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

PIQ
• Posture in Positions
• Initiation and Inhibition
• Quality and Quantity
Posture in Positions

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

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?
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?

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

Torticollis

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

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

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)

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)
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

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

Deformational Plagiocephaly vs Plagiocephaly with Synostosis
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

Klippel-Feil Anomaly

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
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

SCM Anatomy

Idiopathic Muscular Torticollis

- Risk factors for infants 7-12 weeks old:
  - 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
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

Before Treatment

- Decide origin of torticollis
  - 18% are non-muscular
- Do not start a stretching program until a cervical spine x-ray is performed

  *limited value of x-rays in infants

Evaluating Torticollis

- SOAP format
- PIQ tool
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"

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

Brachycephaly vs Plagiocephaly vs Scaphocephaly

- Normal Infant Head Shape
- Brachycephaly
- Plagiocephaly
- Scaphocephaly
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)

Objective (O)

• Muscle Function Scale (MFS) for infants⁶
  – 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

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
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?

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

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
Plan (P)

- Treatment algorithm for Muscular Torticollis
  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
       - 90-95% resolve with conservative treatment

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?

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
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)\(^*\)
  3. Combination of both

• *study found muscle-relaxing technique was the most effective, but should be used with other interventions
Treatment

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

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

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%
Treatment

• Helmet
  – Children over 12 months treated with helmet therapy had an improvement in skull shape in the same interval as younger infants\(^\text{10}\)
  – Supports the use of helmets with children up to the age of 18 months of age

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

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*\(^\text{11}\)
HEP Evidence

• Protocol\textsuperscript{12}:
  – 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

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

Resource for Families

• Video: 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
Resources

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

References

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- 8: Ohman (2010)
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