer in her talk about What We Don't Know About the OP Baby. It is less important to know the fetal position than it is important to respond to the needs of the birth. The muscles, ligaments and bones may need accommodation regardless of fetal position. In other words, tension in the psoas pair of muscles or pelvic floor can delay an anterior baby and a posterior baby. Extension of the anterior fetus' head can prevent engagement in some pelvises. The main point is that we can, when needed, promote progress regardless of fetal position.*

66

Discuss

- Discuss the effects of birth biomechanics and delivery interventions on the newborn musculoskeletal system

67

3rd Trimester Complications

PLACENTA PREVIA: placenta in front of presenting part due to low implant.

ABRUPTIO PLACENTA: part of placenta has detached from uterine wall. Bleeding may be "concealed" or "revealed" (subtypes)

Dx: ULTRASOUND will differentiate location and integrity of placenta.

68

Case Study

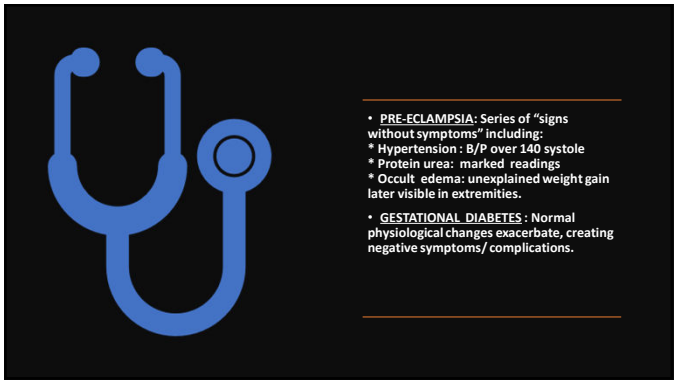
69

Hypothermia to Treat Neonatal Hypoxic Ischemic Encephalopathy: Systematic Review

Prakesh S. Shah, MD, MSc, FRCPC; Arne Ohlsson, FRCPC, MSc; Max Perlman, FRCPC

- Asphyxia accounts for 23% of the 4 million annual global neonatal deaths.[1] In developed countries, the incidence of postintrapartum asphyxial hypoxic-ischemic encephalopathy (HIE) is 1 to 2 in 1000 live births.[2] Pathologic and imaging investigations in the last 2 decades have clarified cellular injury mechanisms occurring after asphyxia.[3] The secondary neuronal damage that follows the primary insult is the target for preventive interventions. Hypothermia, both systemic (whole body) and selective (head cooling), has shown promise in studies in animals, neonates, and adults.[4-9] Possible mechanisms of action of hypothermia include reduced neuronal metabolic demand, reduced cytotoxin accumulation, and prevention of apoptosis during secondary energy failure.[10]

70



- **PRE-ECLAMPSIA: Series of "signs without symptoms" including:**
  - *** Hypertension : B/P over 140 systole**
  - *** Protein urea: marked readings**
  - *** Occult edema: unexplained weight gain later visible in extremities.**
- **GESTATIONAL DIABETES : Normal physiological changes exacerbate, creating negative symptoms/ complications.**

71

Labor, Birth and the Baby



72

Labor and Delivery

Prolonged

Precipitous

73

Importance to a Chiropractor

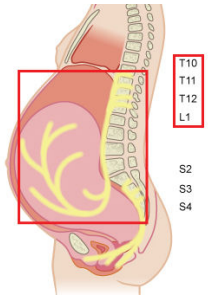
Prolonged: Increased compressive and torsional forces

Precipitous: Rapid decent. Less time for gradual adaptation

74

Neurological Supply -Labor

- Parasympathetic fibers of the uterus are derived from the pelvic splanchnic nerves (S2-S4). The cervix is largely innervated by the inferior nerve fibers of the uterovaginal plexus. The afferent fibers mostly ascend through the inferior hypogastric plexus to enter the spinal cord via T10-T12 and L1 nerve fibers.



75



76

Importance to a Chiropractor

- Induction: stronger, more frequent contractions, increased compressive load on baby, increased length of labor time
- Interventions-Instrument assisted deliveries
- Forceps: High localized forces to the head and upper cervical spine
- Vacuum extraction: traction forces to the head and cervical spine, cervical strain patterns, cephalohematomas, caput succedaneum
- Cesarean section: Non-labor Lack of compression, possible impact on spinal proprioception and tone regulation. Difficult extraction can traction head and neck.

77

Importance to a Chiropractor

Compression : passage through birth canal compresses cranial bones, cervical and thoracic spine

Traction: Pulling forces affects upper cervical spine (CO-C2)

Rotation: Baby normally rotates through canal assistance could cause segmental subluxation

Lateral Flexion: shoulder dystocia or asymmetrical decent

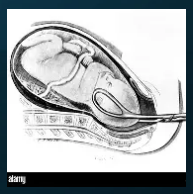
78

Interventions

- Forceps
- Vacuum Extraction
- Cesarean Section
- Induction/augmentation (Pitocin)

79

Forceps





80

Vacuumn Extraction





81

HEAD SHAPE

- During the birth, the baby's head is compressed and the cranial plates overlap.
- This process is called molding
- Note depressed frontal bone



82



Perform a Cranial Exam

- General observation before touching
- Head position and spontaneous movement
- Facial symmetry
- Resting posture and tone
- Alertness/state regulation
- Quality and symmetry of cry
- Observe feeding if appropriate



83

Newborn	24-48 hours	2 weeks
• During vaginal birth the cranium is deformed resulting in an elongated head shape	• The cranial bones slowly glide back into place leaving the infant with a more rounded head	• NO visible displacement of the cranial bones

84

Head shape and cranial symmetry

- View from anterior, posterior, lateral, and superior perspectives
- Assess for plagiocephaly/brachycephaly
- Frontal and occipital symmetry
- Ear position
- Facial/orbital symmetry
- Measure head circumference when indicated



85

Scalp, sutures, and fontanelles

- Inspect/palpate scalp
- Anterior and posterior fontanelles
- Sagittal, coronal, lambdoid, and metopic sutures
- Look for unusual ridging, widening, overlapping, swelling, or asymmetry
- Distinguish positional molding from findings warranting medical evaluation



86

Cervical and craniovertebral assessment

- Resting head rotation
- Active cervical movement
- Gentle passive ROM when appropriate
- Upper cervical symmetry
- SCM tone and symmetry
- Screen for torticollis



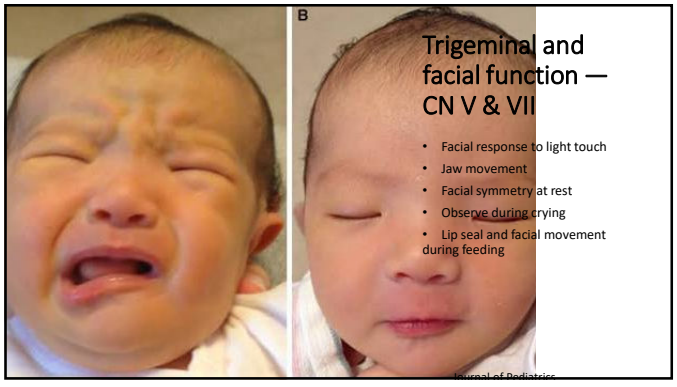
87



Eyes and visual responses — CN II, III, IV, VI

- Pupil size/symmetry and light response
- Eye position
- Fixation
- Tracking appropriate to developmental age
- Conjugate eye movements
- Observe for persistent strabismus or nystagmus

88



Trigeminal and facial function — CN V & VII

- Facial response to light touch
- Jaw movement
- Facial symmetry at rest
- Observe during crying
- Lip seal and facial movement during feeding

89

Auditory/vestibular function — CN VIII

- Response to sound
- Startle/orienting response as developmentally appropriate
- Observe head/eye responses and balance in older infants



90

Oral cavity and feeding examination — CN V, VII, IX, X & XII

- Palate and oral structures
- Tongue position and movement
- Suck strength and rhythm
- Suck–swallow–breathe coordination
- Gag when clinically indicated rather than routinely provoking it
- Voice/cry quality
- Signs of coughing, choking, fatigue, or aspiration during feeds



91

Caput Succedaneum



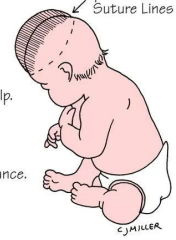


92

CAPUT SUCCEDANEUM

Cap Goes Across Suture Lines

- Boggy edematous swelling of the fetal scalp.
- Disappears without treatment.
- No pathological significance.



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93

CAPUT SUCCEDANEUM		CEPHALOHEMATOMA
Swelling of the scalp itself, not involving bleeding under the skull		A collection of blood between baby's scalp and skull
Caused by prolonged pressure being exerted on baby's head during delivery by a dilated cervix or vaginal walls **Using forceps or extraction tools can increase chances	CAUSE	Commonly caused by blood vessels that were damaged during labor and delivery **May be damaged from difficult delivery, forceps, or vacuum extraction
Extends across suture lines; not well defined	LOCATION	Well defined by suture; gradually developing, hard edge
Size largest at birth, gradually subsides within 48 hours	SIZE	Becomes larger after birth, then disappears within 6-8 months
• Puffiness/bulging around affected area • Bruising of baby's scalp • Increased molding (elongation) of baby's head • Newborn jaundice (not always)	SYMPTOMS	• Accumulation of blood under the scalp and above baby's skull, causing bulging **Because of its location under the periosteum, you will probably not see any cut or bruise on the surface of the skin over the bulge
Typically no underlying skull bone fracture	DAMAGE	May have underlying skull bone fracture
Almost always goes away on its own within a few days **If jaundice, light therapy	TREATMENT	Let the body naturally reabsorb the collected fluid; will resolve within a few months **If complications arise, drain the blood

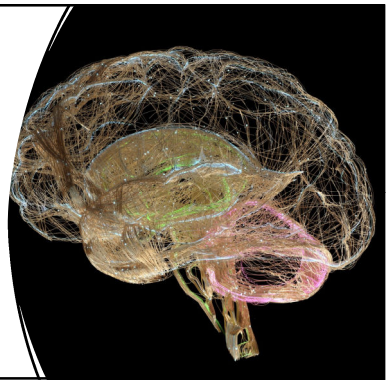
94

Three-dimensional magnetic resonance imaging of fetal head molding and brain shape changes during the second stage of labor

Olivier Ami ,Jean Christophe Maran,Petra Gabor,Eric B. Whitacre,Dominique Musset,Claude Dubray,Gérard Mage,Louis Boyer

Published: May 15, 2019
https://doi.org/10.1371/journal.pone.0215721

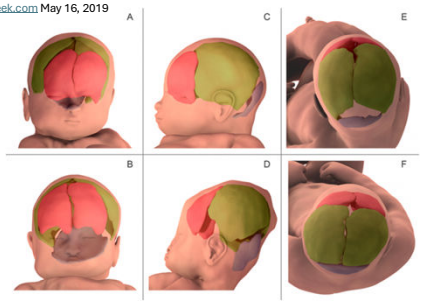
- Abstract
- "To demonstrate and describe fetal head molding and brain shape changes during delivery, we used three-dimensional (3D) magnetic resonance imaging (MRI) and 3D finite element mesh reconstructions to compare the fetal head between prelabor and the second stage of labor. A total of 27 pregnant women were examined with 3D MRI sequences before going into labor using a 1 Tesla open field MRI. Seven of these patients subsequently had another set of 3D MRI sequences during the second stage of labor..."



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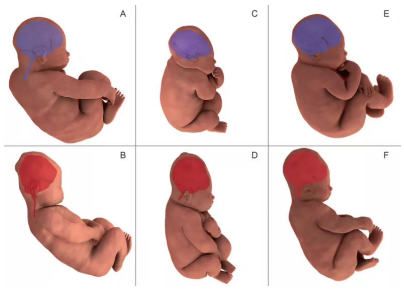
3D MRI Images Show How a Baby's Head Shape Changes During Labor in Incredible Detail

www.newsweek.com May 16, 2019



96

Three-dimensional fetal brain MRI reconstruction before labor (shown in purple in A, C, E) and during the second stage of labor (shown in orange in B, D, F). **PLOS ONE**



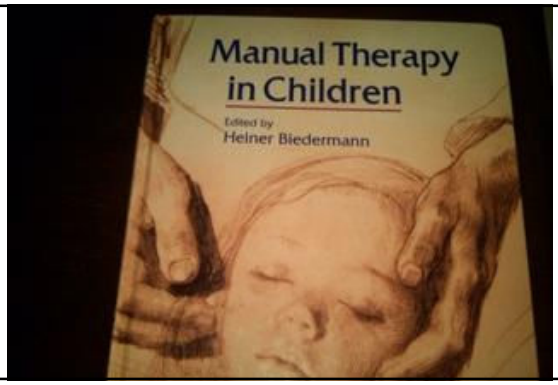
97

Birth

- **The Stress of Being Born**, Hugo Lagercrantz and Theodore Slotkin Scientific American, April 1986
- Catecholamine release during labor
  - Promotes normal breathing
  - Alters blood flow to protect heart and brain against asphyxia
  - Immediate mobilization of fuel for energy
  - Enhances maternal-infant attachment



98



99

Birth Trauma and its Implications for neuromotor development
Sacher R

"When considering injuries and dysfunctions of the spine and its associated structures, the significance of birth trauma is often underestimated and the resulting symptoms frequently misinterpreted.

The consequence of trauma to the baby during birth and in the months immediately preceding and following the birth are thus concern not only to gynecologist and pediatricians, but also to practioners of manual therapy."

100

"Every C-section involves considerable traction on the spine and its associated structures regardless of the fetus being taken out by legs or head."

The report of false diagnosis (including pediatric neurology) is four out of five cases where severe injury to the spinal cord occurred

101

Research

- **Forces involved with labor and delivery-a biomechanical perspective**
  Grimm MJ.
  Ann Biomed 2021
- **Review of: Forces involved with labor and delivery—a biomechanical perspective**, By Sue A. Weber DC, MSc
- **Chiropractic Care for the Pregnant Body**
  Shayna N Conner, Amanda S Trudell, Craig A Conner

102

Perform

Perform an age-appropriate chiropractic history and examination of newborns and infants.



103

Why History and Exam



104

The Birth History

- Discuss Labor and Delivery
  - Hospital, birth center, home birth
  - Length of time
  - Pushing phase
  - Interventions (epidural, Pitocin, medications etc.)
  - Delivery (assisted, forceps, vacuum extraction-section)
  - Presentation (beech, facial, head)
  - APGAR score
  - NICU
  - Days is hospital
  - Vaccines

105

Apgar sign	2	1	0
Heart Rate	Normal (above 100 beats per minute	Below 100 beats per minute	Absent
Breathing (rate and effort)	Normal rate and effort, good cry	Slow or irregular breathing, weak cry	Absent (no breathing)
Grimace (responsiveness or reflex irritability	Pulls away, sneezes, or coughs with stimulation	Facial movement only(grimace) with stimulation	Absent (no response to stimulation
Activity (muscle tone)	Active, spontaneous movement	Arms and legs flexed with little movement	No movement "floppy tone"
Appearance (skin color	Normal color overall (hands/feet pink)	Normal color (hands/feet bluish)	Bluish-gray or pale all over

106

NEWBORN HISTORY FORMS

What forms should be used to properly document the newborn history?

- Demographics and consent
- Pregnancy history
- Birth history
- Newborn history



107

OBSERVATION
(BEFORE YOU TOUCH THE INFANT)

- COLOR: Normal = pink or pink undertones
- POSTURE/TONE: Normal = flexed and strong
  - Positioning of head, neck, extremities
- ACTIVITY: good and responsive to the exam
  - Symmetric, no hypotonus, not jittery, not flaccid



108



BODY POSTURE

Newborn posture is best examined with baby supine.

Observe & listen throughout the exam

- Preferred position
- Head tilt
- Asymmetric movement
- Hypotonia
- Jitters

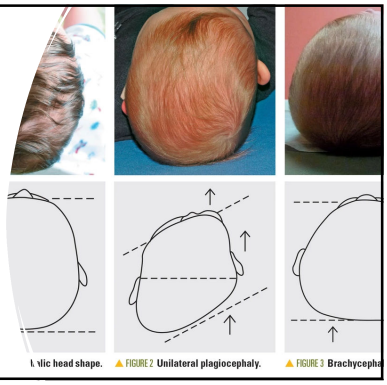
109

Newborn Skull Shape Types

Brachycephaly Characteristics
Brachycephaly presents as a broad, short head due to early closure of the coronal sutures.

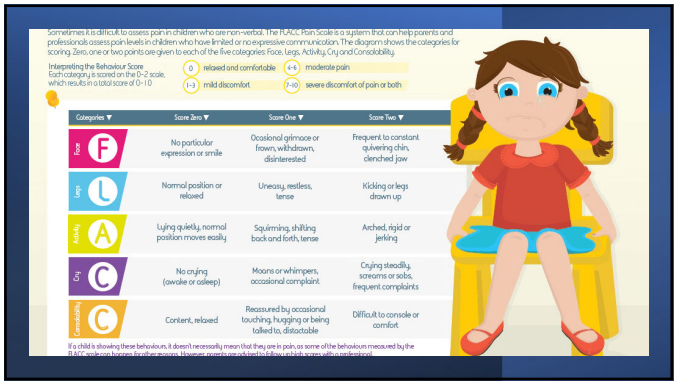
Dolichocephaly Features
Dolichocephaly shows a long, narrow skull, often observed in premature infants.

Plagiocephaly Signs
Plagiocephaly is characterized by asymmetrical flattening on one side of the skull, commonly caused by external pressure.



...vic head shape. ▲ FIGURE 2 Unilateral plagiocephaly. ▲ FIGURE 3 Brachycepha

110



111

Primitive reflexes and neurologic integration

- Rooting
- Suck
- Moro
- Palmar grasp
- Plantar grasp
- ATNR
- Galant and stepping



112

Rooting Reflex

- This reflex starts when the corner of the baby's mouth is stroked or touched. The baby will turn their head and open their mouth to follow and root in the direction of the stroking. This helps the baby find the breast or bottle to start feeding. This reflex lasts about 4 months.



113

Moro Reflex

- The Moro reflex is often called a startle reflex. That's because it usually occurs when a baby is startled by a loud sound or movement. In response to the sound, the baby throws back their head, extends out their arms and legs, cries, then pulls the arms and legs back in. A baby's own cry can startle them and set off this reflex. The Moro reflex lasts until the baby is about 2 months old.



114

Grasp Reflexes (Palmar-Plantar)

- Stroking the palm of a baby's hand causes the baby to close their fingers in a grasp. The grasp reflex lasts until the baby is about 5 to 6 months old. A similar reflex in the toes lasts until 9 to 12 months.



Palmar grasp reflex



Plantar Grasp Reflex

115

Fencer/ATNR

- When a baby's head is turned to one side, the arm on that side stretches out and the opposite arm bends up at the elbow. This is often called the fencing position. This reflex lasts until the baby is about 5 to 7 months old.



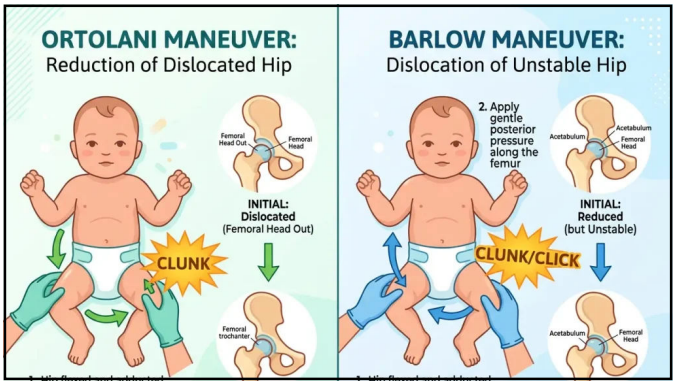
116

Galant Reflex

- Prone position, stroke the paravertebral area unilaterally. The response should be the pelvis should swing/lateral flex to the side stimulated. Birth to 4-6 months



117



118

ALLIS' TEST

- Flex hips and knees and check knee height
- One knee lower suggests DDH/CHD on the low side



119

Recognize

Recognize clinical signs associated with intrauterine constraint in newborns and infants.

120

Complications Potentially Associated with Constraint

- Craniosynostosis
- Plagiocephaly-Torticollis
- Shoulder Dystocia
- Postural Changes
- Dysregulation
- Club Foot

121

Importance to a Chiropractor

- Often observed during normal pediatric chiropractic exam/assessment
- Cervical rotation (one side feeding, altered feeding positions)
- Torticollis
- Plagiocephaly (positional or structural)
- Thoracolumbar compensations (lateral flexion, trunk rotation)
- Altered primitive reflex integration
- Dysregulation (sleep, feeding, GI, colic)

122

Craniosynostosis -Plagiocephaly

- Craniosynostosis is a condition where skull sutures fuse prematurely, while plagiocephaly is characterized by a flat spot on the head due to external pressure. Clinically noted is an abnormal shaped head with possible raised ridges along sutures. (developmental delay and brain growth restriction can be associated with this diagnosis
- Plagiocephaly is a condition usually caused by external factors such as position for extended periods of time, intrauterine position, or torticollis. The sutures are not fused in the skull. Symptoms of flattening in the back of the head or side of the head are common. Asymmetrical head shape, ear misalignment.



123

Case study

124

Latching-Feeding difficulties, Difficult Birth

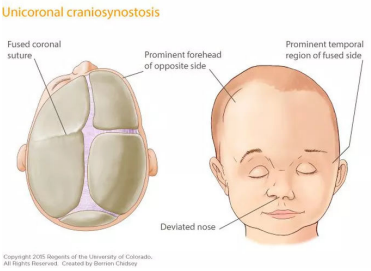
- Mom was referred by an IBCLC for cranial distortion and latching/sucking-feeding well. Will nurse with mother inside lying 1 oz weighted feed-3oz bottle
- Birth HX: Natural occurring pregnancy after 2 failed fertility attempts. 2 minor MVA's, last trimester minor swelling, back pain, fatigue. Membrane sweep at 40.1 contractions started the next day went back to hospital. Mom received pain medication. Broke water, no progression, epidural, Pitocin, no progression, position change-dialation-pushed, heart rate decelerated, changed position pushed 3 hours, vacuum extraction failed first time, vacuum extraction 2nd time was working but head retracted, and presentation was shoulder dystocia, attending push very hard on mother abdomen and the doctor reached and pulled her out. Apgar low at birth recovery-quick, no NICU just suctioned fluid from lungs.(Saturday night to Monday morning) WT9.13, Home 2 days later

125

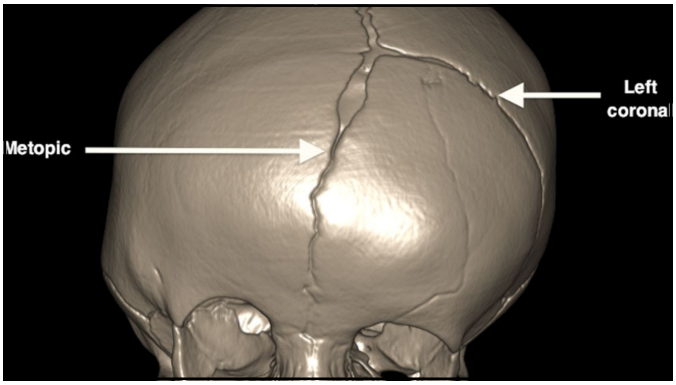
Exam

- 3 weeks old
- Swelling and bruising head Left Parietal bone - vacuum
- Lateral cervical flexion- right, Persistent Rotation Left, Restricted ROM
- Ptosis of eyelid right/appearance slit compared to left
- Infant neuro was within normal with decreased fencer right
- Cranial misalignment, depressed frontal, abnormal molding left temporal, occiput and sphenoid
- Initial visit weighted feed 1.4 oz after care, cross body

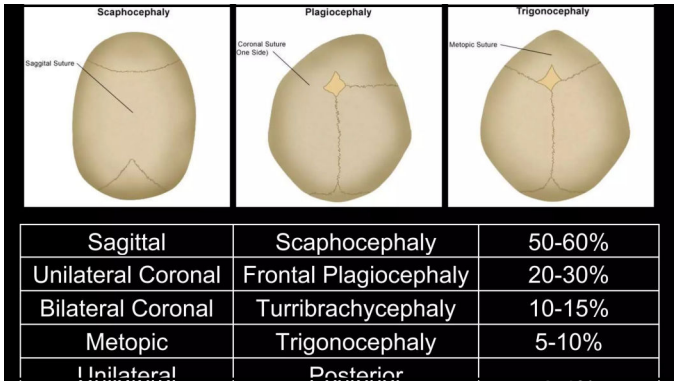
126



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128

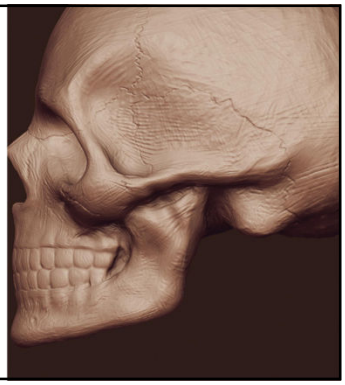


Sagittal	Scaphocephaly	50-60%
Unilateral Coronal	Frontal Plagiocephaly	20-30%
Bilateral Coronal	Turribrachycephaly	10-15%
Metopic	Trigonocephaly	5-10%
Unilateral	Posterior	

129

Treatment

- Craniosynostosis usually involves surgery to correct the fused sutures and reshape the skull when necessary. Early diagnosis can determine the type of surgery performed. Prior to 2 months, microsurgery is an option compared to reshaping.
- Plagiocephaly manage with reposition , chiropractic, PT, helmets. This usually doesn't require surgery



130



Craniosynostosis post surgical

Unilateral Coronal craniosynostosis

131

- **After Endoscopic (Minimally Invasive) Surgery**
- **Helmet therapy is essential.**
- Endoscopic surgery removes the fused suture but relies on **rapid brain growth and helmet guidance** to reshape the skull.
- Typically:
  - Helmet fitting begins **1–2 weeks postoperatively**.
  - Worn **23 hours per day** for **6–12 months**, depending on growth and correction.
- The helmet directs skull growth along open sutures, preventing re-fusion and encouraging normal symmetry.

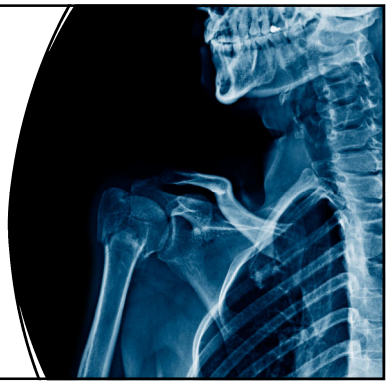


132

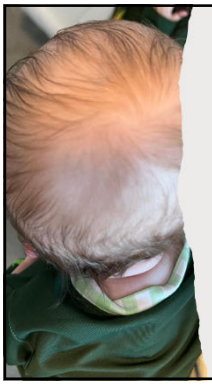
Intrauterine Constraint and Craniosynostosis
Dept of Pediatrics and Surgery (Div Neurosurgery) School of Medicine University California

Higginbottom, Jones, James MD

- Defects of the craniofacial and peripheral skeleton
  - Plagiocephaly
  - Micrognathia
  - Congenital Hip Dislocation
  - Talipes equinovarus



133



Plagiocephaly Characteristics

- Flattening of the cranial bones
- Bossing of the sutures/forehead on flat side
- Prominent cheek on flat side
- Distortion of one eye
- Malposition of ear
- Possible jaw involvement
- Facial asymmetry

134

History



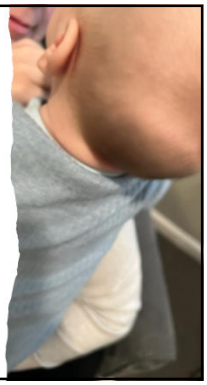
Cries a lot
Doesn't like the car or car seat.
Born with shoulder dystocia
Bruising on the face noted right side and broken blood vessel right eye.
Fussy most of the time
Will not sleep unless held only for a short time.
Swaddle but doesn't like
Can't put him down
He quiets when eating then cries again after
Might sleep for 3 hours once per nighttime
Breastfeeding, won't take a bottle, not sure if he has reflux
He has had a revision for tongue tie. Gaining weight and growing.

135



Clinical observation and evaluation

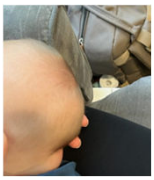
- Extension prominence/Very stiff/rigid
- Irritability/not easily settles
- Screams in supine position
- Happier prone over person's lap
- Low tone facial muscles/difficulty nursing/latch
- Tongue tie release
- Weak tongue
- ROM of cervical spine cause crying and irritability
- Infant reflexes/automatism exam normal
- Reflux
- Occiput malposition

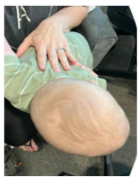


136

Images 3 months with chiropractic care







137

Prevalence Comparison

Condition	Prevalence	Age of Detection	Typical Cause
Craniosynostosis	~1 in 2,000–2,500 live births	At birth or early infancy	Premature fusion of sutures
Positional Plagiocephaly	20–30% of infants (up to 46% mild cases)	4–6 months	External pressure, head positioning

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Summary Comparison

Feature	Craniosynostosis	Deformational Plagiocephaly
Primary Cause	Premature suture fusion	External mechanical forces
Suture status	Fused	Open
Brain growth	May be restricted	Normal
Skull shape	Pattern depends on fused suture	Flattening opposite bossing pattern
Associated syndromes	Often	Rare
Treatment	Surgical correction	Repositioning, physical therapy, helmet if needed

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Deformational Plagiocephaly Prevalence

- **Definition:** Skull asymmetry due to external molding forces; sutures remain open.
- **Overall:** Ranges from **20% to 30%** in infants under 1 year.
- **Peak incidence:** Around **4 months of age**, declines as infants gain mobility.
- **Mild asymmetry:** Seen in up to **46%** of infants.
- **Moderate–severe cases:** Approximately **8–10%**.
- **Risk factors:** Supine sleep position (since "Back to Sleep" campaign), limited neck mobility, firstborn status, prolonged time in carriers or swings.
- **References:**
- Hutchison BL, et al. *Pediatrics.* 2004.
- Mawji A, et al. *Pediatrics.* 2013.
- van Vlimmeren LA, et al. *Pediatrics.* 2007.

140

Deformational (Positional) Plagiocephaly

- **Definition:** Asymmetrical flattening of the skull without premature suture fusion. The sutures remain open.
- **Etiology:**
- **External Mechanical Forces**
  - **Prolonged supine positioning** (most common)
  - **Limited neck rotation** from **congenital muscular torticollis**
  - **Uterine constraint** (first-born status, multiple birth, breech position)
- **Postnatal Factors**
  - Preferred head-turning to one side
  - Extended time in car seats, swings, or carriers
  - Delayed gross motor development (less tummy time)
- **Neuromuscular or developmental causes**
  - Hypotonia or asymmetric motor control contributing to uneven positioning
- **Pathophysiology:** Pressure on one part of the skull causes flattening and compensatory bossing of opposite regions, but sutures remain patent and brain growth is normal.

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Torticollis

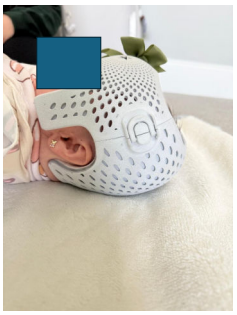
142

Results

- The tight SCM will limit cervical spine range of motion.
- The ear is on the affected side is drawn closer to the ipsilateral shoulder.
- The chin rotates to the opposite side
- Severity of torticollis and deformity of the features is dependant on how long and how severely the baby is stuck in the pelvis
- Cranial deformity is common with torticollis- known as Plagiocephaly

143



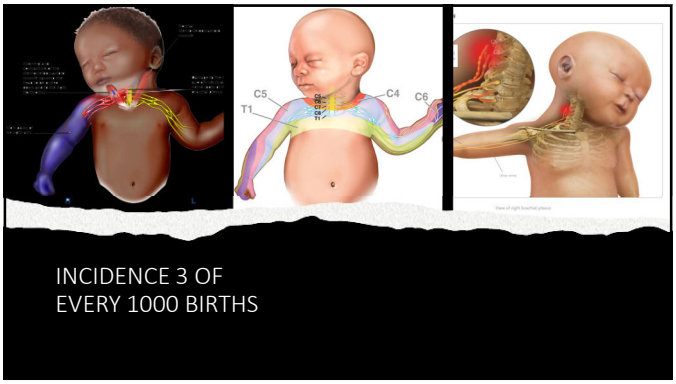


144

Shoulder Dystocia/Brachial Plexus Injuries

- Shoulder dystocia: Significant lateral traction on cervical spine, risk- Brachial plexus injury, Cervical subluxation, facial swelling/compression
- LGA: Increase resistance during delivery, higher compressive and torsional forces
- Prematurity: Increased ligamentous laxity, less structural stability and more susceptible to strain

145



INCIDENCE 3 OF EVERY 1000 BIRTHS

146

Erb's Palsy (C5-6)

Mechanism

- lateral flexion of the head towards the contralateral shoulder with depression of the ipsilateral shoulder producing traction on plexus
- adducted, internally rotated shoulder; pronated forearm, extended elbow ("waiter's tip")

Physical Exam

- C5 deficiency
- axillary nerve deficiency
- deltoid, teres minor weakness
- suprascapular nerve deficiency
- supraspinatus, infraspinatus weakness
- musculocutaneous nerve deficiency
- biceps and brachialis weakness
- C6 deficiency
- radial nerve deficiency
- brachioradialis, supinator weakness

147

Klumpke's Palsy (C8-T1)

Mechanism

- rare in obstetric palsy
- usually arm presentation with subsequent traction/abduction from trunk
- Horner's Syndrome
  - Decreased pupil size
  - Ptosis eyelid
- Prognosis Poor for spontaneous remission

Picture Compliments Shriners Hospital online

Physical Exam

- deficit of all of the small muscles of the hand (ulnar and median nerves)
- "claw hand"
- wrist in extreme extension because of the unopposed wrist extensors
- hyperextension of MCP due to loss of hand intrinsics
- flexion of IP joints due to loss of hand intrinsics

148





149

38 WEEK PREGNANT- INDUCTION

- 38-week pregnant female with marginally high blood pressure in mid pregnancy treated and controlled with medication is recommended induction due to BP
- Induction (29 ½ hours)
  - Prostaglandin suppository (2)
  - Balloon dilation
  - Pitocin
  - Broke water
  - Multiple epidurals
  - Chorioamnionitis

- Shoulder Dystocia
- APGAR 3,5,8
- Facial bruising and swelling
- Right arm paralysis (brachial plexus injury)
- Born limp, gray, no cry
- Suctioned
- Breast fed/ poor transfer
- Jaundice
- Admitted to pediatric floor day 2
- Billi lights
- Formula administered-aspirated-choked
- Home day 4 with daily bilirubin checks

150

Clinical
Chorioamnionitis

151

Terrific 2

152

How's My Posture?



153

Irritable Infant syndrome of Musculoskeletal Origin (IISMO)

Dr. Joyce Miller,DC,DABCO and SoniaCaprini Croci, DC

Infant Colic

- Relentless crying-especially in the evening
- Pained faces
- Rigid abdomen
- Flexed legs
- Flailing arms
- Clenched fists

Irritable infant-Musculoskeletal origin

- Excess crying- any time
- Antalgic Posture
- Affective Disorder
- Restless Sleep and general unrest
- Decreased eye contact
- Tactile defensive

154

Colic

- Rule of "3" Wessel 1954
- Fussy or colicky infant, otherwise healthy and well fed, paroxysm of irritability, fussiness or crying
  - 3 weeks of age
  - 3 hours a day
  - 3 or more days a week
  - 3 weeks or longer
- Illengworth's 1954 "three month colic" rhythmic attacks of screaming in the evening w/associated symptoms of facial redness, drawing up knees to chest, clinched fists, borborygmi (growling) and flatulence up to 3 months

155

Disorganized Suckling

- Mechanical birth trauma
- Congenital deformities
- Genetic developmental syndromes
- Pharmacologic suppression
- ***Delay in putting the baby to breast***
- ***Nursery mismanagement***
- Neurologic suppression or developmental delays
- Biomechanical dysfunction



156

Dysfunctional Breastfeeding

- Suppressed or weak rooting or suckling reflex
- Decreased oral excursion
- Failure to flange lips
- Tongue action
  - Short
  - Frenulum
  - Used to control MER or oversupply
- Decreased range of motion C01
- Decreased range of motion cervical spine



157







Foot deformities

158

Assess

Assess cranial, cervical, spinal, and extremity asymmetries associated with constraint patterns.

159

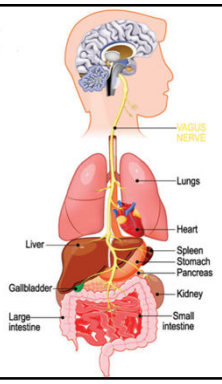
Just a reminder…

- We are big, they are small.
- Be aware of how much area one finger covers on the fetal skull!
- Move slowly, respectfully, cautiously and gently

160

Vagus Nerve

- Splits in two as it exits the medulla oblongata. Runs down your neck to the large intestine. Below esophagus two side join to form vagal trunk then branches off again
- The internal carotid artery, internal Juglar vein and Vagus nerve run very close to each other on lateral side of the neck.
- Influences muscles of the palate, pharynx larynx motor and sensory and swallowing
- In the thoracic cavity the left Vagus N wraps around aortic arch down the esophagus to diaphragm and intestines. Right side follows esophagus to diaphragm and intestines.
- Cardiac and pulmonary plexus are also affected.
- Vagus innervates stomach, (anterior/posterior branch)parasympathetic
- Innervates GI tract about 2/3 of the transverse colon



161

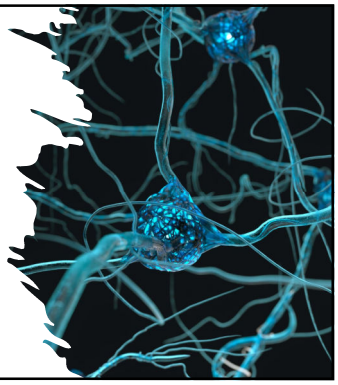
- Dysautonomia – malfunction of the vagus nerve
- Vagopathy-problems with vagus nerve
- Testing Vagus Nerve
  - Gag reflex (brainstem orgin)
  - Vagal nerve stimulators
    - Epilepsy
    - Major depression Disorders

- Acid reflux
- GERD
- Abdominal Pain/colic
- Bloating
- Difficulty Swallowing
- Dizziness/Fainting
- Wheezing
- Nausea/vomiting
- Mood disorders

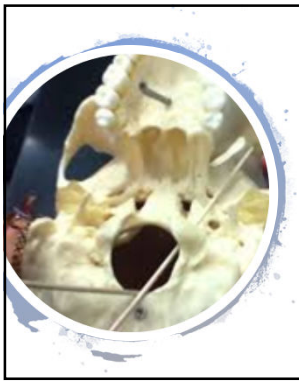
162

A Review on the Vagus Nerve and Autonomic Nervous System During Fetal Development: Searching for Critical Windows
Francesco Cerritelli 1, Martin G Frasch 2, Marta C Antonelli 3 4, Chiara Viglione 1, Stefano Vecchi 1, Marco Chiera 1, Andrea Manzotti 1 5 6

- The autonomic nervous system (ANS) is one of the main biological systems that regulates the body's physiology. Autonomic nervous system regulatory capacity begins before birth as the sympathetic and parasympathetic activity contributes significantly to the fetus' development. In particular, several studies have shown how vagus nerve is involved in many vital processes during fetal, perinatal, and postnatal life: from the regulation of inflammation through the anti-inflammatory cholinergic pathway, which may affect the functioning of each organ, to the production of hormones involved in bioenergetic metabolism. In addition, the vagus nerve has been recognized as the primary afferent pathway capable of transmitting information to the brain from every organ of the body.



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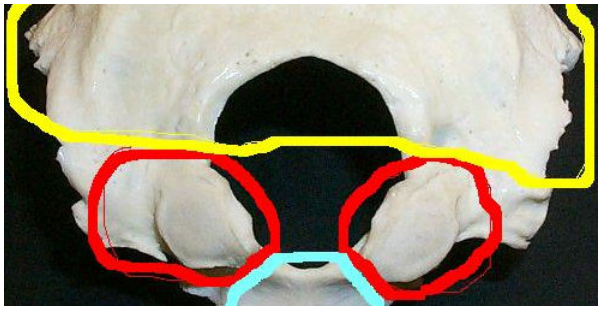
What about the subluxation

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

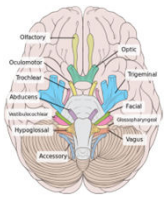
cranial nerves arise from the medullary portion of the
- brainstem and exit through the jugular foramen (CN IX
- and X) and the hypoglossal canal (CN XII). Disruption in
- the innervation to any of the associated structures would
- potentially interfere with the suckling process.

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165

Cranial Nerves



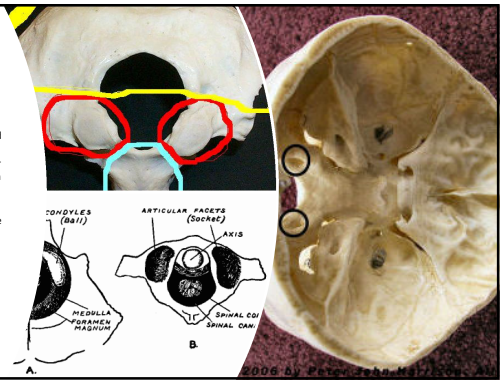
#	NAME	SMB	Origin	Nuclei	Function
I	Olfactory	S	Telencephalon	Ant. Olfactory	Smell
II	Optic	S	Diencephalon	Ganglion Cells of retina	Vision
III	Oculomotor	M	Ant. Midbrain	Oculomotor, Edinger-Westphal	Most eye mvts, Eye lid, pupil, ciliary body
IV	Trochlear	M	Dor. Midbrain	Trochlear	In. Sup. Obl Ms.
V	Trigeminal	B	Pons	4 Trigeminal	Sen. Face, & Ms. Mastication
VI	Abducens	M	Ant. Pons Margin	Abducens	Lat. Rectus

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#	NAME	SMB	Origin	Nuclei	Function
VII	Facial	B	Pons (Cerebello-pontine angle)	Facial, Solitary, Sup. Salivary	Facial expression, taste ant. 2/3 tongue, Salivation, tears
VIII	Auditory	S	Lat to VII	Vestibular, Cochlear	Equilibrium, hearing
IX	Glossopheryngeal	B	Medulla	Ambiguus, Inf Salivary, Solitary	Taste post. 1/3 tongue, parotid, motor to stylopharyngeus , sensory tonsils (gag)
X	Vegas	B	Medulla	Ambiguus, vegal, Solitary	Larynx, swallow, gag, parasymp thorax, 2/3 abdomen
XI	Spinal Accessory	M	Cranial & spinal roots	Ambiguus, Sp. Acc.	Shrug, Turn head, Swallow, gag
XII	Hypoglossal	M	Medulla	Hypoglossal	Tongue movement: swallow, speak

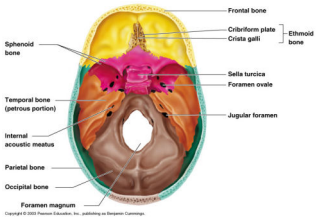
167

- 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.



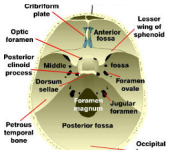
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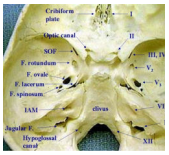
The Connection



CRANIAL NERVE	FORAMEN	NEONATAL REFLEX
V Trigeminal		Phasic Bite, Rooting, Suckling
VII Facial	Internal Auditory Meatus with VIII	Rooting, Suckling
IX Glossopharyngeal	Jugular Foramen	Gag, Suckling
X Vagus	Jugular Foramen	Cough, Gag, (reflux, vomiting)
XI Accessory	Jugular Foramen	Rooting
XII Hypoglossal	Hypoglossal Canal (occipital)	Lateralization and protrusion of tongue, rooting and suckling

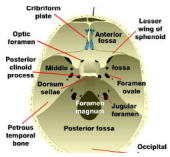
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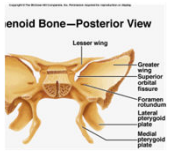




Foramen magnum	• Spinal cord
Hypoglossal canal	• Hypoglossal nerve (motor to the tongue)
Jugular foramen	• Glossopharyngeal, Vagus and Spinal accessory

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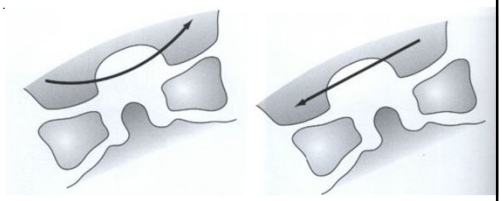
Superior orbital fissure	Oculomotor, trochlea, abducent and ophthalmic division of trigeminal
Optic canal	Optic nerve
Foramen rotundum	Maxillary division of trigeminal nerve
Foramen ovale	Mandibular division of trigeminal nerve

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Biomechanics – Latero-flexion

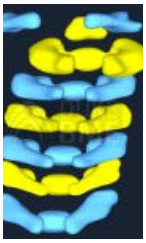
H Biedermann. Manual Therapy in Children, 2004.

- Adults and bigger children atlas moves under the occiput toward the concave side of the head
- Small children (before verticalization) Atlas moves to the "upper" or convex side



172

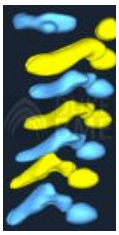
Biomechanical Features



On lateroflexion (frontal plane) the atlas does not move into the concavity as it does in adults, but it moves in the convexity *(Biedermann 1999)*

The infant cervical spine appears much more extended in the saggital plane
- (von Kortzfleisch1993)

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Incomplete uncinate processes and wedge shaped vertebra, lax ligaments and developing muscles result in greater instability within the cervical spine

The spinal cord is 8 times more vulnerable to stretch/traction forces as compared to the postural soft tissue structures

Allowing for subluxation and or spinal cord injuries

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Biomechanical Features

- The main pivot for movement in the saggital plane is not in the C5/C6 segment as in adults but in the C2/C3/C4

(Catell and Filtzer 1965, Hill et al 1984, Nitecki and Moir 1994

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What is your Big Idea…Mission… Purpose?

176

That NO child will be left behind without chiropractic care!

THANK YOU, ❤ Dr Lora



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