CONCUSSION PROFILE SCREEN OCULAR SUBTYPE SCORE AND OBJECTIVE FINDINGS OF OCULOMOTOR DYSFUNCTION IN PEDIATRIC CONCUSSION PATIENTS

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Background: Visual abnormalities and oculomotor dysfunction are common findings in pediatric concussion patients. Not only are these symptoms reported by patients subjectively, but they can be measured objectively using clinical tools including oculomotor tracking (OMT) devices.

Purpose: To identify trends between levels of subjective visual symptoms and objective oculomotor findings on OMT.

Methods: Retrospective cohort of 65 patients (12-21 years old) from 11/05/20 to 6/10/21. Each visit, the concussion clinical profile (CP) screen was completed, which has a total score (0-89) and a weighted ocular subtype score (0-3) based on five vision focused questions in the screen. At the same visit, the OMT device (250 Hz video-eye tracker inside a headset) measured various biodata including microsaccade (MS) magnitude, vertical and horizontal saccadic latency. Near point convergence (NPC) was measured by a physician. Patients were classified into low grade (n=48) or high grade (n=17) using an ocular subtype score threshold of 1.5. A paired two sample t-test was used to compare both groups objective OMT data.

Results:
The low grade group had an average MS magnitude of 1.06 degrees, an average vertical saccadic latency of 217.49 ms, an average horizontal saccadic latency of 198.16 ms, and a physician measured NPC of 8.75 cm. The high grade group had an average MS magnitude of 1.21 degrees, an average vertical saccadic latency of 234.37 ms, an average horizontal saccadic latency of 202.24 ms, and a physician measured NPC of 13.82 cm (Table 1). T-tests for MS magnitude and NPC revealed statistically significant differences between the two groups for both variables ($p= 0.02$ and $p=0.003$, respectively). The t-test for vertical latency had a p-value of 0.06. The low grade group had an average CP score of 9.3 while the high grade group had an average CP score of 43.7 with a statistically significant difference.

Conclusion: Patients who report high grade visual symptoms on CP screen ocular subtype score show trends of higher MS magnitudes and saccadic latencies on OMT and higher NPC on exam. Furthermore, low grade patients report significantly lower CP scores compared to high grade patients suggesting visual abnormalities play a central role in overall symptom burden.

Further studies are needed to confirm this trend and to evaluate the role of vision on the overall clinical picture of pediatric concussion patients.

Table 1: MS Magnitude, NPC, Vertical Latency, and CP Score in Low vs High Grade Patients

	Low Grade (0-1.5)	High Grade (1.6-3.0)	P-value (alpha = 0.05)
MS Magnitude (degrees)	1.06	1.21	0.02
NPC (cm)	8.75	13.82	0.003
Vertical Latency (ms)	217.49	234.37	0.06
Horizontal Latency (ms)	198.16	202.24	0.62
CP Score	9.3	43.7	1.52 x 10^-14