Obstructive sleep apnoea in children

A child with noisy breathing and daytime sleepiness

Tasnoova Ali, Habib Bhurawala

CASE

A boy aged five years presented to the paediatric outpatient clinic with a six-month history of snoring and noisy breathing during sleep, at times associated with nasal congestion. His parent also reported a history of excessive daytime sleepiness and difficulty concentrating at school. His vital signs and cardiovascular and respiratory examinations were normal. His height was 111 cm (eighth centile) and weight was 17.7 kg (fifth centile).

QUESTION 1

How common are snoring and obstructive sleep apnoea (OSA) in children?

QUESTION 2

What are the causes of snoring in children?

QUESTION 3

What are the causes of OSA in children?

QUESTION 4

What are the symptoms of OSA?

ANSWER 1

While snoring affects 15–22% of children, only 3% of children have OSA.[1]

ANSWER 2

Sleep-disordered breathing describes a continuum of chronic respiratory disturbance or snoring.[2] The continuum includes (from least severe to most severe):[2]

- primary snoring – habitual (occurring more than three nights per week) snoring without obstruction (apnoeas, hypopnoeas), frequent arousals or gas exchange abnormalities
- upper airways resistance syndrome – snoring, increased work of breathing and frequent arousals without recognisable obstructive events or gas exchange abnormalities
- obstructive hypoventilation – snoring and elevated end-expiratory carbon dioxide (CO_2) partial pressure in the absence of recognisable obstructive events
- OSA – recurrent episodes of partial or complete upper airway obstruction (apnoeas, hypopneas) with gas-exchange abnormalities including impaired oxygenation and elevated end-expiratory CO_2 partial pressure.

It is important to note that while upper respiratory tract infections and tonsillitis may cause acute snoring episodes in children, these conditions do not cause chronic or prolonged snoring.

ANSWER 3

The most common cause of OSA in children is an enlargement of the tonsils or adenoids.[3,4] The tonsils and adenoids grow most quickly in the preschool years. This rapid enlargement of the tonsils or adenoids can lead to obstruction of airflow through the pharynx. During sleep, relaxation of the dilating muscles of the pharynx further contributes to this obstruction.

Other causes of OSA include chronic allergic rhinitis, obesity and disorders associated with musculoskeletal or neurological causes of airway size reduction.[5]

ANSWER 4

Nocturnal symptoms of OSA include:[5,6]

- habitual snoring (≥3 nights per week)
- restless or agitated sleep
- increased work of breathing
- pauses in breathing, gasping
- mouth breathing
- night sweats.

Daytime symptoms of OSA include:[5,6]

- excessive sleepiness
- morning headaches
- poor school functioning or other behavioural concerns (difficulty learning, hyperactivity).

CASE CONTINUED

Examination of the throat showed moderately enlarged adenoids compressing approximately 75% of the postnasal space. The child also had mildly enlarged (grade 2) tonsils with no pus or exudates.

An intranasal corticosteroid was commenced. This led to improvement but not complete resolution of his symptoms.

QUESTION 5

What are the diagnostic tests for OSA?

QUESTION 6

What are the management options for patients with OSA?

ANSWER 5

Overnight oximetry is a test during which pulse oximetry and transcutaneous CO_2 are measured continuously overnight.[7] The McGill oximetry scoring system is used to risk-stratify patients with possible

OSA.[7] It has lower sensitivity when compared with polysomnography and therefore is not diagnostic. It is only useful as a screening tool.

Polysomnography is the gold standard for confirming the diagnosis.[3] Polysomnography simultaneously measures multiple channels, including breathing, heart rate, oximetry, CO_2, sleep stage and muscle activity. It can therefore be used to diagnose OSA.

ANSWER 6

In children with mild OSA without any allergic rhinitis, 'watchful waiting' has been shown to lead to an improvement in the condition. In 2015, the Childhood Adenotonsillectomy Trial (CHAT) found that 42% of children aged 5–9 years with mild-to-moderate OSA improved (ie had no signs of OSA on polysomnography) without any intervention after seven months.[8]

In children with mild-to-moderate OSA, anti-inflammatory medications such as intranasal corticosteroids and leukotriene receptor antagonists have been shown to reduce the severity of symptoms.[9]

In children who have moderate or severe OSA with adenotonsillar hypertrophy who are otherwise healthy, adenotonsillectomy is considered first-line therapy as it is effective in improving respiratory parameters, as measured by polysomnography, and quality of life.[3,10] Nasal continuous positive airway pressure (CPAP) is also useful in moderate-to-severe OSA.[10] For children with neuromuscular disorders, bilevel positive airway pressure (BiPAP) may be used.[11] Rarely, certain surgeries may be helpful for children with craniofacial abnormalities, such as maxillary distraction in midfacial hypoplasia.[12]

CASE CONTINUED

Overnight oximetry with continuous transcutaneous CO_2 monitoring demonstrated a 10 mmHg increase in partial pressure of CO_2 with sleep onset, accompanied by observations of snoring, supporting the diagnosis of OSA. The patient was referred for polysomnography to confirm the diagnosis.

Flexible naso-endoscopy performed by an ear, nose and throat specialist re-demonstrated moderately enlarged adenoids, compressing 75% of the postnasal space. Tonsils were again found to be mildly enlarged (grade 2). Hence, the patient was referred for an elective adenoidectomy.

The patient's mother was contacted four months after the procedure. She reported a significant improvement in her child's symptoms; his daytime sleepiness had improved, and he was more alert and had a greater ability to focus on tasks.

Key points

- While OSA is one of the causes of snoring, not all children who snore have OSA.
- OSA in children can lead to poor sleep quality, learning difficulties, impaired growth and cardiovascular complications.
- Polysomnography is the gold standard for confirming the diagnosis. Overnight oximetry is a useful screening tool.
- In mild cases, a 'watchful waiting' approach has been shown to lead to improvement of symptoms.
- Symptoms in mild-to-moderate cases have also been shown to be improved by anti-inflammatory medications such as intranasal steroids.
- In otherwise healthy children with moderate-to-severe OSA who have adenotonsillar hypertrophy, adenotonsillectomy is usually an effective treatment.

Authors

Tasnoova Ali MD, Junior Medical Officer, Prince of Wales Hospital, NSW. tasnoova.ali@health.nsw.gov.au

Habib Bhurawala MBBS, MD, DCH, AFRACMA, FRACP, Head of Paediatric Department, Nepean Hospital, NSW; Conjoint Lecturer, Sydney Medical School Nepean, Discipline of Paediatrics, The University of Sydney, NSW

Competing interests: None.

Funding: None.

Provenance and peer review: Not commissioned, externally peer reviewed.

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correspondence **ajgp@racgp.org.au**