Nationwide Trends in Ophthalmic Trauma Related to Major Sports: An NEISS Study

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BACKGROUND INFORMATION

- Ocular injuries are one of the leading causes of **visual disability** among the United States populace[1]
- Particularly among younger patients, **sports-related activities** represent a substantial source of ocular injury, constituting an important consideration for clinicians[2]
- As the majority of ocular trauma is preventable,[3] it is essential to evaluate trends in sports-related ocular injuries for the purposes of identifying risk factors and developing **future participation guidelines**
- The objectives of this investigation were to
  - Assess **national trends** in the incidence of ocular injuries across five major sports (baseball, soccer, tennis, football, basketball)
  - Examine **differences** between presentations by time-period (pre-COVID vs. COVID)

METHODS

- National Electronic Injury Surveillance System (NEISS) database queried for injuries related to baseball, soccer, tennis, football, and basketball
  - Entries non-traumatic in nature excluded (remaining entries, ***n* = 3584**)

Table 1: Demographic characteristics of analyzed cohort

	Male	Female	Pediatric (age ≤ 18)	Adult (age > 18)
Number (%)	2990 (83.4%)	594 (16.6%)	2439 (68.1%)	1145 (31.9%)

- Narrative entries reviewed to determine mechanism of injury and visual sequelae
- Linear regression and χ^2 tests performed using GraphPad Prism 9.0 (San Diego, CA)

CONCLUSIONS

- A **declining** incidence of sports-related ocular injuries was noted between 2011 and 2020
- Expectedly, injuries predominantly occurred among **male** and **pediatric** patients[4]
- When compared to the pre-COVID time-period, there was a greater incidence of **severe** injuries such as hemorrhage
  - Findings from previous investigations have similarly noted an increased severity of ocular trauma presentations[5]
- **Limitations** of this analysis include restriction of data to emergency department visits and limited reporting of vision-specific diagnoses
- The results of this study highlight important considerations for clinicians when evaluating patients for acute sports-related ocular injuries

REFERENCES

1. Kuhn, F., et al. (1999). "Epidemiology and socioeconomic impact of ocular trauma." Vitreoretinal surgery of injured eye. Lippincott-Raven, Philadelphia: 17-24.
2. MacEwen, C. J., et al. (1999). "Eye injuries in children: the current picture." British journal of ophthalmology **83**(8): 933-936.
3. Larrison, W. I., et al. (1990). "Sports-related Ocular Trauma." Ophthalmology **97**(10): 1265-1269.
4. Cao, H., et al. (2013). "Epidemiology of Pediatric Ocular Trauma in the Chaoshan Region, China, 2001–2010." PLOS ONE **8**(4): e60844.
5. Poyser, A., et al. (2020). "Impact of COVID-19 pandemic and lockdown on eye emergencies." European Journal of Ophthalmology **31**(6): 2894-2900.

RESULTS

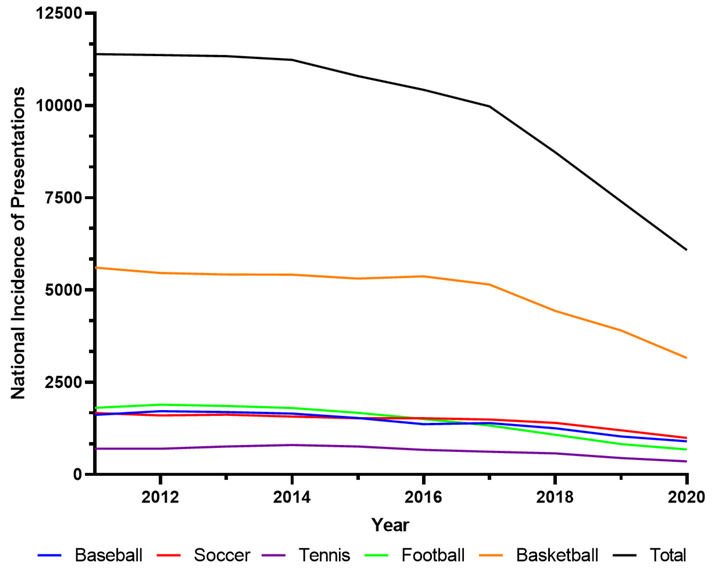

Figure 1: National incidence of sports-related ocular injuries, total and by sport. A decline was observed in the number of presentations from 2011 through 2020 (R^2 = 0.49; *P* = 0.03).

Table 2: Presentation characteristics, pre-COVID (≤ 2019) vs. COVID (2020)

	Pre-COVID (*n* = 3389)	COVID (*n* = 195)	*P* value
Diagnosis			0.01
Inflammatory conditions	8.7%	8.2%	
Contusion/abrasion	51.1%	48.2%	
Foreign body	2.0%	4.1%	
Hemorrhage	2.9%	7.2%	
Hyphema	4.5%	4.6%	
Laceration	2.1%	1.5%	
Other†	28.8%	26.2%	
Mechanism of injury			<0.001
Ball	49.6%	39.2%	
Collisions	2.5%	2.8%	
Foreign body	4.9%	13.1%	
Racket/bat	1.8%	2.3%	
Upper extremity	37.4%	40.3%	
Other‡	3.7%	2.3%	
Visual sequela			0.78
Blurry vision	54.4%	42.9%	
Photosensitivity	8.7%	14.3%	
Vision loss	15.3%	21.4%	
Other§	21.6%	21.4%	
Disposition			0.46
Treated/examined and released	96.3%	98.5%	
Treated and transferred	1.0%	0.5%	
Treated and admitted/hospitalized	1.1%	0.5%	
Other¶	1.6%	0.5%	

†Other diagnoses include fractures, open globe trauma, and unspecified injuries
‡Other mechanisms of injury include other equipment injuries, environmental injuries, and falls
§Other visual sequelae include anisocoria, diplopia, and non-specific visual disturbances
¶Other patient dispositions include held for observation and left without being seen

Table 3: Distribution of presentation characteristics by sport

	Baseball (*n* = 558)	Soccer (*n* = 596)	Tennis (*n* = 226)	Football (*n* = 535)	Basketball (*n* = 1669)	*P* value
Diagnosis						<0.001
Inflammatory conditions	8.2%	11.1%	8.4%	10.5%	7.4%	
Contusion/abrasion	43.2%	34.9%	51.8%	51.0%	59.1%	
Foreign body	0.2%	1.7%	0.4%	3.6%	2.6%	
Hemorrhage	4.8%	4.0%	2.2%	3.6%	2.2%	
Hyphema	7.7%	12.4%	7.1%	1.5%	1.1%	
Laceration	1.6%	0.5%	0.4%	1.7%	3.2%	
Other	34.2%	35.4%	29.6%	28.2%	24.3%	
Mechanism of injury						<0.001
Ball	87.6%	80.5%	92.9%	46.7%	14.1%	
Upper extremity	0.8%	8.5%	0.0%	27.6%	73.8%	
Foreign body	1.2%	5.8%	1.4%	8.0%	6.6%	
Collisions	0.0%	1.5%	0.0%	6.3%	3.2%	
Racket/Bat	8.6%	0.0%	4.7%	0.0%	0.0%	
Other	1.8%	3.8%	0.9%	11.4%	2.3%	
Visual sequela						0.12
Blurry Vision	61.0%	52.4%	55.0%	54.5%	51.6%	
Photosensitivity	7.3%	2.9%	10.0%	15.9%	12.9%	
Vision Loss	7.3%	24.3%	10.0%	9.1%	14.0%	
Other	24.4%	20.4%	25.0%	20.5%	21.5%	
Disposition						0.006
Treated/examined and released	94.3%	97.0%	97.3%	96.1%	96.9%	
Treated and transferred	1.8%	1.0%	1.3%	2.1%	1.5%	
Treated and admitted/hospitalized	2.2%	1.7%	0.0%	1.1%	0.4%	
Other	1.8%	0.3%	1.3%	0.7%	1.2%	