Congenital Muscular Torticollis:
A Pain in the Neck?

Alice Anderson, PT, DPT, MS, PCS
Therapy 2000
Objectives

• Define torticollis & differentiate between CMT & acquired torticollis.

• Describe
  – Components of an torticollis evaluation
  – Conservative treatment strategies
  – Basic principles of conservative adjuvant care: kinesiotaping, TOT collar
  – Indications for surgical intervention
Congenital Muscular Torticollis

- Congenital unilateral shortening of SCM, may be assoc with muscle fibrosis
- May involve platysma &/or scalenes

Wheeless Textbook of Orthopaedics-
www.wheeless.com; Karmel-Ross, 2005

Photo:
http://www.plagiocephalypillow.info/treatment_management.php
Congenital Muscular Torticollis

More common since “Back to Sleep” program (1992)
Anatomy of the SCM

- **Cleidomastoid**
  - Deep band running from the mastoid to the medial half of the clavicle
- **3 superficial bands that form “N”**
  - Cleido-occipital
  - Sterno-occipital
  - Sterno-mastoid
  - Latter 2 share a common tendon

Congenital Muscular Torticollis

- 3rd most common infant musculoskeletal anomaly
- Incidence 1:250 live births
- 3:2 male to female ratio

Wheeless Textbook of Orthopaedics-
www.wheeless.com; Karmel-Ross 2005; Do 2006
Congenital Muscular Torticollis

- 80%-90% of pts with CMT have some degree of plagiocephaly

- 90% w/ good-excellent outcome when initiated within 1st year of life

Photo: http://www.plagiocephalypillow.info/treatment_management.php

Associated Problems

- Deformational Plagiocephaly (DP)
- Congenital webs of skin along the side of the neck, pteygium colli

Figure – This 8-month-old infant has on a typical orthotic cranial molding helmet used for treatment of positional plagiocephaly.
Associated Problems

- Bony anomalies
  - C-spine
  - DDH (20%)
    - Dev Hip Dysplasia
  - Metatarsus adductus
Etiology

- Unclear

- Birth Trauma: The SCM is shortened due to a tear at birth resulting in hematoma formation which undergoes fibrous contracture.

Content courtesy of Stephanie Pryor, PT--CMCD

http://contemporarypediatrics.modernmedicine.com/contpeds/data/articlestandard/contpeds/312004/108032/k5a055f1.gif
Etiology

• Unclear
  – *Ischemic Hypothesis*: Venous occlusion produces ischemia in the SCM.

Content courtesy of Stephanie Pryor, PT--CMCD
Etiology

• The Chicken or the Egg
  
  – Does torticollis cause plagiocephaly?
    • 80-90% of torticollis pts have some plagio
  
  – Or vice versa?
    • 20% of pts referred with plagio have torticollis

Freed & Coulter-O'Berry 2004
Etiology

The Chicken or the Egg

- An infant may develop SCM tightness from maintaining a sustained position over time
- Suspect both are possible

Freed & Coulter-O'Berry 2004
CMT - Types

- **Sternomastoid (SMT)**
  - SCM tightness w/ fibrous mass
  - Most common

- **Muscular Torticollis (MT)**
  - SCM tightness w/o mass

- **Postural Torticollis (POST)**
  - Postural presentation w/o muscular tightness or mass

(Karmel-Ross, 2005)
SMT: Pseudotumor/Fibromatosis coli

- Soft, usually nontender, spindle-shaped mass, palpable in mid to lower 1/3 of sternal muscle belly

Note thickened R SCM: pseudotumor

Do 2006; Freed & Coulter-O'Berry 2004

http://www.kinderradiologie-online.de/cgi-bin/textin/bilderansehen.cgi?lang=en&inhalt=20050603161131-a-2&mod=us#us-2
Sternomastoid Tumor: Pseudotumor/Fibromatosis coli

- May be 2/2 microtrauma
- Present in 28%-47% of infants w/ CMT.
- Usually enlarges after identification
- 90% resolve over 5 - 21 mo

Do 2006; Freed & Coulter-O'Berry 2004
Muscular vs Postural Torticollis

- Head Tilt
- SCM tightness
- ↓ Cervical P/AA/AROM
- + Cervical Muscle Imbalance
- No Palpable Mass

- Head Tilt
- No SCM tightness
- Full Cervical PROM
- ↓ Cervical AROM
- + Cervical Muscle Imbalance
- No Palpable Mass
Post-natal Torticollis

- Environmentally Induced
  - Container/Bucket Babies
- Plagiocephaly Induced
- Position Preference Induced
- Neuromuscular Disorders
## Differential Dx

80% of children w/ torticollis have CMT... What about the other 20%?

<table>
<thead>
<tr>
<th>Osseous</th>
<th>Non Osseous</th>
<th>Neurological</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occipitocervical Dysfunction:</td>
<td>Sandifer syndrome</td>
<td>CNS Tumor</td>
</tr>
<tr>
<td>-Rotatory Cervical instability</td>
<td>Grisel’s syndrome</td>
<td>-Posterior Fossa</td>
</tr>
<tr>
<td>Cervical Vertebral Dysfunction:</td>
<td>Muscular</td>
<td>-Cervical Spine</td>
</tr>
<tr>
<td>-Klippel-Feil syndrome</td>
<td></td>
<td>Syringomyelia</td>
</tr>
<tr>
<td>-Scoliosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Hemivertebrae</td>
<td></td>
<td>Arnold Chiari malf</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Occular</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hearing Deficit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paroxysmal Torticollis</td>
</tr>
</tbody>
</table>
Differential Dx: Occular Torticollis

• Visual cause of head tilt

• Assumption: pt tilts head to maintain binocularity and/or to optimize visual acuity

http://vivara.net/images/eyepatch.jpg
Differential Dx: Occular Torticollis

- Sit-up Test: Child has tilt in sitting position, but tilt resolves when in supine.
- Use eye patch to cover eye; Child’s tilt will resolve.

http://vivara.net/images/eyepatch.jpg
Differential Dx: Occular Torticollis

- Refer to Ophthalmology – usually resolves with surgery
- Child may need PT as the SCM may be shortened secondary to prolonged positioning of lateral flexion.

http://vivara.net/images/eyepatch.jpg
EVALUATION
ICF Model

Health Condition
(Disorder or disease)

Body Functions & Structures
(Impairments)

Activity
(Limitations)

Participation
(Restrictions)

Contextual factors

Environmental factors

Personal factors
Body Structure & Function

- Short SCM
- ↓ awareness on short side
- Visual neglect on short side
- Overstretched cervical muscles on uninvolved side
- ↓ cervical muscle strength on uninvolved side

Oledzka, Suhr, Widmann: CSM 2013
Body Structure & Function

- ↓ postural muscle activation on short side
- Asymmetric posture and movement patterns
- Asymmetric strength may negatively affect function
- Facial Asymmetry/Plagiocephaly
- ↑ risk of scoliosis

Oledzka, Suhr, Widmann: CSM 2013
Functional Activities/Participation

- Difficulty
  - Nursing/taking bottle when presented from short side
  - Looking toward short side for environmental exploration/interaction
  - Reaching for toy on short side
  - Rolling due to \( \downarrow \) lateral head righting on uninvolved side (due to muscle tightness on short side)

Oledzka, Suhr, Widmann: CSM 2013
Personal/Environmental Factors

- Family support system
- Caregivers’ ability to follow home program
Examination: History

- Parent Interview
- Torticollis Hx
- Current Health

Examination: Systems Review

• Vision
  – ↓ cervical ROM negatively impacts visual learning (Padula & Nelson, 2005)
  – “Visual system adapts its functional needs to these limited ranges of postural control.” (Padula & Nelson, 2005)

Examination: Systems Review

• Skeletal System
  – Hips-↑ risk of DDH
    • Ortolani Click
  – LLD
  – Asymmetry
  – ↑ risk of clavicular fx

APTA: Guide to Physical Therapist Practice Online, 2003,
http://guidetoptpractice.apta.org/; Burch, C; Hudson, P; Reder, ; Ritchey, ; Strenk, M; Woosley, M; Cincinnati Children’s Hospital Medical Center: Evidence-based clinical care guideline for Therapy Management of Congenital Muscular Torticollis,
Examination: Systems Review

- Pain
- Integument
  - Clinical appearance of skin around neck especially on shortened side

Feeding

• ↑ risk of GE reflux
• Difficulty latching onto breast/bottle
• ↓ lip strength
• ↓ movement of tongue/jaw
• Facial asymmetry or tongue deviations may complicate cup/straw drinking

Karmel-Ross, 2005
Examination: Systems Review

- Neuro
  - Persistent ATNR
  - Tone
  - Brachial Plexus Injury
  - Horner’s Syndrome -
    - Results from interruption of the sympathetic nerve supply to the eye
    - Characterized by the classic triad of constricted pupil, partial ptosis, and lack of sweating on involved side
Horner’s Syndrome
Examination: Physical Assessment

Posture

- ↓ Lateral tilt of neck on uninvolved side
- ↓ Lateral tilt of trunk on uninvolved side
- ↓ Cervical rotation toward shortened side
- ↓ Trunk rotation toward uninvolved side
- Hiked shoulder on shortened side
- Pelvic obliquity
- Other trunk compensations

Examination: Physical Assessment

- Motor Control/Development
  - Asymmetric UE (and sometimes LE) use
  - Asymmetric weight bearing
  - Difficulty recruiting abdominals
  - Poor movement grading
  - Insecure movement in space
  - Joint locking for stability

Examination: Physical Assessment

• Motor Control/Development
  – Protective responses
    • ↓ activation of shoulder girdle on shortened side
  – Equilibrium Reactions
    • ↓ weight shift toward shortened side
    • Over-response on shortened side
    • Delayed/poor response on uninvolved side
    • ↓ dissociation between head/shoulder/trunk

Examination: Physical Assessment

- Plagiocephaly/Facial Asymmetry
  - Flattened skull on uninvolved side (the side of preferred cervical rotation)
  - Depressed eyebrow
  - Chin deviation
  - Upward shift of mandible
  - Downward shift of eye and ear
  - Posterior shift of ear
  - Frontal bossing on uninvolved side
Plagiocephaly

- Abnormal pull of SCM → asymmetry of face and skull
- Flattening of face is noted on side of contracted SCM
- Increased since “back to sleep” from 1 in 300 live births in 1974 to 1 in 60 in 1996
- Early treatment & positioning program are key
Plagiocephaly Classifications
(Argenta 2004)

- Type I: Posterior asymmetry
- Type II: Posterior asymmetry, ipsilateral ear positioned anterior or inferior
- Type III: Posterior asymmetry, ipsilateral ear positioned anterior or inferior, frontal asymmetry
- Type IV: Posterior asymmetry, ipsilateral ear positioned anterior or inferior, frontal and facial asymmetry
- Type V: Posterior asymmetry, ipsilateral ear positioned anterior or inferior, frontal and facial asymmetry, temporal bossing or posterior vertical cranial growth
Ohman, A: 2012
Physiother Theory Pract 28:402-406
ROM Assessment
## Norms

**TABLE 4**

Mean Measurements of Rotation and Lateral Flexion at the Ages of 2, 4, 6, and 10 Months

<table>
<thead>
<tr>
<th>Measurement</th>
<th>At 2 Months of Age (°)</th>
<th>At 4 Months of Age (°)</th>
<th>At 6 Months of Age (°)</th>
<th>At 10 Months of Age (°)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotation mean</td>
<td>105.2</td>
<td>111.8</td>
<td>112.4</td>
<td>111.7</td>
</tr>
<tr>
<td>Lateral flexion mean</td>
<td>68.1</td>
<td>69.5</td>
<td>69.2</td>
<td>70</td>
</tr>
</tbody>
</table>
Assessment

**Norms**

**TABLE 5**

Norms for Muscle Function, ie, Strength/Endurance for Healthy Infants According to an Ordinal Muscle Function Scale 0 to 4

<table>
<thead>
<tr>
<th>Strength/Endurance At Ages</th>
<th>Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 months</td>
<td>1.0</td>
<td>0–2</td>
</tr>
<tr>
<td>4 months</td>
<td>2.6</td>
<td>1–4</td>
</tr>
<tr>
<td>6 months</td>
<td>3.0</td>
<td>2–4</td>
</tr>
<tr>
<td>10 months</td>
<td>3.4</td>
<td>3–4</td>
</tr>
</tbody>
</table>

Muscle function estimated by holding the infant horizontally using the lateral head righting reaction. Head position estimated in relation to the horizontal line, 0 = below, 1 = on the line, 2 = slightly over, 3 high over, and 4 = very high over.
Do your pts look like this?

CONTENT
NO TEARS
SMILING!!!
Measurement Woes
YIKES!

How can I measure this baby’s neck?


- 100% of respondents assessed head tilt while 95% assessed cervical PROM


- 86% of respondents usually use a visual estimate
- Most never use goniometer (53%) or arthrodial protractor (95%)
- 21% occasionally use photos while 21% sometimes use video
Respondents noted awareness of ↓ accuracy of eye-balling ROM but felt that was best option.

No good measuring device exists for babies with torticollis.

Babies become very upset w/ goniometry.

Intra-rater Reliability of Measurement

- Intra-rater reliability of measuring cervical rotation & lat flexion in infants w/ CMT

  - 23 infants, ages 1-5 mo
    - Group 1-measured twice during 1 session
    - Group 2-measured once, waited 1 hr, measured again

- Cerv rotation measured w/ goniometer
- Lat flex measured with arthrodial protractor
- Photos of each motion were taken simultaneously with measurement

Intra-rater Reliability of Measurement

Results

- High intra-rater reliability regardless of time b/w 2 measures, specific range measured & end-feel differences
- Least agreement was found when comparing ROM measurement w/photos

Photo Assessment

- Photo Array
  - Reliable assessment method for lateral flexion
  - Excellent method to see change over time

Photo Assessment

Initial Eval Pictures

1 month follow up

Slide Courtesy of Stephanie Pryor, PT-CMCD
Bottom Line

- Arthrodial Goniometer/Protractor
- Goniometer
  - With or w/o carpenter’s level
- Inclinometer
- Measure landmark to acromion
- Photo Array
THERAPEUTIC MANAGEMENT
Conservative Management: Positioning

- Try to interact with baby on side where neck movement is limited
  - Position crib so baby has to look to tight side to see door/activity.
  - Position baby on changing table so he has to move toward tight side to see you
  - Begin tummy time early

http://3.bp.blogspot.com/_EX3WoMlqpc8/TA3LnZjCCQI/AAAAAAAAAEk/Y3b1XRM4hBw/s1600/DSC_0661.JPG
Conservative Management: Positioning

• Try to interact w/ baby on side where neck movement is limited
  – Place toys on the side of the stroller, swing, crib, or infant seat where neck rotation is most limited
  – Carry & nurse/feed baby so he must turn toward limited side

Conservative Management: Positioning

- Use cushioned head support to help keep head in midline when in car seat or carrier.
- Minimize time in devices: car seats, carriers, exersaucers, etc. Encourage tummy time instead.

http://community.babycenter.com/post/a24783729/bestThingIeverbought
Mimos Baby Pillow

Cost: $66 online
Use only with supervision
Not FDA approved for crib use

http://www.plagiocephalyflathead.com/cart.php
Baby Stay Asleep System

• Developed by an OT, an engineer, & Nutrition Scientist
• Cost: $89
• 3 elements:
  – Wrapper
  – Bumpers
  – Fitted sheet
    • built-in velcro holds bumpers & wrapper

http://www.babystayasleep.com/products/
Baby Stay Asleep System

- Certified by Consumer Product Safety Commission's federal safety standards. Many sleep positioners are not safety certified.
- Can be used w/ HOB ↑ up to 30 degrees.
- Designed for babies up to 20 lbs. & 8 months old.

http://www.babystayasleep.com/products/
Plagio Positioning
Early PT Prevents Severe DP

- Prospective RCT comparing PT with usual care for preventing DP
- N=65 babies at 7 weeks with plagiocephaly
  - Babies with CMT were excluded
- Control-Parental pamphlet describing basic prevention measures

Early PT Prevents Severe DP

- Intervention
  - 8 sessions between 7 wks-6 mo
  - Exercises to ↓ positional preference
  - Developmental motor activities
  - Parent ed
    - Etiology of positional preference
    - Counter-positioning
    - Handling
    - Tummy Time

Early PT Prevents Severe DP

• Conclusion
  – By 6 mo of age, intervention group babies with severe DP had ↓ from 53% to 30 %
  – Control group babies with severe DP had ↓ from 63% to 56%
  – At 12 mo, intervention group babies with severe DP had further ↓ to 24%, while controls remained unchanged.

Conservative Management - Stretching

- Stretching-P/AA/AROM ex
  - Consider need for x-rays before stretching is initiated
  - Hold at least 30 sec
  - Work into the day: Recommend caregiver perform at each diaper change
Conservative Management - Stretching

• Stretching-P/AA/AROM ex

  – 2 Man stretch vs more gentle approach

• Muscle snapping- (Cheng, Cheh, et al 2001)
  – 9% of patients experience sudden giving away during stretch
  – Results in immediate \( \uparrow \) PROM
  – Theorized to be partial to full rupture of SCM
  – No long term negative effect
Are Screening X-Rays Needed Before Stretching?

- Snyder & Coley reviewed plain films of 502 babies with torticollis. (Avg age 3.5 months)
  - Identified 10 positive cases
    - 6/10 were false positives
    - Of the 4 positive cases
      - 1 had instability contraindicating stretching
      - 3 had bony anomalies where stretching would be harmless, though ineffective

Synder, E and Coley, B: Limited value of plain radiographs in infant torticollis. Pediatrics 2006, 118:
Are Screening X-Rays Needed Before Stretching?

- No false negatives
- Craniocervical junction, most likely site of instability, is difficult to interpret in infants.

Synder, E and Coley, B: Limited value of plain radiographs in infant torticollis. Pediatrics 2006, 118:
Are Screening X-Rays Needed Before Stretching?

- Are radiological studies harmful/helpful?
  - CT: Ionizing radiation increasingly recognized as source of future cancer, esp when performed young
  - MRI: Child must be sedated
  - Plain Films: Difficult to get good reading

Synder, E and Coley, B: Limited value of plain radiographs in infant torticollis. Pediatrics 2006, 118:
Are Screening X-Rays Needed Before Stretching?

• Conclusion

− Infants with typical clinical CMT findings are unlikely to benefit for plain radiographs.

− Some suggest using diagnostic algorithms, rely on clinical history, physical examination, and response to therapy.

Synder, E and Coley, B: Limited value of plain radiographs in infant torticollis. Pediatrics 2006, 118:
Are Screening X-Rays Needed Before Stretching?

• Conclusion
  – Authors suggest radiological studies be reserved for children who fail to respond to PT & children w/ atypical clinical findings.

Synder, E and Coley, B: Limited value of plain radiographs in infant torticollis. Pediatrics 2006, 118:
Conservative Management: Stretching

- What do you think?
  - This is only 1 study.
  - What about that 1 baby where stretching could have caused injury?
  - Considering need to minimize health care costs, what is best medicine?
Conservative Management

- Positioning
- ROM/Stretching (football carry)
- Strengthening
- Tummy Time

Conservative Management

- GM Activities promoting more normal movement patterns
- HEP
- Adjuvant Care
  - KT, TOT, massage

Is This The Best Way to Treat Torticollis?
Conservative Management

• Strengthening
  – At 3-4 mo, begin active lateral flex activities to strengthen overstretched lat flexors

• Emphasis is on HEP
  – Work into day; eg, carry in football hold after each diaper change
  – Tummy Time
  – Positioning
Tummy Time
Conservative Management

Your baby needs Tummy Time!
Place babies on their stomachs when they are awake and someone is watching. Tummy time helps your baby's head and neck muscles get stronger and helps to prevent flat spots on the head.
Videos: Jonathan Eval and Treatment

(1:20-3:37)
Videos:
Eval and Treatment
Videos: Eval and Treatment

(00:30-end)
Adjuvant Care

- Massage/MFR
- Orthoses
  - TOT Collar
  - Soft collar
  - Helmet/DOC band
- Kinesiotaping®
TOT collar

• Indications

• ≥ 4 months of age
• Consistent head tilt of ≥ 5 degrees
• Adequate ROM & lateral head righting reaction (head control & strength) to lift head away from the side of the TOT Collar

• Video:
http://www.youtube.com/watch?v=MrmoLbnOe0A
TOT collar
Kinesio Tex® Tape

- Elasticity of 30-40 %
- Stretches only on longitudinal axis
- 10%-15% stretch on backing paper

http://www.fmadvancedmassage.com/kinesio_taping.html
Kinesio Tex® Tape

- Activated by heat
- Latex-free
- Can be worn 3-7 days
- Can shower with it

http://www.fmadvancedmassage.com/kinesio_taping.html
What Does KT Do?

• Decreases pain
• Decreases swelling
• Decreases muscle spasm
• Facilitates weak or atrophied muscles/tendons
• Inhibits muscles/tendons to reduce spasm or stress

www.vata.us/educational/.../Kinesio_taping.ppt
KT for Torticollis
Literature review

• Many articles on taping for orthopaedic conditions

• Limited research on taping for neurological condition

• Taping and torticollis

• One pilot study on KT in pediatrics

Courtesy of Koseck, K; Duff-Woskosky, A; Lee, S; Wong, W; Grandview Children’s Centre; Kinesiotaping Kids: How Do We Measure Up? www.oacrs.com/News/Conference2006/KinesiotapingKids.ppt
Ohman 2012: The immediate effect of kinesiology taping on muscular imbalance for infants with congenital muscular torticollis

**METHOD:**
- 28 infants with CMT & lat flexor muscular imbalance
- Compared Muscle Function Scale (MFS) score before & after the first taping session
- Inhibitory taping on shortened side
- Facilitatory taping on over-lengthened side
Ohman 2012:

• **RESULTS:**
  - Significant ↓ between MFS scores after KT application (P < .001)

• **CONCLUSION:**
  - KT has an immediate effect on muscular imbalance in infants with congenital muscular torticollis
Timing of KT or Orthotic Intervention

- Consider initiating use of kinesiotape and/or an orthosis (TOT collar, soft collar) in
  - Babies > 4mo of age
  - Who demonstrate > 10° of head tilt
  - After 2-3 mo of intervention

Plagiocephaly Management: Repositioning vs Orthotic

- Torticollis tx started before 3 months had excellent results
- Helmet vs Repositioning
  - Helmet reduced DD from 1.13 to .43
  - PT reduced DD from 1.05 to .50
  - Recommend referral for helmet if child does no improve to conservative treatment after 6-8 weeks.

Infants treated with orthotics were older and required a longer length of treatment (4.2 vs 3.5 mo).

Orthotic group had a mean final Diagonal Diameter (DD) closer to the DD in unaffected infants.

Plagiocephaly Management: Repositioning vs Orthotic

• Helmet was more effective than repositioning (↓ 61% vs 52% in DD)

• Early helmet use – significantly more effective than later (65% decrease versus 51% decrease in DD)

Head Tilt Toward Side of Shorter Sternocleidomastoid Muscle

Vertical Displacement of Soft Tissue (Incomplete Eye Opening)

Upward Cant to Mandible and Alveolar Ridge

Anterior Superior Helical Fold to Lateral Canthus

(>0.5 cm Difference Between two sides)

Vertical Peaking on Side of Flattening

Occipital Flattening with Balding over Resting Area of Occiput

Glabella

Diagonal Diameter

Anterior Displacement of Ear

BPD

APD

Flat Occiput

Eye
DOC Band

- Worn 23 hours/day with one hour off for bathing/hygiene.
- Skin checks are performed regularly during the first two days.
- Growth adjustments are performed weekly or bi-weekly to encourage normal cranial growth.
- A 3D computer model is used at every appointment to track progress.

www.cranialtech.com
Developmental Delay

- National survey of 400 pediatric OT/PT’s
- 2/3 reported ↑ in early motor delays in infants
- Lack of “tummy time,” was reported the primary contributor to the ↑ in early motor delays.

• Ohman et al (2009) compared AIMS scores of 82 infants with CMT & 40 healthy infants.

• Babies in the CMT group had significantly lower AIMS scores than the control group at age 2 mo ((p<0.001) and 6 mo (p<0.05).

• Infants who had at least 3 tummy time sessions/day when awake had significantly higher scores at 2 mo (p=0.001), 6 mo (p<0.001) and 10 mo (p<0.001).

Developmental Delay

- CMT group achieved motor milestones significantly later than the controls

- Risk of delay is more associated with little to no prone time than with CMT

Developmental Delay

- Lessons learned
  - Parents of children with CMT less likely to place child in prone.
  - 17% of CMT and 22% of control group had tummy time.
  - Control group spent significantly more time in prone than the CMT group.

Developmental Delay

- Lessons learned
  - Decreased opportunity in prone affects development greater than CMT alone.
  - No or limited time in prone when awake affects infants in the first 6 months of life

Evidence Based Care Guidelines

PHASES OF REHABILITATION
Phase 1 Rehab Goals

- Caregiver independence and adherence to HEP
- Full passive cervical lat flex to uninvolved side to promote rolling so pt can reposition himself in his crib
- Full passive cervical rotation toward shortened side to promote environmental exploration.
Phase 1 Rehab Goals

- Actively bring head to midline in supine and hold for x sec to promote more normal head shape
- Actively rotate head from side to side in supine to visually track toy in available ROM
Phase 1 Treatment Options

- Football carry
  - Begin with passive stretch to shortened cervical musculature
  - Progress to active head righting in football carry position
- + head to midline
- + visual tracking
- Tummy Time
Phase 1 Treatment Options

- Active cervical rotation in prone and supine
- Active cervical rotation with reach in sit/supported sit
- Cervical/Trunk mobility/stretch
- Overhead UE reach
- + head righting
- Massage/Soft Tissue Mobilization
Phase 2 Rehab Goals

- Caregiver independence and adherence to HEP
- Midline head in highest age appropriate position (sit, quadruped, stand)
- Actively rotate head to both sides with FROM to promote environmental exploration
Phase 2 Rehab Goals

- Actively hold head in midline against gravity for x sec
- Demonstrate antigravity head righting past midline on uninvolved side to promote transitional movements needed to change position while playing on floor.
Phase 2 Treatment Options

- Head righting with rolling
- + active anti-gravity cervical lat flex toward unininvolved side
- Pull to sit with chin tuck
  - AP
  - Diagonals
- + active cervical rotation
Phase 2 Treatment Options

- Developmental activities along prone progression
- Quadruped with chin tuck
- Strengthening of uninvolved, overstretched SCM
  - Therapy Ball
  - Transitional movements
- Scapular stabilization
Phase 2 Treatment Options

• Soft Tissue Mobilization
  – Shoulder girdle
  – Pectorals
  – Quadratus Lumborum
  – Scalenes
  – Suboccipital musculature
Phase 2 Treatment Options

- Open and closed chain UE activities
- Adjuvant Care
  - KT
  - TOT Collar
HEP

- Critical to infant progression
- Parent MUST be able to demonstrate activities
- Should be continued up to 3 mo after DC
HEP

• Limit to 2-3 activities that can be worked into usual routine
  – Football carry at each diaper change
  – Positioning (car seat, crib)
  – Tummy Time

• Provide written instructions & video of HEP
DC Goals

- Full passive cervical rotation and lateral flexion
- Full symmetrical cervical rotation and lateral flexion
- Maintain head in midline
- Equal and age-appropriate head righting
- No compensatory movement patterns during daily activities
PROGNOSIS
Torticollis Prognosis

• Cameron et al. (1994) studies the success of non-operative treatment in 88 babies with torticollis
  – 92% of infants who began passive stretching programs before 3 mo of age had excellent to good outcomes
     • No surgery required
     • 68% achieved full passive neck rotation by 4 months
     • Plagio improved in all cases, no specific treatment given.
  – 17/39 infants who initiated stretching after age 3 months required surgery
Torticollis Prognosis

• Overall, 90% of babies have good to excellent outcomes with conservative care when initiated before 12 mo of age (Cheng 2000)

• Babies in the SCM tumor group who demonstrate > 30° deficit in cervical rotation are more likely to require surgical intervention (Cheng 2000)
Torticollis Prognosis

- Intermittent head tilt may recur with fatigue or when advancing upright activities (stand, walk)
Ian: 1 mo
Ian-5 mo: Pre-Stretch
Ian-5mo: Stretching
Ian-5 mo: Post-stretch
Maria is 4 weeks old. She and her mom are at her one-mo well check-up.

Mom reports that Maria seems to always “flop her head to her R side”.

The Pedi MD reassured mom that babies are supposed to have floppy heads at 5 weeks and that Maria’s head control will improve over the next couple of months. The pediatrician recommended mom use a car seat insert to help with head position in her car seat.
• What other questions would have been good to ask?
• What else could the pediatrician have examined?
• What other recommendations would have been indicated in this situation?
• Is a PT/OT evaluation indicated at this time?
• Maria is now 8 weeks old. She & her mom are at her two-mo well baby check-up.
• Mom reports that Maria still seems to keep her head bent to the right?
• Upon PE, the MD notes a taut R SCM, decreased cervical PROM as well as a palpable mass. Maria is given a dx of torticollis & a referral is made for a PT/OT eval.
Maria is now 10 weeks old. She & her mom are at her initial therapy evaluation.

- 4x2 cm palpable mass R SCM
- R cervical rotation 30 deg, L lateral tilt (-10 deg) from neutral
- What parts of the skull could potentially be flattened?
• What special tests, if any would you perform?
• Would you recommend x-rays prior to stretching?
• What information would you include in parent education?
• What activities would you recommend for her HEP? (Assume the pt has medical clearance for cervical stretching.)
• What frequency of therapy would you recommend?
Maria is now 5 mo old. She & her mom are at her regular therapy appointment.

- R SCM mass is barely palpable
- R cervical rotation 70 deg, L lateral tilt (20 deg) from neutral
- Type III skull asymmetry is apparent
• What treatment activities would you include in her POC?
• What information would you include in parent education?
• What activities would you recommend for her HEP?
• What frequency of therapy would you recommend?
• Would you recommend a helmet?
MARIA

• Maria is now 7 mo old. She & her mom are at her regular therapy appointment.
• R SCM mass is no longer palpable
• Maria has full passive cervical ROM
• Muscle Function Scale = 1 for 10-15 sec and drops to 0
• Head position of choice: R lateral tilt of 15 degrees
What treatment activities would you include in her POC?

What information would you include in parent education?

What activities would you recommend for her HEP?

What frequency of therapy would you recommend?

Would you recommend any adjuvant care or surgical referral? If so, which modality would you try first?
• At what point would you recommend therapy DC?
• What would you include for parent education?
• What would be criteria for resuming therapy?
SUMMARY
Summary

- 90% of babies with CMT have good to excellent outcomes when treated w/in first 12 mo of life
- Parent Ed & HEP
- Positioning
- Stretching
- Tummy Time
- Adjuvant Care
Yippie, we’re done!!!
Tummy Time Resources

• Children’s Healthcare of Atlanta
  http://www.choa.org/Menus/Documents/Wellness/final_tummy_time.pdf

• Pathways Awareness Foundation
Tummy Time Resources

- **Pathways Awareness Foundation**
  - Video: 5 tummy time moves English
  - Video: 5 tummy time moves Spanish
    - [http://www.youtube.com/watch?feature=player_embedded&v=EcZkZhJ33Gg#](http://www.youtube.com/watch?feature=player_embedded&v=EcZkZhJ33Gg#)
  - Video: Jonathan
    - [http://www.youtube.com/watch?v=256SLL40v_Y](http://www.youtube.com/watch?v=256SLL40v_Y)
Selected References

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- **Cincinnati Children's Hospital Medical Center's Evidence Based Practice & BEST Development Teams.** (2008-2010). *Health Policy and Clinical Effectiveness Pediatric Care Guidelines.* Retrieved July 10, 2010, from Cincinnati Children's Hospital Medical Center: http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/guidelines.htm
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