Obstructive Sleep Apnea in a Child: Case Report of an Unusual Cause of Disturbed Sleep in Pediatric Age Group

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ABSTRACT

Introduction: Obstructive sleep apnea (OSA) in children is characterized by episodic complete or partial airway obstruction that occurs during sleep. Major components of obstructive sleep apnea include episodic hypoxia, intermittent hypercapnia and disturbed sleep.

Case Report: A 3 year old girl presented to us with difficulty in breathing and complaints of snoring and abnormal limb movements during sleep along with daytime somnolence. There was also a history of frequent awakening and parents reported that she was not sleeping longer than 4 hours at a stretch. She also had daytime hyperactivity, inattention and undue fidgety. Developmentally she was normal and there was no evidence of any developmental delay. Physical examination was normal except for her weight being less than - 1 SD for expected. Routine investigations turned out to be normal except for mild anemia. Considering the symptoms of sleep disturbance and daytime somnolence along with the history of hyperactivity we thought to rule out obstructive sleep apnea and advised Polysomnography. On Polysomnography she was found to be having Obstructive sleep apnea.

Conclusion: Obstructive Sleep Apnea is an important cause of disturbed sleep, daytime somnolence and hyperactivity in children. In any child presenting with these complaints OSA must be ruled out by polysomnography.

Keywords: Obstructive Sleep Apnea in Children, Disturbed Sleep, Daytime Somnolence, Hyperactivity, Continuous Positive Airway Pressure.

INTRODUCTION

Childhood Obstructive sleep apnea (OSA) is characterized by episodic upper airway obstruction occurring during sleep. The major components associated with OSA includes episodic hypoxia, intermittent hypercapnia and disturbed sleep[1]. The incidence of obstructive sleep apnea in children has been reported to be between 1.5% -2.5% in healthy non-obese children. The incidence increases in children with obesity and risk factors (Adenotonsillar hypertrophy, Downs syndrome or Pierre Robin anomaly). It is more common in whites than blacks. There is no sex predilection during childhood and boys and girls are affected with equal frequency but in adults men are affected twice as commonly as women. The affected age group usually belongs to 2-10 years of age but there are case reports that describes OSA even in infancy[2].

It is a common but under-diagnosed condition because many of the times parents attribute it to habitual snoring and hence consultation is delayed. The levels at which obstruction can occur include nasopharynx, mouth, velopharynx, retroglossal region and larynx. It is important to know that childhood sleep apnea is different from adult sleep apnea. Unlike in adults features like short attention span, emotional liability, day time hyperactivity and daytime somnolence are more common in children[3].

The risk factors associated with OSA in children include Obesity, adenotonsillar hypertrophy, allergic rhinitis, nasal polyps, thyroid disorders, sickle cell disease and syndromes like Downs, Pierre Robin, Crouzon and Marfans syndrome. Irrespective of the associated risk factors the basic mechanism remains either anatomic narrowing or airway muscle weakness, neural dysregulation or a disrupted link between muscles responsible for airway dilatation and airway itself. OSA remains an under-diagnosed and under-treated condition because of its varied symptomatology. Not all children present with similar complaints and it is important to bear this fact in mind while taking history of a child with OSA. A high index of suspicion on the part of pediatrician or pulmonologist is needed while examining a child with symptoms like snoring, disturbed sleep and daytime somnolence. The other signs and symptoms which needs to be specifically asked include daytime fatigue, irritability, delayed development, poor weight gain and morning headache. The complications associated with untreated obstructive sleep apnea in pediatric age group may include poor growth, developmental delay, daytime hyperactivity, behavioral problems, undue daytime fidgety and somnolence. In severe untreated cases ultimately complications like pulmonary hypertension and corpulmonale may develop[4].

In every child presenting with the complaints of snoring and disturbed sleep it is essential that Obstructive sleep apnea be ruled out by clinical examination and appropriate investigations. Clinical examination of these children must include determination of BMI (obesity), examination of mouth, nose and airways to rule out craniofacial anomalies, micrognathia, retrognathia or adenotonsillar hypertrophy.

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The presence of clinical features of any syndrome which may predispose a child for OSA should be actively looked for. The definitive diagnosis of OSA depends upon Polysomnography (PSG) which remains the Gold standard test. In PSG various stages of sleep and physiological parameters are recorded when the child is asleep[5].

We present here case of a 3 year old girl who presented to us with the complaints of snoring, difficulty in breathing and abnormal limb movements during sleep with daytime somnolence. She was diagnosed with OSA on the basis of Polysomnography and treated by CPAP. This case emphasizes the need to have a high index of suspicion in children who present with snoring and disturbed sleep otherwise the diagnosis of OSA can be either missed or delayed.

CASE REPORT

A 3 year old girl was brought to us with the complaints of excessive snoring during night since 6-8 months. This snoring was associated with disturbed sleep and parents complained that the child never slept for more than 4 hours at a stretch. Moreover parents noticed abnormal movements of the limbs during sleep. For these complaints the girl was shown to a local pediatrician who attributed the symptoms to snoring. Not satisfied with the opinion of the pediatrician and because of the increasing symptoms the patient was brought to us. On careful questioning additional history of symptoms like daytime somnolence, undue hyperactivity and fidgety could be elicited.

On physical examination he was found to be developmentally normal. There was no evidence of adenotonsillar hypertrophy or features suggestive of any syndrome which may have predisposed her for development of OSA. Height was appropriate for her age but weight was found to be less than -1 SD for expected age suggesting affected growth. Systemic examination including respiratory, cardiovascular and CNS examination was found to be normal. Complete blood count was done which showed mild anemia (Hb-11.6). Chest X-ray was normal. In view of abnormal movement an EEG was done to rule out seizure activity but it was also normal. Since the child had symptoms of snoring, disturbed sleep and daytime somnolence we decided to rule out OSA and hence Polysomnography was done. The Total and REM sleep Apnea-hypoapnea index (AHI) was found to be 49.2 and 47.3 respectively.

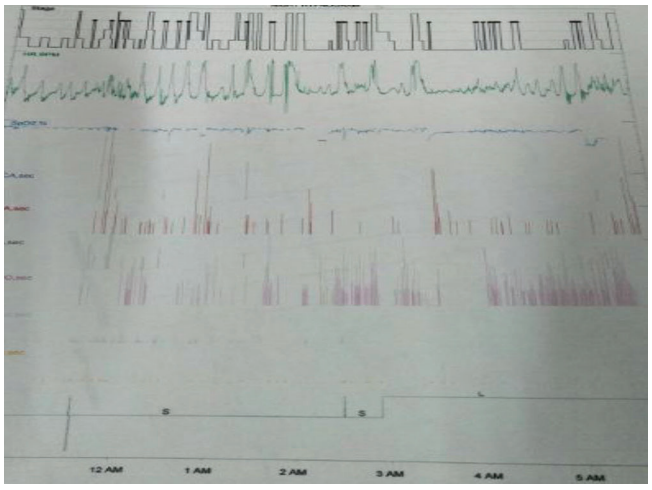

Figure-1: Obstructive sleep apnea. Note the intermittent absence of flow and respiratory efforts suggestive of Sleep Apnea.

With these findings on Polysomnography the diagnosis of OSA was established. CPAP (Continuous positive airway pressure) was advised and apnea disappeared on a CPAP pressure of 8 cmH2O. Parents reported that the snoring, disturbed sleep and abnormal limb movements resolved completely and daytime hyperactivity reduced considerably but didn't resolve completely. Parents were counseled that day time hyperactivity may take some time to resolve. She is being followed-up with positive airway pressure device without any drug therapy and she is reported to have improved drastically since then.

DISCUSSION

In 1965 Jung R et al were the first to describe obstructive sleep apnea and since then this entity has been subject of intense research and great interest to pulmonologists and researchers[6]. In earlier days of management of Obstructive sleep apnea the whole focus was on eliminating the airway obstruction and hence in majority of the seriously affected patients tracheostomy was the only definitive treatment available for OSA. In 1981 Sullivan et al described 5 patients with severe obstructive sleep apnea who were treated with continuous positive airway pressure (CPAP) through comfortable nose mask. The authors used low levels of pressure (4.5-10 cm H2O). They found that the patient responded dramatically to this measure and upper airway occlusion during sleep was completely prevented in each patient. The authors concluded that continuous positive airway works by acting as a pneumatic splint for the airway and is a safe, simple treatment for the obstructive sleep apnea syndrome[7].

The etiology of obstructive sleep apnea is thought to be multifactorial. Various mechanisms which have been postulated to be contributing to OSA include anatomic and neuromuscular factors, respiratory airway threshold and neurological components. Irrespective of the etiopathogenic mechanism the OSA affects the health of an individual by causing disturbed sleep, sleep fragmentation and intermittent hypoxia resulting into hypoxic insults to different organs and systems, mainly the brain and the cardiovascular system. All these effects may cause poor growth especially in children. The diagnosis of OSA should be suspected in any patient who presents with history of snoring, disturbed sleep and daytime somnolence. In children additional symptoms like hyperactivity and undue fidgety should be specifically enquired. The diagnosis can be confirmed by Polysomnography which is aimed to detect the obstructive apneas, hypoapneas and changes in blood oxygen saturation (SaO2). Apnea/hypopnea index (AHI) is generally calculated as the number of obstructive events per hour of sleep and is used to define the severity of OSA[8].

Once the diagnosis is confirmed the management consist of treatment of the cause. Obese patients may improve

after weight reduction or bariatric surgery. Tonsillar and adenotonsillar hypertrophy especially in children can be treated by tonsillectomy or adenoidectomy. Though the role of other surgeries is debatable many surgeries are performed if anatomical obstruction to airways is confirmed by proper imaging techniques and may include surgeries at the level of nose (correction of deviated nasal septum or polypectomy etc), oropharynx (Uvulo-palatopharyngoplasty), tongue (partial resection of the tongue and suspension) or craniofacial structures (Maxillomandibular advancement by osteotomy of the maxilla and mandible). Rarely tracheostomy may be needed in resistant cases[9].

When anatomical obstruction is not detected then the etiology of OSA may be neuronal or neuromuscular and in these cases CPAP may be used as the treatment of choice. CPAP acts by working as pneumatic splint for the airway and significantly reduces incidence of apneas and hypoapneas. Several studies have evaluated the efficacy of CPAP in reducing episodes of apneas in patients of OSA. In patients with mild to moderate sleep apnea use of CPAP is reported to significantly reduce the number of apneas/hypopnoeas consequent upon which there is improved sleep pattern and decrease in daytime somnolence and hyperactivity. All these effects are responsible for improved neurocognitive functions and quality of life. But it must be remembered that the patients who fail to respond to CPAP of 13 cmH2O or more are less likely to respond to CPAP and hence appropriate alternative measures should be taken. The stimulation of upper airway muscles, stimulation of the hypoglossal nerve, nasal expiratory PAP (nEPAP) and Oral negative pressure all are emerging treatment modalities in OSA not responding to CPAP and are still in experimental stages[10].

CONCLUSION

Obstructive sleep apnea (OSA) in children is one of the important causes of disturbed sleep, daytime somnolence and hyperactivity. It carries significant morbidity if left untreated. Its diagnosis is generally delayed because parents usually attribute disturbed sleep to snoring. This case emphasizes importance of ruling out OSA by Polysomnography in children presenting with classical features of disturbed sleep, daytime somnolence and hyperactivity.

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