Sleep Apnea in Children and Adolescents with Down Syndrome

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Objectives

• Review the factors that predispose people with Down syndrome to obstructive sleep apnea
• Discuss the impact of untreated obstructive sleep apnea on health
• Explain how evaluation of obstructive sleep apnea can occur
• Identify some treatment options for obstructive sleep apnea
What is Sleep Apnea?

• A change in breathing when sleeping – pause or partially blocked breathing
  • >10 seconds in Adults
  • >2 respiratory cycles in children

• Obstructive Sleep Apnea
  • Breathing is blocked by an “obstruction” of the upper airway while the chest and abdominal muscles keep attempting to breathe

• “Central” Sleep Apnea
  • Brain does not signal the chest and abdomen to breathe

• Hypopnea
  • Reduction in Breathing by 50% that is accompanied by a decrease in oxygen
Why would children with Down Syndrome be at risk for obstructive sleep apnea?

• Smaller midfaces
• Smaller jaw and smaller hard palate/roof of mouth
  • “relatively” large tongues relative to the size of their mouth
• Decreased pharyngeal muscle tone (Schott, 2004)
  • The pharynx (throat) is made of a collection of muscles
  • The tone of the pharynx maintains its shape
• Frequent nasal and sinus congestion
  • Smaller nasal passageways
  • Immunologic deficiencies
Why would children with Down Syndrome be at risk for obstructive sleep apnea?

- Dysphagia, reflux
- Other airway anomalies
- Lower muscle tone / hypotonia
- Different ages have different risks as well
Developmental changes in craniofacial structures from infancy to adulthood are illustrated.

Contributing factors:
- Maxillo-mandibular growth (mid face)
- Laryngeal descent (location of the vocal cords)
- Changes in size of adenoids and tonsils
Blocked airway

Open airway
Why would children with Down Syndrome be at risk for central apnea?

• Repeated episodes of obstructive sleep apnea can precipitate episodes of central apnea

• Children with Down Syndrome have a decreased neuronal sympathetic response (O’Driscoll, 2012)
  • They do not increase their heart rate and wake up as well as other children who have obstructive sleep apnea
  • This could prolong the decrease in oxygen levels with sleep apnea
What’s the impact of sleep apnea on health of children with Down syndrome?

- Increased incidence of Pulmonary hypertension (Loughlin, 1981)
- Decreased Verbal IQ scores and cognitive flexibility in DS children with sleep apnea. (Breslin, 2014)
- Impaired executive function in children with DS and sleep apnea. (Chen, 2013)
- Increased incidence of depression in adolescents with DS and sleep apnea. (Capone, 2013)
- Hypertension, sleepiness / irritability, weight challenges
How common is sleep apnea in children with Down Syndrome?

• Studies have shown anywhere between 60-100% of children with Down Syndrome having Sleep Apnea!

• Nearly 80% of children with Down Syndrome have evidence of sleep apnea by 4 years of age. (Schott, 2006)

• Obstructive sleep apnea can be found in up to 50% of asymptomatic patients
What are the symptoms of Sleep Apnea?

- Snoring/Heavy breathing
  - 54% of DS children with no reported symptoms demonstrated sleep apnea on a sleep study. (Schott, 2006)
- Restless sleep/frequent awakenings
- Daytime sleepiness/excessive napping
- Sleeping sitting up
- Sleeping with neck extended
- Sleeping bent forward at the waist in sitting position
- Irritability
- Poor attention
- Poor concentration
Evaluation for Sleep Apnea

• “Sleep study” – diagnostic polysomnogram
  • What is it?
    • Monitors heart rate, oxygen level, carbon dioxide level, videotaping, EEG (brain waves), position, breathing effort, air flow
  • Where does it happen?
    • Overnight in a sleep center
    • Ideally, a place that routinely works with children
    • Parent or caregiver stays overnight too
Evaluation for Sleep Apnea

• When?
  • Before the age of 4
  • Anytime...

• What if my child can’t tolerate it?
  • Meeting with a sleep specialist before to discuss desensitization

• What are other options? (Stores, 2014)
  • Videotaping at home
  • Overnight pulse oximetry in home
  • Clinical history
Evaluation for Sleep Apnea

• What about a Home Sleep study?
  • Challenges – keeping the equipment on, doesn’t detect mild obstructive sleep apnea
  • Examples – Compass device versus Watch Pat
    • Compass Device – has a nasal monitor and pulse oximeter that comes off easily
    • Watch Pat – only FDA approved for 12 and older and 65 pounds
  • To qualify for CPAP need to do a “sleep study”
    • An overnight pulse oximeter does not qualify for CPAP
Compass

Watch Pat
Treatment for Sleep Apnea

• Surgery
  • Adenotonsillectomy – removal of tonsils and adenoids
    • Curative in about 50-70% of cases in children with Down syndrome (Shete, 2010)
    • Lingual tonsillectomy – removal of lingual tonsils at the base of tongue
    • Other options...

• Medications
  • GERD / heart burn / trouble swallowing
  • Allergic rhinitis
  • Asthma

• Orthodontics – rapid maxillary expansion
• Weight management
• Reassessment is important
CPAP – continuous positive airway pressure

• How does it work?
• If you or your child start on CPAP, is it “forever”?
Like Father Like Son
Process of getting used to CPAP

- Everyone is unique (Chen, 2013; DiFeo, 2012)
- Explain “why” to use it – health and mood benefits
- Explain “how” to use it
- Help it to feel comfortable
  - Practice even during the day
  - Getting the right fit
  - Falling asleep
  - Staying asleep
- Incentives / Rewards
The Magical Mask

My Tired Brain

By Angela Deal
Illustrated by Brandon Smith
Summary

• Sleep apnea is very common in infants, children and teens with Down syndrome
• Sleep apnea effects the heart, lungs, brain of people which then effects IQ, mood, attention
• Many factors effect sleep apnea and thus, different treatment options exist
• Talk to your doctor or your child’s doctor about your concerns for sleep apnea and how to get tested and treated
Questions?