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COMMENTARY

Understanding the impact of nocturnal hypoxemia in pediatric sickle cell disease

Commentary on Nourani AR, Rahman AKMF, Pernell B, et al. Nocturnal hypoxemia measured by polysomnogram is associated with acute chest syndrome in pediatric sickle cell disease. *J Clin Sleep Med.* 2021;17(2):219–226. doi:10.5664/jcsm.8852

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Sickle cell disease (SCD) is an inherited blood disorder that disproportionately affects African Americans in the United States.[1] Hypoxemia-related vasculopathy is a common endpoint leading to morbidity in SCD. The abnormal hemoglobin in SCD is vulnerable to polymerization and sickling in the setting of hypoxemia, which in turn leads to vaso-occlusive crises and other complications. Children with SCD are at an increased risk of sleep-disordered breathing (SDB).[2,3] By definition, SDB also predisposes to nocturnal hypoxemia. As such, SCD and SDB share common pathogeneses related to ischemia, hypoxemia, reperfusion injury, and endothelial dysfunction. Acute chest syndrome (ACS) is the most severe pulmonary complication of SCD in children. It is characterized by dyspnea, cough, hypoxemia, chest pain, and fever. Despite advances in the field, very little is known about the pathophysiology of ACS and what risk factors can predict future ACS episodes. The study by Nourani and colleagues[4] in this issue of the *Journal of Clinical Sleep Medicine* suggests that nocturnal hypoxemia may predispose to ACS episodes in children with SCD.

Their study describes a cohort of children with SCD who had an in-laboratory overnight polysomnography (PSG) performed. The study design was a retrospective cohort study over a 6-year period at an urban, tertiary care, academic medical center. The authors reported that their cohort of children with SCD undergoing overnight polysomnograms had more severe disease compared with those who did not undergo polysomnograms, as evidenced by a higher rate of underlying asthma, ACS episodes, hydroxyurea use, and chronic transfusion therapy. PSG was performed secondary to symptoms of SDB in most children. Hypoxemia was the primary indication for PSG in a smaller percentage of children. The authors noted that approximately 5 years had elapsed between the first ACS episode and PSG. Children with a history of prior ACS were older, taller, and homozygous for hemoglobin SS; were prescribed hydroxyurea; or were on chronic blood transfusion therapy compared with those with no prior ACS. The study found a significant and positive correlation between nocturnal hypoxemia (both mean nocturnal oxygen saturation and percentage of total sleep time with oxygen saturation < 90%) and ACS. The authors provided cutoff values for these measures of nocturnal hypoxemia and the respective sensitivity/specificity data to differentiate between children with ACS vs those without a history of ACS. Although their study found that nocturnal hypoxemia was predictive of past ACS, they infer that findings of nocturnal hypoxemia may be predictive of future ACS risk.

The Nourani et al study[4] highlights the importance of sleep-related sequelae in chronic cardiopulmonary conditions. Up to 40% of all children with SCD and 69% of those with symptoms of SDB are at risk of OSA.[2,3] Clinical history and physical exam findings alone are insufficient in screening for OSA in children, specifically in those with comorbid medical conditions.[5] This inadequacy is particularly complicated in conditions that predispose to cardiopulmonary compromise (such as SCD) because symptoms often overlap. Although the current SCD guidelines by the American Society of Hematology recommend against screening for SDB in asymptomatic individuals, this study by Nourani and colleagues[4] provides evidence that screening for hypoxemia using overnight in-laboratory PSG in children with SCD may aid in risk stratification and individualized management.[6] Moreover, in asymptomatic children with SCD (no SDB symptoms), screening for nocturnal hypoxemia using in-laboratory PSG may be a necessary step in mitigating the consequences of vaso-occlusive crises (ie, ACS). Prospective studies are needed to better understand the role of nocturnal hypoxemia in predicting morbidity related to SCD and whether there is value in screening asymptomatic children for SDB.

CITATION

Ehsan Z. Understanding the impact of nocturnal hypoxemia in pediatric sickle cell disease. *J Clin Sleep Med.* 2021;17(2):119–120.

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