Sideline Utility of Commonly Used Concussion Tools to Detect Sport Related Concussion

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BACKGROUND

- Current sideline assessment tools for sport-related concussion (SRC) focus on brief cognitive and balance tests to detect injury.
- Current tools do not include comprehensive assessments of the oculomotor or vestibular systems to detect impairment or symptoms that may occur following SRC.
- Evidence suggests that vestibular and oculomotor impairment and symptoms represent an important outcome to assess following concussion[1] and have shown to be present following a SRC.[1-4] On field dizziness, which is often a vestibular-related symptom, has been associated with a 6.4x increase risk for a prolonged recovery.[5]

The purpose of this investigation was to assess sideline utility of commonly used clinical measures to detect a Sport Related Concussion.

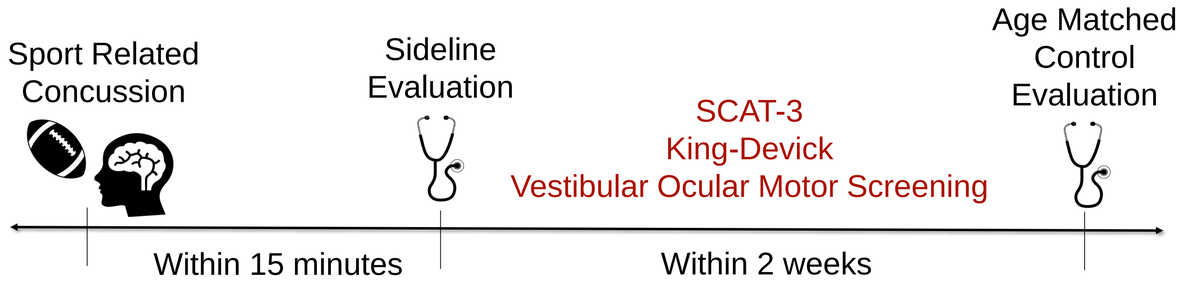
METHODS

Sample

- Prospective cohort study at a suburban public high school.
  - Concussed and sport/age-matched controls
- American football male student-athletes 13-18 yrs. old
- Exclusion criteria: >2 prior concussions, prior brain surgery, and vestibular and/or oculomotor disorders.

Statistical Analyses

- Univariable logistic regression was utilized to investigate relationships between clinical outcomes and concussion status.
  Independent variables included:
  - Vestibular Ocular Motor Screening (VOMS) symptom provocation
  - Near Point Convergence
  - King-Devick (KD) Time
  - SCAT-3 Total Symptom Score
  - Standard Assessment of Concussion (SAC) Score
  - Modified Balance Error Scoring System (mBESS) Score
- To describe differences between the SRC and control groups, Mann-Whitney U-tests and Fisher's exact tests were used.



RESULTS

26 total participants were enrolled (13 SRC and 13 controls)
- Mean age=15.7±1.2 years, 100% male

Table 1. Means and 95% Confidence Intervals (CI) for Key Outcomes

Variable	SRC Mean (95% CI)	Control Mean (95% CI)
SCAT-3 Total Symptom Score	20.9 (9.8, 32.0)	3.3 (0.0, 6.6)
Near Point Convergence	5 (2,8)	3 (2,4)
KD Time	49.3 (36.0, 62.5)	54.7 (50.4, 58.9)
SAC Score	24 (22.0, 26.0)	25.8 (24.2, 27.5)
mBESS Score	6.5 (4.2, 8.9)	4.4 (3.1, 5.7)

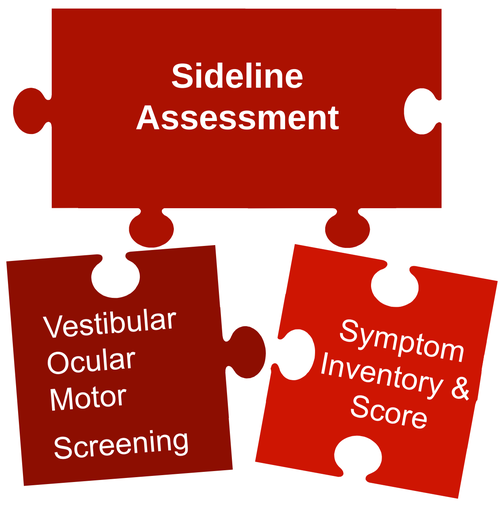
Table 2. Association between Key Clinical Measures and Concussion Group

Variable	Odds Ratio (concussed vs. control)	95% Confidence Interval	AUC
SCAT-3 Total Symptom Score	1.165	1.004 – 1.352	0.876
Near Point Convergence	1.246	0.924 – 1.679	0.586
KD Time	0.975	0.919 – 1.036	0.831
SAC Score	0.813	0.613 – 1.077	0.659
mBESS Score	1.356	0.945 – 1.946	0.717

NOTE: Only total symptom score was significantly worse between the SRC vs. control group. KD time was slower in the control group (Exact p<0.05).

NOTE: All 6 individuals with VOMS symptom provocation were in the concussion group; the n was too small to run statistical models (n=6 with provocation).

CONCLUSIONS



- **Total symptom score** provides valuable information on the sideline in **determining suspected SRC**.
- **VOMS symptom provocation** may also be useful in detecting sideline abnormalities and screening should be **included in sideline assessment**.

REFERENCES

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