

## Evaluation Skills Part 1: Torticollis

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### Objectives:

- To define what torticollis is
- To identify 6 types of torticollis
- To evaluate torticollis using SOAP format
- To apply the PIQ tool when assessing torticollis
- To identify 4 treatment techniques for torticollis

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### PIQ

- **P**osture in Positions
- **I**nitiation and Inhibition
- **Q**uality and Quantity

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## PIQ

	Supine	Prone	Sitting	Standing	Quadruped	Kneeling
Posture in Positions						
Initiates						
Can't Do						
Quality						

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## Posture in Positions

- What are they doing in:
  - Supine
  - Prone
  - Sitting
  - Standing
  - Quadruped
  - Kneeling

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## Initiation and Inhibition

- Observe what movements the child initiates
- What functional movements can they do
  - Can they feed themselves? Rotate to reach for objects?
- What parts of their body are they using for the movements?
- What is inhibiting them from initiating other movements? Are they stuck in one position? Is this a primitive reflex?
- Can they sustain and terminate movements?
- What transitions do they initiate?

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## Quality and Quantity

- How do they initiate the movements (body part flexion, extension, dissociation)?
- Where is the head in relation to the body during transitions?
- Are they using one side of their body more than another?
- Are they using mass patterns of flexion or extension?
- What is the speed of their movements?
- Are they using a more immature pattern of movement?
- Is there any change in respiratory pattern?

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## Torticollis

- Torticollis ("twisted neck"); Plagiocephaly ("oblique head")
- Back-to-sleep program started in 1992, with 40% decrease in SIDS and increase in posterior plagiocephaly and torticollis<sup>1</sup>




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## Torticollis

- Causes:
  - May be related to:
    - Intrauterine malpositioning
    - Ischemic event and compartment syndrome
    - Birth trauma

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## Torticollis

- Prone positioning for 1 hour and 21 minutes a day when awake for 4 month olds = significant differences in milestone achievement<sup>2</sup>
  - hands and knees
  - active extension
  - sitting skill progression
  - prone positioning helps with other anti-gravity and weight bearing skills

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## Torticollis associated with:

1. Benign Paroxysmal Torticollis
2. Plagiocephaly without synostosis (PWS)
3. Plagiocephaly with synostosis
4. Vertebral anomalies
5. Ocular torticollis
6. Idiopathic Muscular Torticollis (congenital)

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## Benign Paroxysmal Torticollis

- When a child presents with a different tilt each visit
- Look for:
  - a family history of vestibular problems
  - a family history of migraines
  - on medication REGLAN (for severe GERD)

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### Plagiocephaly without Synostosis

- AKA: Postural torticollis
- Onset is immediately after birth
- No fibrotic changes in muscle
- Related to preferred sleeping position
- Easily treated with passive muscle stretching and re-positioning program if caught early

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### Plagiocephaly with Synostosis

- Early closure of sutures of the skull (normally between 12-18 months)
  - Increased ICP
  - Vision, hearing, and breathing problems
- Head shaped like a trapezoid
- Ear positioned posteriorly
- Smaller vertical length of face and horizontal length may be larger
- Requires surgery

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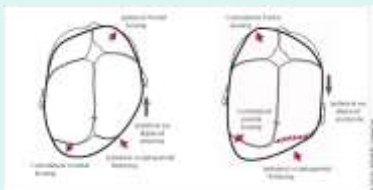
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### Deformational Plagiocephaly vs Plagiocephaly with Synostosis



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## Vertebral Anomalies

- Klippel-Feil anomaly (bony anomaly)
  - Fusion of any 2 of the 7 cervical vertebrae
  - Failure of division of cervical vertebrae during early fetal development
  - Leads to scoliosis and head tilt
  - Identified by cervical spine x-rays
  - Associated defects: anomalies of kidneys, ribs, cleft palate, respiratory problems, heart malformation

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## Klippel-Feil Anomaly



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## Ocular Torticollis

- Most commonly paresis of superior oblique (turns eye down and out) innervated by cranial nerve 4 (trochlear)
- May also be CN 3 (oculomotor)
- Persistent head tilt resulting in secondary neck contractures
- Not likely before 6 months of age
- Sit up test:
  - Look at degree of torticollis in supine and sitting
  - If torticollis resolves in supine, it's ocular torticollis

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## Idiopathic Muscular Torticollis

- Congenital
- Cause: fetal position, birth trauma, vascular injury to SCM
- See plagiocephaly with it- need to treat both
- See 1-2 weeks after birth
- Some muscular fibrosis: either tumorous or bands
- Trapezius muscle may be affected

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## SCM Anatomy



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## Idiopathic Muscular Torticollis

- Risk factors for infants 7-12 weeks old<sup>3</sup>:
  - Sleeping in supine: 2.7x odds of getting posterior plagiocephaly
  - Males were 1.5x more likely to get posterior plagiocephaly
  - If they have a right sided or left sided head positional preference, this is a >4x the odds of developing posterior plagiocephaly
  - Most are right sided preference

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## Impact of Torticollis

- Altered perception of center of mass
- Asymmetrical weight bearing
- Transitions affected by neck asymmetry
- Protective extension reactions may be delayed
- Compensations diminish development of midline postural control<sup>4</sup>

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## Before Treatment

- Decide origin of torticollis
  - 18% are non-muscular
- Do not start a stretching program until a cervical spine x-ray is performed<sup>5</sup>
  
- \*limited value of xrays in infants

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## Evaluating Torticollis

- SOAP format
- PIQ tool

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## Subjective (S)

- Birth history
  - Pre or peri natal difficulties
  - Ultrasounds show restriction of space
- Family history
- Medical history
  - Reflux
    - Sandifer's Syndrome
  - Neurological issues
  - X-rays of cervical spine
  - Passed hearing and vision screening
- Typical day
  - How much time spent in "containment devices"

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## Objective (O)

- PIQ
  - **Posture in Positions**
    - Face in midline in supine
    - Describe flat spots, plagio- vs scapho- vs brachycephaly
  - Palpate neck (tight band?)
  - Palpate along sutures to check for ridging (want sutures open)
  - Cranial Vault Asymmetry Index

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## Brachycephaly vs Plagiocephaly vs Scaphocephaly



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### Objective (O)

- Head righting reactions
  - full, partial, or no response
- Range of motion
  - Measure active and passive to both sides
    - neck rotation (100-120 degrees)
    - lateral flexion (>65 degrees)

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### Objective (O)

- Muscle Function Scale (MFS) for infants<sup>6</sup>
  - Hold infant vertically around trunk without support of head, then lower to horizontal position; have grid of horizontal lines behind; has to hold head for 5 seconds to get score
  - Rating scale of 0-4
    - 0= head below horizontal
    - 1= head in the horizontal
    - 2= head slightly over horizontal
    - 3= head high over horizontal
    - 4= head very high over horizontal

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### Objective (O)

- **Initiation and inhibition**
  - Look at anti- and pro- gravity movements
  - Describe their movement patterns
    - Asymmetrical neck extension to the side of tightness
  - What can they NOT do?
    - Head righting reactions
    - Protective reactions (delayed on opposite side of tilt)
    - Head control in various positions
    - Difficulty reaching with upper extremities
    - Poor or asymmetrical upper extremity weight bearing in prone
    - 2 handed play, hand transfer skills, grasping

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### Objective (O)

- **Quality and quantity**

- How are they rolling?
  - Lateral neck flexion at sidelying phase to both sides
- How are they reaching for toys in prone?

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### Objective (O)

- **Sensation and perception**

- Visual tracking (peripheral and central)
- Decreased visual engagement
- Delayed visual convergence
- Difficulty with downward gaze
- Response to auditory input
- Response to tactile input

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### Plan (P)

- **Goals:**

- Neutral head position
- Full passive and active ROM into restricted areas
- Correct movement patterns for age-appropriate movements (head righting during rolling)
- Prevent facial and skull deformities
- Prevent postural changes

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## Plan (P)

- Treatment algorithm for Muscular Torticollis<sup>7</sup>
  1. PT 6-8 weeks then re-evaluate
    - Improving: continue PT 6-8 more weeks
    - Not improving: ophthalmological and neurological evaluation
    - Persistent head tilt with tight band: consider surgery at 2-3 years
  2. Persistent head tilt with negative medical workup and unclear exam, check for:
    - C spine x-rays
    - C spine CT
    - Brain and C spine MRI
      - Most cases resolve within an average of 6 months
      - 90-99% resolve with conservative treatment

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## Treatment

- Massage
- Stretching of tight muscles (neck and trunk)
  - Contraindications: Down Syndrome/ ligament laxity; Spina Bifida; Bony abnormalities; Compromised circulatory or respiratory system
- Strengthening of weak muscles
- Active positioning
- Use of correct patterns for movement
- Address deficits in developmental progression
- Referral for helmet? or Surgery?

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## Treatment

- Stretching
  - Lengthen anterior neck muscles (hand in V over sternum and child looks up- platysma)
  - Left and right rotation
  - Left and right lateral neck flexion
  - Suboccipital release
- Strengthening
  - Active lateral neck flexion ("active carrying")
  - Sidelying- lifting head against gravity
  - Righting reactions
- Range of motion
  - Active and passive neck rotation
  - Active and passive lateral neck flexion
  - Active and passive neck flexion and extension

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### Treatment



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### Treatment

- Kinesiotape:
  1. Tape to facilitate SCM and upper trapezius on the weak side with no stretch to the tape
  2. Muscle-relaxing on affected side (across SCM with mild stretch)<sup>8\*</sup>
  3. Combination of both
- \*study found muscle-relaxing technique was the most effective, but should be used with other interventions

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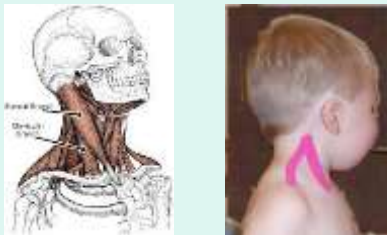
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### Treatment



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## Treatment

- Tortle
  - Good for younger, less active babies
- The Lounger
  - Positions child in a flexed position with head in midline




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## Treatment

- Helmet
  - Based on literature, the most effective period for cranial remodeling is 4-12 months
  - Cranial remodeling in very young infants, birth to 5 months, can be influenced by re-positioning and handling
  - The FDA prohibits the dispensing of helmets for cranial remodeling after 18 months of age




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## Treatment

- Helmet
  - Better outcome for helmet treatment vs natural course
  - Infant with helmets reached much better outcome within a shorter time
  - Helmet reduced initial asymmetry by 68%; non helmet reduced by 31%<sup>9</sup>

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## Treatment

- Helmet
  - Children over 12 months treated with helmet therapy had an improvement in skull shape in the same interval as younger infants<sup>10</sup>
  - Supports the use of helmets with children up to the age of 18 months of age

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## HEP

- HEP!!!!!!
  - 90 minutes/week of PT vs 166 hours at home
  - Stretching
  - Positioning (prone)
  - Visual tracking
  - Carrying to activate weak muscles (facilitate head righting)
  - Active cervical rotation in supine and prone
  - Active cervical rotation with reaching in supine
  - Overhead reaching to get UE stretching
  - ROLE: right on odd days, left on even days

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## HEP Protocols

- Exercises repeated throughout the day for 5x/day (or at every diaper change)
- Each stretch held for 30 seconds as tolerated
- Stretches done 4-5x/day (or at every diaper change)
- \*Continue up to 3 months after discharge\*<sup>11</sup>

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## HEP Evidence

- Protocol<sup>12</sup>:
  - PTs doing stretching vs parents doing stretching
    - PTs: 3x/week; stretch from 10-30 seconds; each session about 15 minutes (parents did no stretching at home)
    - Parents: 3-5 short sessions, 2x/day; held stretch 10-30 seconds; lasted 15 minutes; did 7 days/week

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## HEP Evidence cont.

- Outcome:
  - All achieved good ROM but PT group achieved that ROM faster
  - PT achieved ROM within 0.9 months vs 3 months for parent group
  - "No head tilt" reached faster for PT group (2.5 months) vs 4.5 months for parent group
  - At first evaluation, 18 infants had plagiocephaly but only 2 had it after treatment

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## Resource for Families

- Video: [www.HeadsUpBaby.com](http://www.HeadsUpBaby.com)
  - **"Heads Up Baby: Prevention and early treatment of deformational plagiocephaly in your baby"**
    - What is plagiocephaly: risk factors, prevention, treatment
    - Altering home environment and re-positioning
    - Tummy time and sitting activities
    - Strengthening and stretching activities

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## Resources

- Karen Karmel-Ross book: TORTICOLLIS
- On-line sources for pictures of stretches
  - Texas Pediatric Surgical Associate
    - [www.pedisurg.com/PtEduc/Torticollis.htm](http://www.pedisurg.com/PtEduc/Torticollis.htm)
  - [www.orthoseek.com/articles/ifs-left.html](http://www.orthoseek.com/articles/ifs-left.html)
  - [www.torticolliskids.org/favorite.htm](http://www.torticolliskids.org/favorite.htm)
  - [www.cranialtech.com](http://www.cranialtech.com)

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## References

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- 3: Mawji, et al (2014)
- 4: Oledzka, et al (2013) APTA CSM) Clinical Approach to the Evaluation and Treatment of Congenital Muscular Torticollis
- 5: Synder, EM, Coley, BD (2006) Limited value of plain radiographs in infant torticollis. *Pediatrics*, 118 (6),e1179-84
- 6: Ohman, et al (2008)
- 7: from presentation at APTA Combined Sections Meeting, Jan 2013; Magda Oledzka, PT, MBA, PCS; Maureen Suht PT, DPT, PCS; Roger Widmann, MD
- 8: Ohman (2012)
- 9: Kluba, et al (2014)
- 10: Couture DE, et al (2013)
- 11: From presentation at APTA Combined Sections Meeting, Jan 2013; Magda Oledzka, PT, MBA, PCS; Maureen Suht, PT, DPT, PCS; Roger Widmann, MD
- 12: Ohman, et al (2010)

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