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EDITORIAL

Sleep-disordered breathing in children: are we underestimating the problem?

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Sleep-disordered breathing (SDB) is a spectrum of disorders, ranging from primary snoring to severe obstructive sleep apnoea syndrome (OSAS). Several studies have suggested that primary snoring may affect 10–25% of children aged 3–12 yrs, and 10% of these children may have OSAS [1–3]. SDB is known to be associated with behavioural problems, such as aggression, hyperactivity, attention-deficit disorder and poor socialisation [4]. GOZAL [5] showed that SDB was 6–9-fold more common in 1st grade children (aged 6 yrs) who were in the bottom tenth percentile for academic achievement. Furthermore, neurocognitive functions, such as memory, learning and problem solving, are reduced in children with SDB [6]. Therefore, it is not surprising that the overall health status and quality of life for children with SDB is reduced significantly [4, 7]. Indeed, the quality of life for children with adenotonsillar disease, a group of children with SDB and/or recurrent throat infections, was shown to be similar to children with asthma or juvenile rheumatoid arthritis and, in some respects, worse [8].

A high percentage of children with SDB who undergo adenotonsillectomy experience resolution of the disorder, as documented by post-operative polysomnography (PSG) [9]. However, do behavioural and neurocognitive problems also resolve after surgical therapy? Using the Child Behavior Checklist total problem score, GOLDSTEIN *et al.* [4] showed that the number of children who scored in the abnormal range after adenotonsillectomy for SDB was reduced from 16 children (25%) to only five children (8%). OWENS *et al.* [6] studied eight children with mild-to-moderate OSAS before and after adenotonsillectomy. They demonstrated mild deficits in executive functions and motor skills, with modest improvements in the same domains after treatment. FRIEDMAN *et al.* [10] compared 27 children with OSAS who underwent adenotonsillectomy to 14 controls. Children with OSAS had impaired neurocognitive function compared with controls. Around 6–10 months after adenotonsillectomy, children in the OSAS group showed improvement in all general scales with an effect large enough to approach the levels of the control groups. GOZAL [5] demonstrated that children with SDB who were poor academic performers improved their grades after adenotonsillectomy. This did not apply to children without SDB or to children with SDB who refused surgical therapy.

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Dramatic improvements in quality of life are reported by caregivers after adenotonsillectomy for SDB. A significant improvement in all domains of the Obstructive Sleep Apnea-18 quality of life questionnaire, including sleep disturbance, physical symptoms, emotional symptoms and daytime functioning, is seen after surgery [4, 7]. Furthermore, these improvements in quality of life remain significant compared with baseline values for $\geqslant$18 months after surgery [11].

In this issue of *European Respiratory Journal*, the study by MONTGOMERY-DOWNS *et al.* [12] examines the impact of adenotonsillectomy for OSAS in pre-school-aged children from a low-income community population. Previous studies have been restricted by small numbers of children from a wide age range who were referred because of a sleep disturbance. MONTGOMERY-DOWNS *et al.* [12] studied 19 children with OSAS, using cognitive assessment before and after surgical therapy, and compared them with matched controls. These children were identified after >6,000 questionnaires were sent and 1,951 returned. PSG and cognitive testing were performed on 273 children. A total of 39 children were diagnosed with OSAS, 25 children underwent adenotonsillectomy and 19 children returned for post-operative evaluation. The study showed that cognitive scores were significantly lower in OSAS subjects *versus* controls. Both sleep and cognitive parameters improved after adenotonsillectomy for OSAS and became similar to matched controls.

The study population was selected from families who would not normally seek evaluation and treatment of OSAS. It highlights the need for more awareness by paediatricians and teachers of an association between behavioural problems and SDB. The study also demonstrates the difficulties in studying at-risk populations. Children are often not seen for follow-up assessments, and identifying and studying controls can be very difficult and time consuming. The study does support the need for school-based screening programmes. However, the feasibility of such an approach is questionable, in view of the high default rates and the limited data available from cognitive screening.

Are we underestimating the impact of SDB on behaviour and cognition? There can be little doubt that there is increased awareness of the problem. The American Academy of Pediatrics (Elk Grove Village, IL, USA) recently published clinical practice guidelines on the diagnosis and management of childhood OSAS and emphasised the need to screen all children for snoring [13]. Recent studies have shown that primary snoring, without OSAS, is not as ''benign'' as was first thought and is also associated with behavioural and cognitive

problems, including reduced verbal and global intelligence quotient scores, reduced attention and memory deficits [14]. The disruption of sleep in snoring children throughout the first decade of life, a period of rapid neurological development, may lead to significant neurocognitive deficits similar to those seen with OSAS [14]. However, it remains unknown how children with primary snoring should be selected for surgical therapy and whether adenotonsillectomy is effective. Also, further investigations are necessary to determine the effect of SDB on behaviour in different age and ethnic groups. Finally, there may be little correlation between neurocognitive performance and OSAS severity, as measured by PSG. FRIEDMAN *et al.* [10] did not find a correlation between neurocognitive scores and OSAS severity, as measured by the respiratory distress index (RDI), oxygen desaturations or sleep disruption. Furthermore, MITCHELL *et al.* [7] showed that improvements in quality of life after adenotonsillectomy for OSAS did not correlate with pre-operative OSAS severity, as measured by the RDI. In both studies, post-operative PSG was not available, and it may be that sleep characteristics after surgical therapy more closely correlate with improvements in neurocognitive scores and quality of life.

The diagnosis of sleep-disordered breathing has moot value unless effective therapy is available. The study by MONTGOMERY-DOWNS *et al.* [12] suggests that adenotonsillectomy alleviates the behavioural and neurocognitive disorders associated with obstructive sleep apnoea syndrome in a population of disadvantaged children who might suffer disproportionately if obstructive sleep apnoea syndrome was allowed to persist. It highlights the need for more research in this exciting field.

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