

Doctor, my child snores like my husband. Is that a problem?

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Disclosure of potential sources of conflict of interest (last 2 years)

- Biron Groupe Santé
 - Consulting physician
 - Member of consultative committee
 - Medical director, Pediatric section
- Youthdale Sleep Centre
 - Consulting physician
- Takeda Canada
 - Speaker for sponsored presentations

None of these potential sources of conflict of interest have influenced the content of this presentation.

Case History

- 5 year-old girl who comes to see you with her mother for an annual visit
- The mother says that she has recently noticed that the child snores loudly.
- She wants to know if she should be concerned.

Snoring in children

- Occasional snoring is frequent in children, especially during colds.
- Habitual snoring (i.e. 3 or more nights per week) occurs in 3 to 12% of children.
- Obstructive sleep apnea syndrome occurs in 1 to 5% of children.
- When should we worry?

Obstructive sleep apnea / hypopnea syndrome (OSAS)

- Intermittent partial or complete obstruction of the upper airway during sleep
- Clinical spectrum ranging from simple snoring to severe obstructive events resulting in oxygen desaturation, carbon dioxide retention and sleep disruption due to recurrent micro-arousals

OSAS – possible consequences

- Increased sleep requirements, daytime sleepiness
- Hyperactivity, irritability, concentration difficulties
- Developmental issues, failure to thrive in young children
- Persistent or secondary nocturnal enuresis
- Effects on cardiovascular system in severe cases
- Even primary snoring may have effects on learning and behaviour

Questions

- Witnessed apneas?
- Gasping or obstructed breath sounds?
- Restless sleep?
- Excessive sweating during sleep?
- Nighttime awakenings?
- Sleep positions?
- Daytime fatigue (apart from naptime?)
- Morning headaches?
- Hyperactivity?
- Concerns about growth, weight gain and/or development?
- Family history?

Our patient – further history

- Snoring occurs almost every night
- Mother is not sure about pauses, but obstructed breath sounds with gasping have been noted
- Sleep is restless with some brief awakenings
- The child tends to sleep on her side, sometimes with her neck hyperextended
- She does not look refreshed when she wakes up in the morning
- Her kindergarten teacher has noted that the child seems to have a short attention span and tend to « fidget »
- The paternal grandfather has been diagnosed with sleep apnea

Physical exam – risk factors for OSAS

- General
 - Mouth-breathing
 - Audible respiration
 - Obesity
 - Decreased muscle tone
- HEENT
 - Enlarged tonsils
 - Retrognathia/mandibular hypoplasia
 - High arched palate
 - Midfacial hypoplasia (e.g. as in Trisomy 21, achondroplasia)
 - Other craniofacial abnormalities

Our patient – physical exam

- Alert and well-looking child, well-nourished, non-obese
- HEENT
 - Mouth breathing
 - Retrognathia
 - Tonsils 3+
- Remainder of physical exam unremarkable

Case summary so far...

- 5 year-old girl with snoring, disturbed sleep, and daytime concentration issues. Physical exam reveals mouth breathing and tonsillar hypertrophy.
- You suspect obstructive sleep apnea syndrome.
- What now?

Options

- Order a diagnostic study
- Refer to ENT
- Refer to Respiriology
- Refer to a Sleep Clinic

Diagnostic studies for sleep apnea

- Complete polysomnography
 - In the sleep lab
- Cardiorespiratory polygraphy
 - In the sleep lab
 - At home
- Overnight oximetry
 - At the hospital / in a sleep lab
 - At home

Polysomnography (PSG)

- 'Gold standard' for the diagnosis of OSAS
- Many signals recorded
 - EEG, EOG, EMG
 - ECG
 - Air flow
 - Thoracic and abdominal movements
 - Oxygen saturation
 - pCO₂
 - Snoring
 - Video

Polysomnography: events identified

- Sleep stages
- Respiratory events
 - Central apneas and hypopneas
 - Obstructive and mixed apnées et hypopneas
 - Respiratory event related arousals (RERA) or increased upper airway resistance
- Position
- Oxygen desaturation
- Hypoventilation
- Micro-arousals
- Periodic limb movements
- Other movements or nocturnal events

Polysomnography: advantages and disadvantages

- Advantages
 - Identifies respiratory events including those associated with micro-arousals
 - Detects periodic limb movements and other sleep pathology
- Disadvantages
 - Requires an overnight stay in a sleep lab
 - Long wait for pediatric studies in the public sector
 - Expensive in the private sector

Cardiorespiratory polygraphy

- Often prescribed in adults
- Not validated by the AASM for children, but used in various sleep centres
- Signals recorded
 - Air flow
 - Thoracic and abdominal movements
 - Oxygen saturation
 - Pulse rate
 - Body position
- Respiratory events are scored using air flow, oxygen saturation and pulse rate variation.

Cardiorespiratory polygraphy: advantages and disadvantages

- Advantages
 - Can be done at home
 - If done in a hospital, uses fewer resources
 - Less expensive than PSG in the private sector
- Disadvantages
 - Does not detect EEG micro-arousals
 - Does not detect periodic limb movements and other sleep pathologies
 - No information on sleep stages or sleep quality

Overnight pulse oximetry

- Recording of one or two nights
- Used frequently in Québec
- Signals recorded
 - Oxygen saturation
 - Pulse rate
- Respiratory events scored based on episodes of oxygen desaturation (3% ou 4%)
- McGill Oximetry Score often used for interpretation
 - Evaluation of baseline saturation, number of events and degree of desaturation, and presence or absence of event clusters (Référence: *Nixon, GL et al; Pediatrics 2004*)

McGill Oximetry Score

Guide d'interprétation des résultats :

McGill Oximetry Score*	Classification AOS	Nombre d'événements avec une SaO ₂ < 90%	Nombre d'événements avec une SaO ₂ < 85%	Nombre d'événements avec une SaO ₂ < 80%	Nombre de regroupements de désaturations (cluster)
1	Étude normal ou étude non concluante pour AOS	< 3	Aucun	Aucun	< 3 regroupements et saturation > 95%
2	Léger	≥ 3	≤ 3	Aucun	>3
3	Modéré	≥ 3	>3	≤ 3	>3
4	Sévère	≥ 3	>3	>3	>3

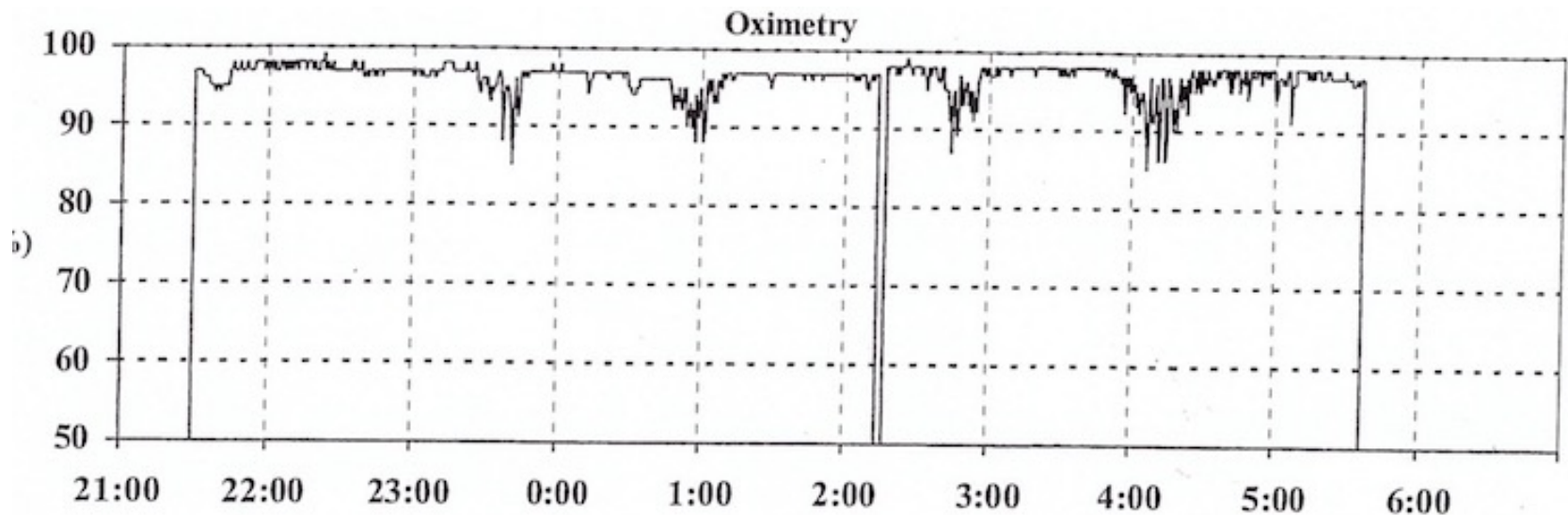
Réf: Nixon et al, Pediatrics, 2004

Overnight oximetry: advantages and disadvantages)

- Advantages
 - Easy to do at home
 - Relatively easy to obtain, especially without interpretation
 - Useful to identify more severe cases of OSAS with significant oxygen desaturation
- Disadvantages
 - A normal test does not eliminate OSAS as events associated only with micro-arousals cannot be identified
 - Types of respiratory events cannot be differentiated

Back to our case...

- You decide to do overnight oximetry
- The result comes back abnormal with an elevated desaturation index and 4 clusters of desaturation.



Next steps

- You refer the child to ENT for evaluation.
- They confirm hypertrophy of the tonsils and the adenoids.
- A trial of a nasal corticosteroid does not improve the child's symptoms so she is scheduled for adenotonsillectomy.
- You see the child in follow-up a few months after surgery. She is no longer snoring, her sleep has improved, and her daytime functioning is improving as well.

Conclusions

- Snoring in children should be taken seriously.
- Various diagnostic studies are available
- Consultation requests are also an option
- Treating sleep apnea can have a significant impact on the quality of a child's sleep and on their ability to concentrate and to learn during the day.