



Increases in Pediatric Sports Injuries Late in the COVID-19 Pandemic

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Introduction

Since reaching a pandemic status in March 2020, COVID-19 has caused many public health policies to be put in place including social distancing, self-quarantining, and a variety of public closures.^{1,2} Importantly, this included schools, extracurricular activities, and organized sports. As sporting organizations attempt to ensure an adequate season, variations in weekly games and more condensed schedules could be contributing to increased risk of injuries.

This study aimed to examine the impact COVID-19 had on the incidence of pediatric sports related musculoskeletal injuries as public health measures changed. Our hypothesis was that sports injuries would increase in rates over the summer months as athletes began to train for their fall sports seasons following months of rest or unorganized training.

Materials and Methods

This is a retrospective cohort study of pediatric patients presenting for musculoskeletal injuries during the COVID-19 pandemic compared to previous years. The patients were sorted by date of initial presentation for care. The "Early" cohort consisted of patients presenting between March 15th and April 15th. The "Middle" cohort consisted of patients arriving between June 15th and July 15th, while the "Late" cohort consisted of patients arriving between August 15th and September 15th. Control groups consisted of patients presenting in similar time frames in the two previous years, 2018 and 2019,

Patients were included if they were between the ages of 5 and 18 when presenting to an orthopedic clinic office or the emergency room for one of the following acute injuries occurring as a result of sports: ACL injury, meniscus injury, patellar dislocation, shoulder dislocation, ankle ligament sprain, clavicle fracture, medial epicondyle fracture, tibial spine fracture, and stress fracture.

Variables were compared between the 2018-2019 and 2020 cohorts and the "Early", "Middle", and "Late" cohorts. Statistical significance was defined in this study with a threshold of $p < 0.05$. Chi squared and Fisher's exact tests were used to compare categorical variables.

Mann-Whitney U tests were used for continuous variables. Statistical analysis was performed using IBM SPSS Statistics for Macintosh, Version 24.0 (IBM Corp., Armonk, NY).

Results

A total of 1384 patients with the injuries of interest were reviewed with 643 (46.5%) occurring as a result of a sport-related injury. 506 of these patients presented in between 2018 and 2019, while 137 presented in 2020. Ankle sprains were the most common injury and accounted for 54.2% of all injuries, while tibial spine fractures represented 0.5% of injuries. Basketball was the single sport that contributed the most number of injuries with 126 (24.9%) in 2018-2019 and 40 (29.2%) in 2020 ($p = 0.506$). ACL injuries, meniscal injuries, patellar dislocations, medial epicondyle fractures, and stress fractures saw an increase in relative proportion of injuries in 2020 ($p = 0.002$).

A total of 227 patients were seen in the Early cohort (March 15th-April 15th) with 217 being seen between 2018-2019 and 15 being seen in 2020. 170 patients were seen in the Middle cohort (June 15th-July 15th) with 132 in 2018-2019 and 38 in 2020 and finally, 246 in the Late cohort (August 15th-September 15th) with 162 in 2018-2019 and 84 in 2020. 31 (14.6%) patients in the Early cohort required surgical intervention in 2018-2019, while only 2 (13.3%) underwent surgery in 2020 ($p = 0.891$). In the Middle cohort, surgical treatment was seen in 27 (20.5%) patients in 2018-2019 and 8 (21.1%) in 2020 ($p = 0.936$). Yet, in the Late cohort, 18 (11.1%) patients underwent surgery in 2018-2019, while 20 (23.8%) were treated surgically in 2020 ($p = 0.009$).

Discussion

As the world continues to adapt to the COVID-19 pandemic, schools, extracurriculars, and sports have all made various attempts to provide children with safe environments. This study examined sport-related injury trends presenting to a pediatric hospital during the COVID-19 pandemic and demonstrated significant changes in injury type. Previous studies have shown the effects of prolonged

Table 2: Injury Characteristics and Management of Early (March, April), Middle (June-July), and Late (August-September) Patients in 2018-2019 versus 2020

Variable	March/April 2018-2019	March/ April 2020	P-value	June/July 2018-2019	June/July 2020	P-value	August/September 2018-2019	August/ September 2020	P-value
Injury Type									
ACL Injury	20 (9.4)	2 (13.3)		17 (12.9)	5 (13.2)		16 (9.9)	13 (15.5)	
Meniscus Injury	4 (1.9)	3 (20)		8 (6.1)	1 (2.6)		4 (2.5)	4 (4.8)	
Patellar Dislocation	17 (8.0)	2 (13.3)		11 (8.3)	4 (10.5)		11 (6.8)	9 (10.7)	
Shoulder Dislocation	11 (5.2)	0 (0)		2 (1.5)	0 (0)		6 (3.7)	1 (1.2)	
Clavicle Fracture	21 (9.9)	2 (13.3)		11 (8.3)	1 (2.6)		25 (15.4)	6 (7.1)	
Medial Epicondyle Fracture	10 (4.7)	0 (0)		5 (3.8)	4 (10.5)		2 (1.2)	4 (4.8)	
Tibial Spine Fracture	1 (0.5)	0 (0)		0 (0)	0 (0)		1 (0.6)	1 (1.2)	
Ankle Sprain	123 (58)	6 (40)		75 (56.8)	15 (39.5)	0.002	89 (54.9)	41 (48.8)	
Stress Fracture	5 (2.4)	0 (0)	0.018	3 (2.3)	8 (21.1)		8 (4.9)	5 (6.0)	0.190
Injury Laterality									
Right	105 (49.8)	8 (53.3)		66 (50)	22 (59.5)		81 (50.6)	44 (52.4)	
Left	104 (49.3)	7 (46.7)	0.906	66 (50)	15 (40.5)	0.309	77 (48.1)	39 (46.4)	0.848
Bilateral	2 (0.9)	0 (0)		0 (0)	0 (0)		2 (1.2)	1 (1.2)	
Seen at Previous Institution	42 (19.8)	5 (33.3)		25 (18.9)	10 (26.3)		20 (12.3)	19 (22.6)	
OSH Urgent Care	52 (24.5)	1 (6.7)		22 (16.7)	2 (5.3)		29 (17.9)	12 (14.3)	
OSH ED	17 (8.0)	2 (13.3)		20 (15.2)	9 (23.7)		12 (7.4)	16 (19)	
OSH Clinic	93 (43.9)	5 (33.3)		59 (44.7)	17 (44.7)		99 (61.1)	32 (38.1)	
Not Previously Seen	8 (3.8)	2 (13.3)	0.179	6 (4.5)	0 (0)	0.262	2 (1.2)	5 (6.0)	<0.001
Not Recorded									
Delay to Presentation (days) †	7.23 ± 12.3	18.3 ± 26.7	0.140	9.26 ± 15.3	10.7 ± 25.7	0.730	8.14 ± 27.7	11.3 ± 31.5	0.023
Initial Visit Type									
ED	71 (33.5)	2 (13.3)		45 (34.1)	8 (21.1)		71 (43.8)	17 (20.2)	
Clinic	141 (66.5)	11 (73.3)	<0.001	87 (65.9)	30 (78.9)	0.126	91 (56.2)	67 (79.8)	<0.001
Virtual	0 (0)	2 (13.3)		0 (0)	0 (0)		0 (0)	0 (0)	
Treatment									
Surgical	31 (14.6)	2 (13.3)	0.891	27 (20.5)	8 (21.1)	0.936	18 (11.1)	20 (23.8)	0.009
Non-Surgical	181 (85.4)	13 (86.7)		105 (79.5)	30 (78.9)		144 (88.9)	64 (76.2)	

†Mann-Whitney U

rest on sports injuries, but this study set out to understand sports injury progression during the COVID-19 pandemic, specifically.³⁻⁶ Understanding how this pandemic has already affected sports injuries in the pediatric population will be paramount in further understanding future sources of musculoskeletal injury for children.

Bram et al. demonstrated how pediatric fracture volume presenting to a single pediatric health system decreased by 2.5-fold during the peak of the COVID pandemic in March

and April 2020.⁷ When looking specifically at sports injuries, this study found a 1.8-fold decrease in monthly sports injury volume during this time. In the early fall however, the relative proportion of sport injuries in 2020 increase and surpasses the proportion seen in previous years (Figure 1). COVID precautions during the early part of the pandemic led to many organized youth sports leagues being suspended causing our reported decrease in volume during the early spring and early summer.^{8,9}

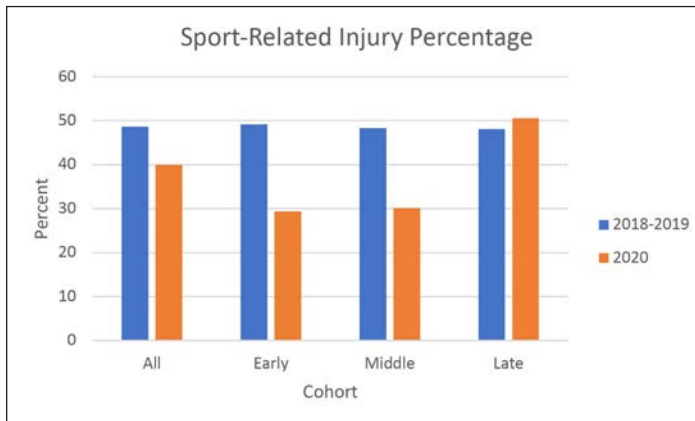


Figure 1. Percent of all injuries occurring during sport represented by cohort. All represents all data collected. Early represents data from March 15th-April 15th. Middle represents June 15th-July 15th. Late represents August 15th-September 15th.

In the summer and fall of the pandemic, many fall sports including football and soccer were resuming in a variety of different capacities.^{10,11} As a result, we were able to show an increase of almost 13% in the rate of injuries requiring surgical intervention during the late summer and early fall of the pandemic relative to non-pandemic timeframe (Figure 2). With organized sports returning for a fall season in late August to early September, the statistically significant increase in surgical interventions during this interval suggest injuries during COVID may be more severe. Instituting training programs could help reduce the risk of knee injuries and prevent significant injuries necessitating surgical treatments as the COVID pandemic progresses.²¹⁻²³

Several limitations to this study should be noted. This study only analyzed injuries occurring while playing sports and therefore does not take into account other injuries that may be due to deconditioning but did not occur during the act of playing sports. Additionally, due to the concern for COVID transmission, while several different injuries were evaluated, we cannot definitely state whether sports related injuries are changing due to altered behaviors and staying away from sports or due to failure to present. Relative rates of injuries may be skewed due to failure of less severe injuries to present

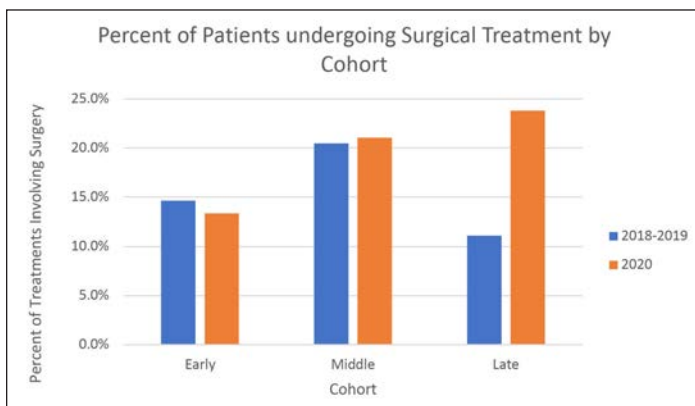


Figure 2. Percent of Injuries necessitating surgical intervention broken down by cohort and year. Early Cohort is defined as those presenting between March 15th-April 15th. Middle Cohort represents June 15th-July 15th and Late Cohort represents August 15th-September 15th.

in 2020. Additionally, with a lack of data on patients training schedules during 2020, it is difficult to assess if the COVID pandemic has changed how many hours of exercise patients are doing per week. Finally, as social distancing rules continue to evolve, some sports are not played in the same way as they were previously and therefore may change the risk of injury for patients.

Conclusion

The COVID-19 pandemic has led to several changes in sporting events and extracurricular activities for the pediatric population. This retrospective study demonstrated an overall decrease in sport-related injuries during three different time intervals throughout the evolving COVID-19 pandemic. Furthermore, the proportion of injuries requiring surgical treatment between August 15th and September 15th 2020 increased compared to previous years suggesting a greater risk for significant injuries as patients are returning to organized sports. As the COVID-19 pandemic continues, providers should be aware of the increased risk of significant injuries to their patients and counsel patients on gradual return to sport.

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