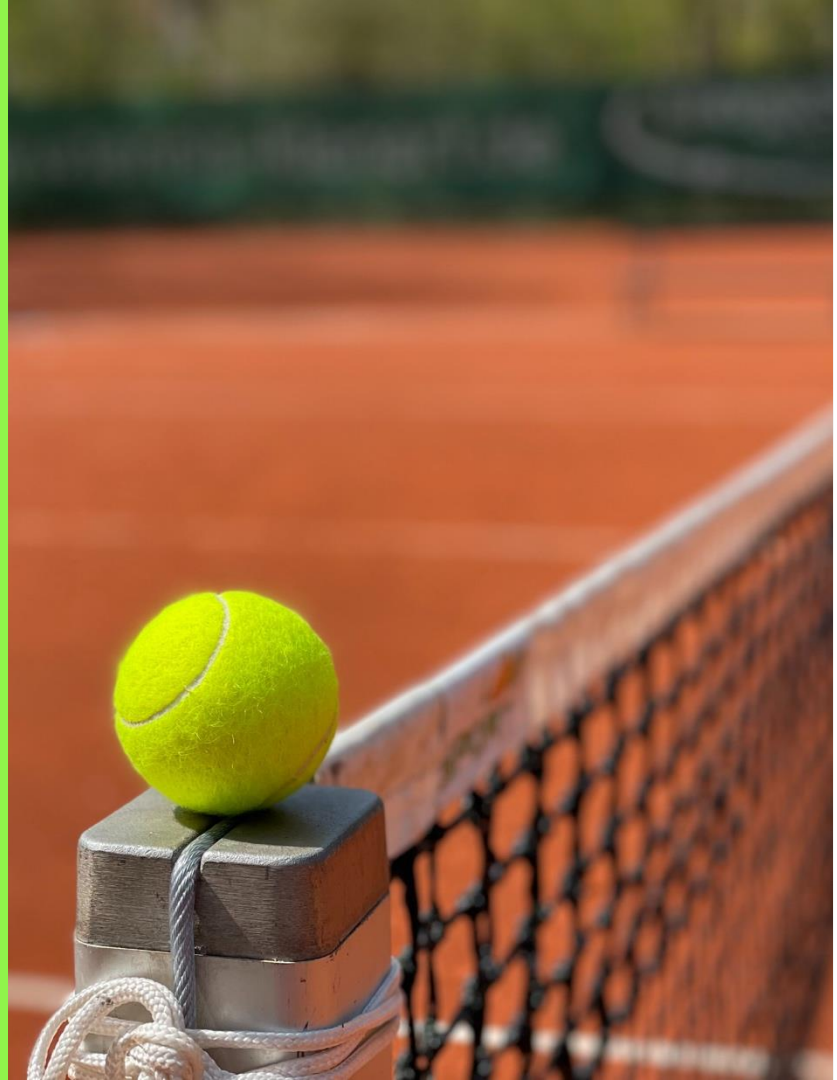
UNDERSTANDING UPPER EXTREMITY INJURIES ON TOUR



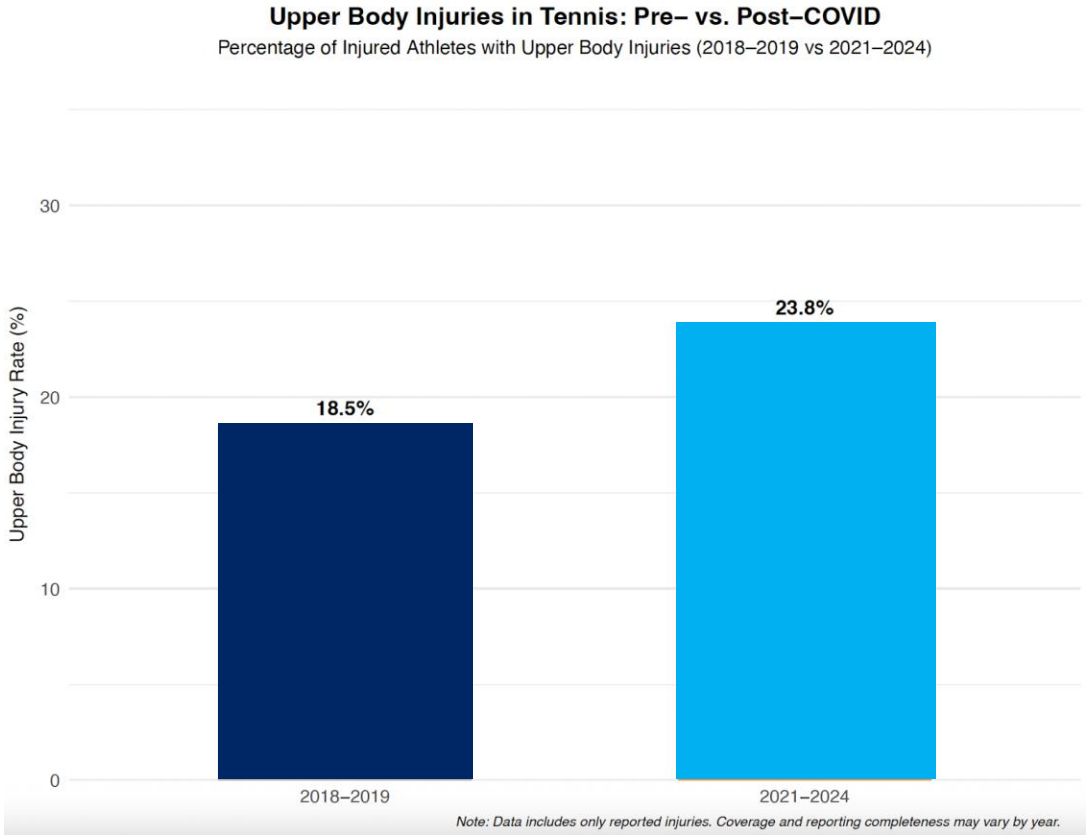
In recent years, several players have raised concerns regarding a perceived decline in tennis ball quality and its impact on upper extremity injury risk. This study aimed to examine the rate of upper extremity injuries on tour and potential risk factors.

Approach:

- Understand the rate of upper extremity injuries and YoY trends
  - *How many players are experiencing upper extremity injuries? How did injury rates compare pre-COVID (2018-2019) and post-COVID (2021-2024)?*
- Understand when and where upper extremity injuries are occurring
  - *Are injuries isolated incidents or are there predictable injury clusters? If there are predictable injury clusters, what modifiable, external conditions correlate with injury clusters?*

Increase in Upper Extremity Injuries

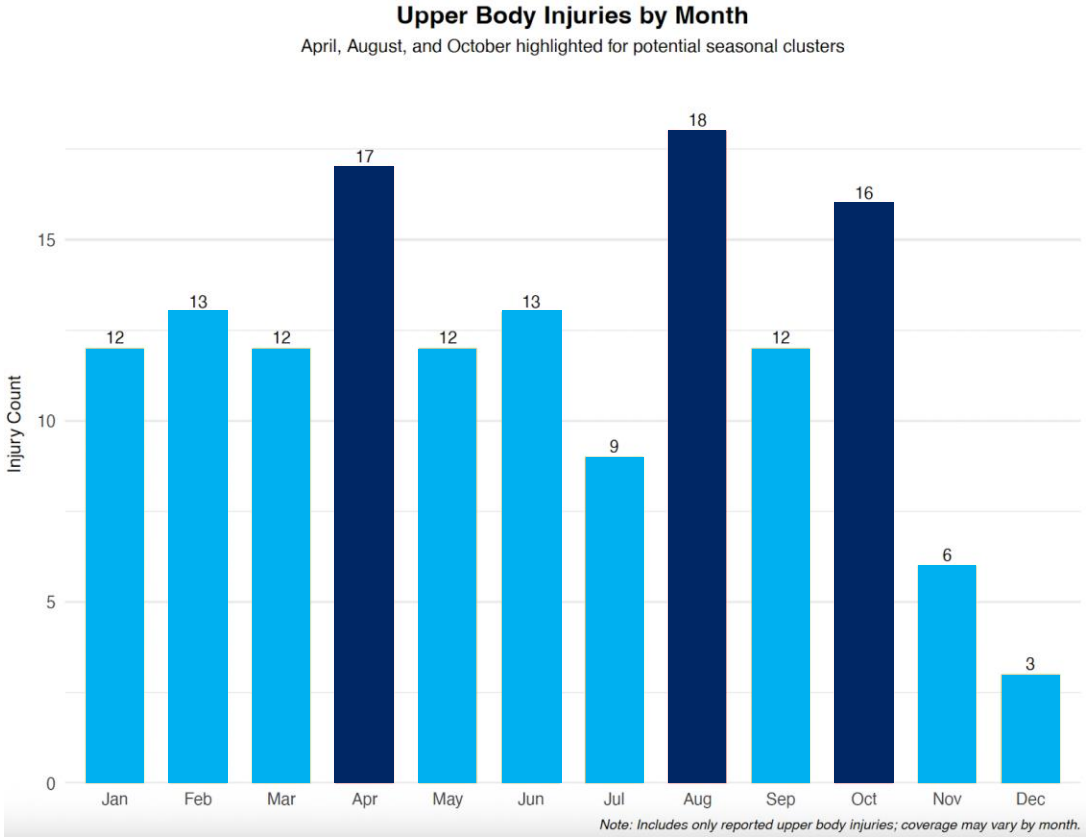
- Data reveals a clear increase in upper extremity injuries, particularly affecting the shoulder, elbow, and forearm, in 2021-2024.



Predictable Injury Clusters During Tour Season

Data reveals that April, August, and October are the highest-risk months for upper extremity injuries. These are predictable injury clusters that may be tied to modifiable external conditions, such as:

- Event scheduling density
- Variation in ball construction and response
- Rapid surface transitions
- Environmental factors such as humidity or altitude



Risk Factors During Injury Cluster Months

- There are several modifiable, external conditions unique to April, August and October that may result in increased upper extremity injury risk.

Month	Common Injuries	Injury Risk Factors
April	Rotator cuff irritation, wrist tendinitis, triceps strain	Clay season kickoff. Clay requires: • More topspin – increased shoulder and forearm workload • Longer rallies – more overhead strokes and serves • Change in movement dynamics – More sliding and more stress on upper body for power
August	Shoulder impingement, elbow tendinopathy	• Peak load on hard courts • High match density • Surface hardness: Hard courts don't absorb shock, more vibration through elbow and shoulder • Extreme heat and humidity – Increased fatigue • Velocity dependent conditions – Faster surfaces create more reliance on velocity, risking shoulder/elbow overload, even during returns where increasingly oblique and back strains are noted
October	Biceps strain, shoulder instability, wrist injuries from mistimed strokes	• Cumulative season fatigue – Players have been competing since January • Travel overload – Asia to Europe swing • Indoor hard courts – Faster, lower bounce means higher force transition, more explosive serving and forehands

Key Findings

Power, Spin, and Speed Have Fundamentally Changed the Game:

The modern game is built around aggressive racquet acceleration, explosive serve mechanics, and heavy topspin. These elements have increased baseline torque and load on the shoulder and elbow—regardless of match count. This shift amplifies the effect of any variability in ball construction or surface.

Risk Increases During Transition and Peak Load Periods:

April, August, and October are all "transition" or "peak load" periods in the tennis calendar. Transitions in surface, schedule intensity, or conditions (e.g., clay to hard, outdoor to indoor) put adaptive stress on the upper body, especially if fatigue or previous injuries are present.

Match Length and Volume Are Driving Overuse — Like Baseball:

When combined with longer rallies, tighter match windows, and year-round schedules, the tour is seeing an epidemic of upper extremity overuse injuries. The trend parallels what we're observing in professional baseball, where throwing demands have outpaced traditional recovery models.

Recommendations

Control External Factors Associated with Injuries:

The tours and tournaments must ensure that transition periods do not have additional risk factors due to ball variations. Ball manufacturers must have standardized specifications and appropriate quality control mechanisms for all balls across all events. Importantly, ball standardization has no competitive downside and can be implemented without altering tournament operations.

Protect Players' Transition Periods:

Players must have sufficient time to transition into new swings, and new surfaces, throughout the season. Guaranteed rest time between events would allow players more adequate time to recover and transition to new surfaces. Similar to how NFL and NBA athletes have training camps, and MLB athletes have spring training, tennis players must be afforded ramp-up periods to adequately prepare for the upcoming workload and new environmental variations.

Prioritize Player-Controlled Data Logging:

Collecting more player-controlled data is crucial to understanding more variables associated with these trends. Proactive data collection also allows medical staff to intervene early before pain becomes long-term injury. Data analysis shows early symptoms of arm fatigue typically appear 24-48 hours before performance drops or withdrawal. Players should be empowered to seamlessly track symptoms, ball feedback, and surface adaptation.