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Medical management of severe obstructive sleep apnoea in two cases during the coronavirus disease 2019 pandemic

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Clinical Record

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Abstract

Objective. Severe paediatric obstructive sleep apnoea in typically developing children with adenotonsillar hypertrophy is primarily managed surgically. Non-emergency ENT surgery was paused early in the coronavirus disease 2019 pandemic and children were offered medical management for obstructive sleep apnoea.

Methods. A service evaluation was performed to assess the impact of continuous positive airway pressure alongside medical management for severe obstructive sleep apnoea.

Results. Over 5 months during 2020, in a tertiary care setting, two children (one boy and one girl), aged 2.7 years and 4.1 years, were offered continuous positive airway pressure and medical treatments for severe obstructive sleep apnoea whilst surgery was paused during the coronavirus disease 2019 pandemic. Both children failed to establish continuous positive airway pressure therapy because of ongoing disturbed sleep on ventilation, and they proceeded to adenotonsillectomy. Sleep-Related Breathing Disorder scale scores improved following surgical intervention.

Conclusion. Continuous positive airway pressure therapy is poorly tolerated in children with severe obstructive sleep apnoea secondary to adenotonsillar hypertrophy. Surgery remains the most appropriate treatment.

Introduction

Medical management and watchful waiting are well-recognised treatment modalities for mild to moderate obstructive sleep apnoea (OSA).[1] In randomised, controlled trials in children aged three to nine years with mild to moderate OSA, watchful waiting was associated with improved apnoea–hypopnoea index scores in 46–82 per cent of children over a six-month period.[2,3] Historically, children with severe OSA and adenotonsillar hypertrophy have been primarily treated with surgery. The impact of a non-surgical approach on improvement or spontaneous resolution of severe OSA is unknown.

At the onset of the coronavirus disease 2019 pandemic, the British Association of Paediatric Otolaryngologists advised against ENT surgery for all except the most severe cases of airway obstruction with irreversible cor pulmonale. This created an opportunity to explore further the impact of non-surgical therapies for the management of severe OSA.

Materials and methods

This paper describes two typically developing, non-obese children with a history of OSA, who were assessed with overnight Masimo (Irvine, California, USA) oximetry and the Sleep-Related Breathing Disorder scale of the Pediatric Sleep Questionnaire.[4] A Sleep-Related Breathing Disorder scale score of greater than 0.33 was regarded as indicative of OSA.[4] Those with a 4 per cent oxygen desaturation index of greater than 25 episodes per hour were referred directly for urgent surgical management.

Both children, who had severe OSA (defined as a 4 per cent oxygen desaturation index of 10–25 episodes per hour) and adenotonsillar hypertrophy, were offered medical management. This consisted of continuous positive airway pressure (CPAP) therapy, in conjunction with topical nasal steroids, oral antibiotics and montelukast to reduce upper airway inflammation and treat pre-existing infection.

The CPAP devices and appropriate interfaces were delivered to the home setting. Education and training for the initiation of CPAP therapy was undertaken by the long-term ventilation team, and was conveyed to the parents or carers and children via a video conference call.

Tolerance of CPAP therapy was defined as adherence to treatment for a minimum of 4 hours. All patients were given a minimum of one month for adaptation to the new intervention (CPAP treatment). Children unable to tolerate CPAP therapy at this time point were referred for surgical management unless a significant improvement in their OSA symptoms was experienced following medical treatment alone.

Table 1. Pre- and post-intervention Sleep-Related Breathing Disorder scale and pulse oximetry data

		Pre-medical interventions (CPAP & medical therapies)							Post-surgical intervention
				Pulse oximetry data					
Case no.	Age at 1st sleep study (years)	SRBD score	McGill oximetry score	Mean saturations	4% ODI	3% ODI	Minimum saturation	Delta index	SRBD score
1	2.7	0.62	3	94.4	18.5	29.8	72	0.91	0.04
2	4.1	0.67	3	96.5	23.0	29.0	68	1.12	0.27

No. = number; CPAP = continuous positive airway pressure; SRBD = Sleep-Related Breathing Disorder scale of the Pediatric Sleep Questionnaire; ODI = oxygen desaturation index

Sleep-Related Breathing Disorder scale completion was repeated for all children at six months post intervention.

A service evaluation was undertaken to assess the impact of medical management on outcome, in terms of adherence to CPAP therapy and improvement of OSA as determined by the Sleep-Related Breathing Disorder scale.

Results

During the 5-month study period (March–July 2020), two children (one boy and one girl), aged 2.7 years and 4.1 years respectively, were offered CPAP and medical treatments for severe OSA. Both children failed to establish CPAP therapy. Reasons for non-adherence were: ongoing disturbed sleep on ventilation ($n = 2$), and inability to tolerate a mask ($n = 1$).

Both children proceeded to adenotonsillectomy. In both cases, the Sleep-Related Breathing Disorder scale score improved post-surgery (Table 1). The Sleep-Related Breathing Disorder scale and pulse oximetry data are provided in Table 1.

Discussion

These two cases demonstrate that CPAP therapy is poorly tolerated in children with severe OSA secondary to adenotonsillar hypertrophy. This is most likely because adenoidal and tonsillar tissue causes a comparatively immovable physical obstruction of the posterior pharynx and nasal passages, making CPAP therapy difficult to deliver.

- Managing severe obstructive sleep apnoea medically is a challenge
- Non-tolerance of continuous positive airway pressure may be multifactorial
- Such non-tolerance is likely impacted by occlusion of the airway caused by enlarged tonsils and adenoids

The local centre provides care to a large cohort of children on CPAP therapy (more than 100 currently), and it experiences similar levels of tolerance and adherence to other centres of a similar size. Whilst the difficulty in CPAP therapy tolerance most likely reflects anatomical airway blockage with soft tissue structures, it is possible that the mode of training impacted on the success rate of implementing CPAP therapy. Training via videoconferencing has only recently been introduced to the ventilation service. Adherence to CPAP therapy, defined as 4 hours of CPAP treatment tolerance within 1 month of starting CPAP therapy, was achieved in 47 per cent of all patients started on CPAP treatment during the period from February 2020 to February 2021, which is comparable to previous data. The period of one month was chosen for this study because of the severe nature of the OSA and a requirement to intervene in instances of treatment failure. In practice, many children take longer than a month to acclimatise to CPAP therapy.

Conclusion

These two cases suggest that CPAP therapy is poorly tolerated in children with severe OSA secondary to adenotonsillar hypertrophy, and surgery in the first instance remains the most appropriate mode of therapy. Prospective cohort studies are required to determine whether children with adenotonsillar hypertrophy and severe OSA can be managed effectively with CPAP therapy, and thus avoid surgical interventions.

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Competing interests. None declared

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