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ORAL ABSTRACTS

114.SICKLE CELL DISEASE, SICKLE CELL TRAIT AND OTHER HEMOGLOBINOPATHIES, EXCLUDING THALASSEMIAS: CLINICAL AND EPIDEMIOLOGICAL

Sleep Fragmentation and Obstructive Sleep Apnea Are Associated with High Primary Stroke Risk in Children with Sickle Cell Disease

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Background
Children with sickle cell disease (SCD) are at elevated risk of developing sleep disorders, [1] which may contribute to the sequelae of their disease. One important sequela of SCD exacerbated by sleep disorders is cerebrovascular stroke. Transcranial Doppler (TCD) screening of large intracranial arteries can detect elevated blood velocity and strongly predict stroke in children with SCD. [2] However, the association between stroke risk, as assessed by TCD, and sleep disorders has not been sufficiently investigated.
Main Objective
To investigate the association between sleep disorders and abnormal TCD examinations in children with SCD.
Design/Methods
We evaluated associations between sleep disorder severity with TCD examinations in children with SCD. We selected all participants from the Sickle Cell Clinical Research and Intervention Program (SCCRIP), who underwent polysomnography between 2016 - 2020 and had at least one TCD examination. SCCRIP prospectively recruits patients diagnosed with SCD and includes retrospective and longitudinal collection of clinical, neurocognitive, geospatial, psychosocial, and health outcomes data. [3] The severity of sleep apnea was assessed using the apnea/hypopnea index, separated into total and obstructive apnea/hypopnea indices. The number of oxygen desaturation events per hour of sleep as well as the O2 saturation nadir were recorded. Sleep fragmentation was measured by the total arousal index (events per hour of sleep) and sub-categorized into spontaneous and respiratory-related arousal indices. Transcranial Doppler exams were reported as abnormal with timed average mean maximum velocities (TAMMV) of greater than 200 cm/s, high-conditional $>$ 185 cm/s, low-conditional $>$ 170 cm/s, and normal $\leq$ 170 cm/s. Exact Wilcoxon rank sum test was used to compare sleep outcomes between two groups. The false discovery rate adjusted p-values or q-values were calculated using Benjamini and Hochberg approach to control for multiple comparisons at a level of 0.05.
Results
Eighty-four patients met inclusion criteria (genotypes SS/SB0 81 (96%), median age 8.3, range 2.2-23.1, 42 male: 42 female). Six patients had abnormal, six high-conditional, 12 low-conditional velocities, while the remainder (60) had normal TCD exams. Patients with abnormal TCD exams exhibited more severe obstructive sleep apnea (mean AHI 25.0 + 9.1 vs. 5.3 + 8.3, $p = 0.003$), more severe respiratory related arousals (12.7 + 7.9 vs. 3.2 + 4.5, $p = 0.008$), and higher total arousals (22.9 + 7.7 vs. 12.9 + 5.8, $p = 0.01$) than those with normal TCD studies at $p<0.05$.The number of oxygen desaturation events per hour (mean 10.6 + 10.5 vs. 4.5 + 8.0, $p = 0.05$) was not significantly different among patients with abnormal and normal TCD exams at

q<0.05 but the O2 saturation nadir was significantly less in patients with abnormal TCD exams (mean 74.0 + 5.0 vs. 86.8+9.9, p = 0.007) at q<0.05 (Figure 1).

Conclusion

In pediatric patients with SCD, a link exists between sleep apnea, O2 saturation nadir, sleep fragmentation, and stroke risk. While the findings of this study establish a correlation between sleep disorders and cerebrovascular complications in SCD, further research is still necessary to fully comprehend the exact role of sleep disorders on stroke risk. Nevertheless, this study underscores the importance of addressing sleep apnea and promoting healthy sleep patterns in pediatric patients with SCD to reduce the risk of stroke.

References

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Disclosures Heitzer: *Global Blood Therapeutics:* Consultancy.

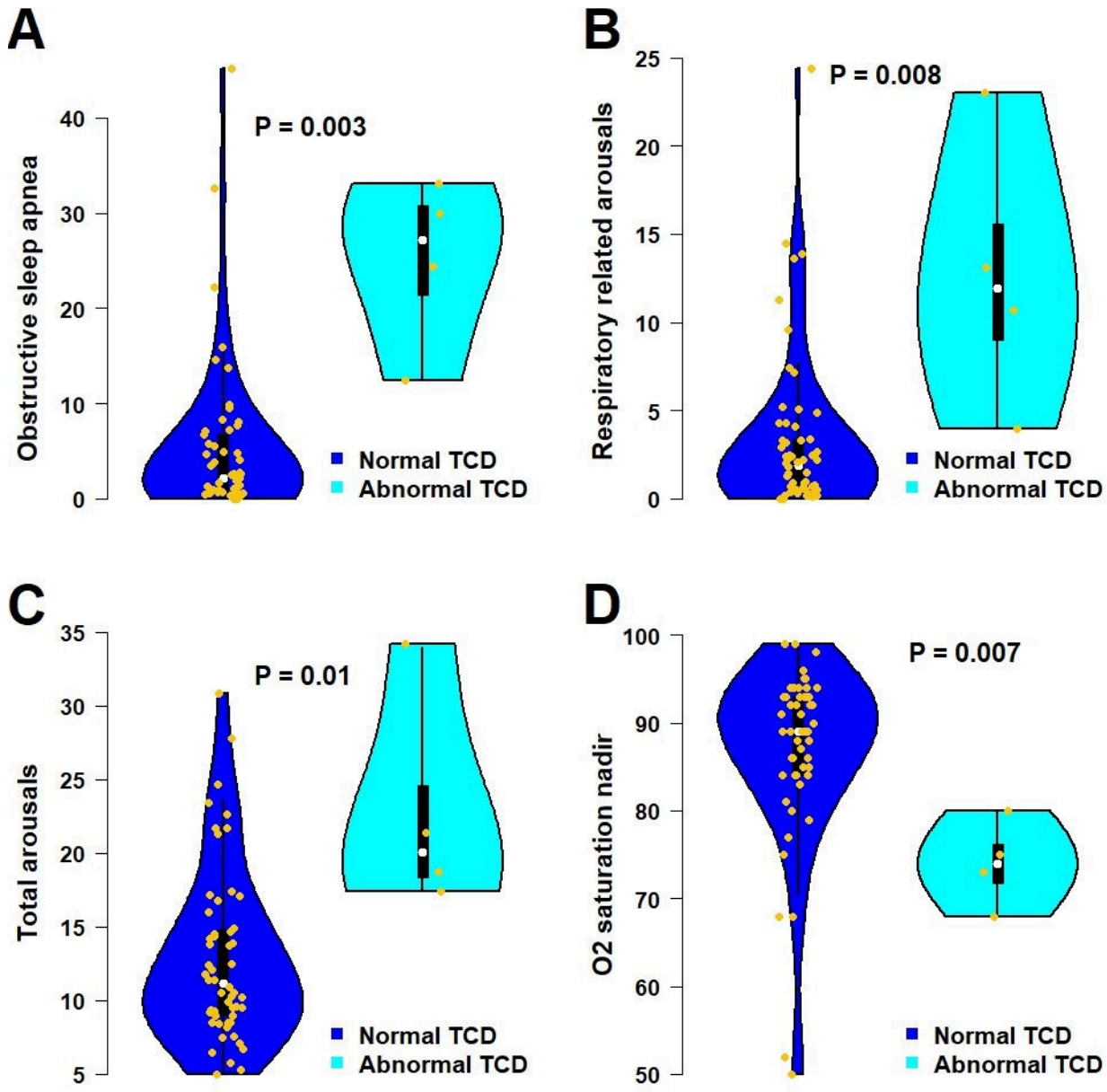

Figure 1

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