

# An Epidemiologic Analysis of 5th Metatarsal Fractures and Return to Sport in Collegiate Athletes

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## INTRODUCTION:

Fractures of the 5<sup>th</sup> metatarsal are common injuries in athletes, often resulting in significant disability and difficulty returning to play. Due to the tenuous blood supply at the 5th metatarsal metadiaphyseal junction, these fractures are susceptible to delayed healing and nonunion. As a result of these Jones fractures, surgery is often indicated in an athletic population. There is little data detailing the epidemiology of these fractures in collegiate athletes. Characterizing the rates and severity of 5<sup>th</sup> metatarsal fractures among collegiate athletes may help refine the training, equipment, and rehabilitation of athletes to minimize the incidence and impact of such an injury.

The objective of this study is to describe the epidemiology of metatarsal fractures suffered by National College Athletic Association (NCAA) athletes using injury surveillance data from 2017 to 2023 obtained from the Pac-12 Health Analytics Program (HAP).

## METHODS:

This retrospective study utilized a de-identified injury and illness database of NCAA Division I collegiate athletes in the Pacific Coast Conference (Pac-12) from the academic year 2017-2018 to 2022-2023. Athletes who experienced metatarsal fractures were analyzed. Injuries were stratified by anatomic location, time missed, proportion treated with surgery, return to play, and timing of injury during competition. Injury rates (IR) per 100,000 athlete exposure hours (AEH) were calculated.

## RESULTS:

Metatarsal fractures were reported in seven sports: baseball, basketball, football, soccer, softball, swimming and diving, and track and field. A total of 90 fractures were reported (68 5<sup>th</sup> metatarsal fractures, 11 5<sup>th</sup> metatarsal avulsion fractures, and 11 other lesser toe fractures). The highest rates of 5<sup>th</sup> metatarsal fracture per 100,000 AEH were among football (1.21), basketball (0.80), and soccer athletes (0.53). The majority of injuries occurred in the second half of competition in football, swimming and diving, and soccer (61%, 100%, and 75%, respectively), while the rates were consistent throughout competition for the other sports.

The proportion of athletes receiving surgery for 5<sup>th</sup> metatarsal fractures was 100% for baseball, 87.5% for basketball, 82% for football, and 86% for soccer. With all sports pooled, 79.2% of athletes underwent surgery for 5<sup>th</sup> metatarsal fractures. 5<sup>th</sup> metatarsal fractures were treated nonsurgically in swimming and diving and track and field athletes. All fractures of lesser toes other than 5<sup>th</sup> were treated nonsurgically. In football players, 89% of players undergoing surgery returned to previous activity level, while 83% of players treated nonsurgically returned. All athletes in the other sports returned to previous activity level regardless of treatment. On average, football players receiving surgery for 5<sup>th</sup> metatarsal fractures missed 143.9 days due to injury, while those treated without surgery missed 118.6 days. Basketball players receiving surgery for 5<sup>th</sup> metatarsal fractures missed 98.6 days due to injury, while those treated without surgery missed 273 days. Soccer players receiving surgery for 5<sup>th</sup> metatarsal fractures missed 118.2 days due to injury, while those treated without surgery missed 59 days.

## DISCUSSION AND CONCLUSION:

5th metatarsal fractures are common injuries among collegiate athletes, with the highest rates in football players. The vast majority are treated surgically, with high rates of returning to previous activity level. There is high variability among sports with regard to time missed due to injury, ranging from 3 to 9 months. Awareness of the incidence and outcome of injuries that affect collegiate athletes and their interventions may allow for improved strategies to prevent and treat injuries.

Table 1: Rate of Metatarsal Fractures by Sport per 100,000 Athlete Exposure Hours (AEH)

|                   | 5 <sup>th</sup> Metatarsal Fracture (Rate) | 5 <sup>th</sup> Metatarsal Avulsion | Fractures of Other Lesser Toes |
|-------------------|--|-------------------------------------|--------------------------------|
| Baseball          | 0.24                                       | 0.36                                | 0                              |
| Basketball        | 0.80                                       | 0.20                                | 0.30                           |
| Football          | 1.21                                       | 0.03                                | 0.15                           |
| Soccer            | 0.53                                       | 0.15                                | 0                              |
| Softball          | 0  | 0                                   | 0.27                           |
| Swimming & Diving | 0.06                                       | 0                                   | 0                              |
| Track & Field     | 0.14                                       | 0.14                                | 0.05                           |

Table 2: Percentage of Athletes Undergoing Surgery

|                   | 5 <sup>th</sup> Metatarsal Fracture (Rate) | 5 <sup>th</sup> Metatarsal Avulsions | Fractures of Other Lesser Toes |
|-------------------|--|--------------------------------------|--------------------------------|
| Baseball          | 100%                                       | 0%                                   | n/a                            |
| Basketball        | 87.5%                                      | 0%                                   | 0%                             |
| Football          | 82%  | 100%                                 | 0%                             |
| Soccer            | 86.7%                                      | 50%                                  | n/a                            |
| Softball          | n/a  | n/a                                  | 0%                             |
| Swimming & Diving | 0%   | 0%                                   | 0%                             |
| Track & Field     | 0%   | 0%                                   | 0%                             |
| Total             | 79.2%                                      | 18.2%                                | 0%                             |

Table 3: Percentage of Injuries by Timing in Competition

|                   | First Half of Competition | Second Half of Competition |
|-------------------|---------------------------|----------------------------|
| Baseball          | 50%                       | 50%                        |
| Basketball        | 50%                       | 50%                        |
| Football          | 39%                       | 61%                        |
| Soccer            | 25%                       | 75%                        |
| Swimming & Diving | 0%                        | 100%                       |
| Track and Field   | 50%                       | 50%                        |

Table 4: Average Days Missed after Surgery or Nonoperative Treatment for 5<sup>th</sup> Met Fractures

|            | Surgery | Nonoperative |
|------------|---------|--------------|
| Baseball   | 37.2    | n/a          |
| Basketball | 98.6    | 273          |
| Football   | 143.9   | 118.6        |
| Soccer     | 118.2   | 59           |