A review of 45 children with suspected obstructive sleep apnoea syndrome in 2 private hospitals in Hong Kong

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Introduction

Obstructive sleep apnoea syndrome (OSAS) was estimated to affect 2% of Hong Kong children.[1] However, the diagnostic gold-standard of OSAS, the overnight full-polysomnogram (PSG) has a relatively low rate of utilisation in the private sector. Disparity of diagnostic access in private and public sector were discussed in US.[2] The characteristics of children referred to a public hospital in Hong Kong were reported[3,4] while similar data were not available for the Hong Kong private sector. In this study, children with suspected OSA referred to two private hospitals in Hong Kong for overnight sleep polysomnography were reviewed.

Methods

Patients aged 2- to 12-year were included in this review. They were referred by private doctors working in Kowloon to 2 different private hospitals, namely the Hong Kong Baptist Hospital and Evangel Hospital from January, 2005 to February, 2006. The ward nurse administered a standard questionnaire (Appendix 1) to their parents. The children, accompanied by one parent, underwent PSG with Alice 4 (Respironics, USA) for one night in a private room. The PSGs were scored by the author manually. Those with incomplete clinical data were excluded.

The diagnostic criteria for OSAS was obstructive apnoea index (OAI) more than 1 per hour[5] or obstructive apnoea-hypopnea index (OAHI) more than 1.5 per hour.[6] Hypopnea was defined as a reduction of oronasal airflow, as detected by thermistor, of more than 50%.

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Results

Forty-five children were analysed from 2 different hospitals, namely the Hong Kong Baptist Hospital and Evangel Hospital. They aged from 2- to 12-year with a mean age of 7.40 years. Eighteen were referred by paediatricians, 16 by otolaryngologists, 4 by general practitioners and the rest by doctors of other specialties. The primary reason was snoring with suspected obstructive sleep apnoea. The demographic and clinical data were summarised in Table 1.

Twenty of the 45 children (44.4%) were diagnosed OSAS. The prevalence of severity as categorised by AHI are listed in Table 2.

Table 1. Demographic and clinical data

Characteristics	Whole Group (n=45)
Mean age (SD) in years	7.40 (3.17)
Male	31 (68.9%)
Mean BMI (SD)	19.2 (7.8)
Snoring frequency	
every night	26 (58%)
every other night	15 (33%)
at least one night per week	4 (9%)
Witness apnoea during sleep	22 (49%)
Sleeptalking	34 (75.6%)
Sleepwalking	4 (9%)
Sleep terror	27 (60%)
Bruxism	20 (44%)
Nocturnal Enuresis (Aged 6-year or above)	9 (20%)
Daytime sleepiness as commented by schoolteacher	17 (38%)
Associated atopic diseases	30 (67%)
Any sibling or parents who snore	27 (60%)
Mean duration of snoring	19.7 (21.4) months

* Data are listed here as number (SD), unless otherwise indicated.

For the sleep symptoms, 26 of them reported snoring every night and 14 of them were diagnosed OSAS, with an odd ratio of 2.53 (95% confidence interval 0.73 to 8.71). Observed aponea was associated with OSAS with an odd ratio of 4.96 (95% confidence interval 1.39 to 17.71) and sleep talking decreased the risk for OSAS 0.21 (95% confidence interval 0.05 to 0.92) respectively (Table 3). After adjustment for age and gender, sleep talking and observed aponea still emerged as significant factors (Table 4). Forty-one point two percent of variables of OSAS (Nagelkerke R^2) were accounted for by this regression model.

Table 2. Polysomnographically data of all patients

Parameters of polysomnography	N=45
Mean OAHI (SD)	5.6 (11.6) episodes per hour
Mean OAI (SD)	3.4 (6.8) episodes per hour
Mean TST (SD)	463 (62) minutes
Mean sleep efficiency (SD)	79.9 (9.3) %
Mean desaturation index (SD)	8.5 (15.6) episodes per hour
Number of children with OSA (%)	20 (44.4%)
Severity of AHI	
<1.5, i.e. normal	25 (55.6%)
1.5-5, mild OSAS	11 (24.4%)
5.1-15, moderate OSAS	3 (6.7%)
>15.0, severe OSAS	6 (13.3%)

* Data are listed here as number (SD), unless otherwise indicated.

Discussion

This study showed a similar distribution of severity of OSAS compared with the previous data by Chau et al.[4] Witnessed aponea and sleep talking were significantly associated with the occurrence of OSAS. Interestingly, sleep talking was negatively associated with OSAS which was different from that reported previously.[7,8]

The referrals were made mainly by paediatricians or otolaryngologists. Only 4 patients were referred by general practitioners. From the author's experience, very few parents walked in the clinic complaining of snoring or suspected sleep aponea. Rather it was the clinical symptoms and associated atopic diseases that alerted the clinician and on further enquiry the possibility of obstructive sleep aponea was revealed.

According to a local data by Ng et al,[9] there were 2 public hospitals in Hong Kong that had dedicated paediatric sleep laboratory. The average waiting time was 6 months for a full sleep study and the waiting time between initial referral to being assessed at sleep clinic was 18 months in their hospital. In contrast, the private hospitals offer a much shorter waiting time, usually 1-2 weeks. As paediatricians generally agreed

Table 3. Comparison between OSA and normal children

	OSA (n=20)	Non-OSA (n=25)	p
Mean age (SD)	6.65 (2.87)	8.00 (3.33)	0.158
Male/Female	5/15	9/16	0.525
Habitual snoring	14 (70%)	12 (48%)	0.224
Observed apnoea	14 (70%)	8 (32%)	0.017*
Sleepwalking	2 (10%)	2 (8%)	1.000
Sleeptalking	12 (60%)	22 (88%)	0.041*
Sleep terror	14 (70%)	13 (52%)	0.359
Bruxism	7 (35%)	13 (52%)	0.367
Nocturnal Enuresis (Aged 6-year or above)	4 (20%)	5 (20%)	1.000
Daytime sleepiness as commented by schoolteacher	9 (45%)	8 (32%)	0.537
Associated atopic diseases	12 (60%)	18 (72%)	0.527
Any sibling or parents who snore	11 (55%)	16 (64%)	0.559
Mean duration of snoring (SD)	16.3 (14.84)	22.4 (25.48)	0.322
Mean body mass index (SD)	18.96 (4.5)	19.37 (10.0)	0.869

Data are listed here as number (SD), unless otherwise indicated.
*Statistically significant

Table 4. Logistic regression analysis of independent risk factors for OSA in the study population

Risk factor	Regression coefficient (S.E.)	Odds ratio (95% CI)	p
Age	-0.15 (0.13)	0.86 (0.67 to 1.11)	0.256
Gender	0.79 (0.90)	2.20 (0.38 to 12.83)	0.382
Observed apnoea	2.26 (0.89)	9.62 (1.69 to 55.56)	0.011
Sleep talking	-2.66 (1.05)	0.07 (0.01 to 0.55)	0.012
Constant	0.72 (1.06)	-	0.494

that full PSG should be done for all children with suspected sleep aponea and, based on previous estimations of prevalence of OSAS in Hong Kong children,[1] there was strong reason to believe that the private service was very under-utilised in Hong Kong.

This low utilisaton rate is probably due to multiple factors: under-diagnosis and recognition by primary care doctors and paediatricians; many children with snoring underwent adenotonsillectomy without PSG preoperatively; expenses in private hospitals for PSG and lack of a standardised protocol for referral and management of such patients.

In conclusion, 44% of children who underwent PSG in private hospitals had OSAS and witnessed apnoea was a significant risk factor for OSAS. In view of the different waiting time for PSG in the private and public hospitals, OSAS in children is an area where public/private collaboration should be looked into.

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Appendix I. Questionnaire

Date of birth: _____

Bodyweight: _____ kg Height: _____ cm

Date of sleep study: _____

Reason of referral:

1. **suspect sleep apnoea** _____
2. **Others:** _____
3. **Any sleep study before?** Yes / No

Sleep symptoms

1. **Snoring:** every night / more than 3 nights per week / 1-3 nights per week / none
2. **Duration of snoring:** _____ years _____ months
3. **Have your child ever stopped breathing during sleep?** Yes / No
4. Any of the following:
   - **A. Sleeptalking** Yes/No
   - **B. Sleepwalking** Yes/No
   - **C. Sleep terror** Yes/No
   - **D. Bruxism** Yes/No
   - **E. Enuresis** Yes/No
5. **Has a teacher commented that your child looked tired or slept in the class?** Yes / No
6. **Any allergic disorders (asthma, allergic rhinitis, eczema)?** Yes / No
7. **Any siblings or parents who snore?** Yes / No
8. **Relationship of informant and patient;** parent/child _____ others _____