# America's Pastime

## Overuse injuries in baseball and softball: Part I

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To many Americans, summertime and baseball are synonymous. The sound of a baseball game on the radio is the soundtrack for summer picnics, washing the car, or working in the yard. And, in unprecedented numbers, adults are joining in fitness activities, including amateur softball and baseball leagues. Weekend warriors who pick up the sport again in adulthood are often not in optimum condition, are more prone to injuries, and should take it slow when jumping into the game.[1,2] Anyone who is over 40, diabetic, a smoker, or has any physical disability should see a family physician before starting to play.[1]

To better understand how injuries occur and what treatment is most effective, we provide a two-part discussion. The first article will discuss injuries and the second will provide prevention and treatment guidelines.

We should preface this discussion by saying that the following injuries are adult overuse injuries. There are some specific differences between overuse injuries to adult tissues and bones and those of children, whose bones and tissues are still growing and developing. We discuss overuse injuries in children in the articles titles KidSports, but suffice it to say that all of the injuries mentioned here can happen to children. The consequences can be more severe when growing tissues are damaged.

There is some confusion in the literature about which injury is most common in baseball, but among the culprits are shoulder and elbow injuries for throwers (especially pitchers), injuries from sliding into bases, and being hit by the ball.[3,4,5] Also common are over-exertion, falls, collision with another player, misjudged catches resulting in finger injuries, and being hit by the baseball bat (more common in children).[5] The latter injuries are acute, rather than overuse injuries, and these will not be covered in these articles.

Overuse injuries can occur either gradually or quickly during a brief, intense period of play. Most importantly, they can be often prevented.[6,7] Many injuries occur at the beginning of the baseball season[5] when relatively unused body tissues (muscles, ligaments, tendons, and bones) are subjected to unaccustomed stress.[5,7] The injuries are a result of the introduction of new skills, inadequate or poor technique, a rapid increase in training intensity, or pushing towards peak performance in the later phases of training.[7] Also, many people think that because they play in another sport they will be in good shape for playing on a summer softball league. Unfortunately, muscles are used differently in other sports so overuse injuries are still likely to occur.[6]

Since each position in baseball involves different movements, we will discuss the potential injuries by activity or position on the field.

***Pitching Injuries***

Throwing is involved in all positions on the field, but most intensely for the pitcher. Throwing injuries may be caused by intrinsic factors such as decreased range of motion, impaired joint mobility, and decreased strength, or by extrinsic factors such as training errors and improper throwing mechanics.[3]

*Underhand/Windmill Pitching*

Most of the literature covers overhand pitching, but underhand, or windmill, pitching is not exempt from shoulder injuries.[3] One survey of eight collegiate softball teams participating in a NCAA softball tournament found that 80% of the participating pitchers reported injuries. 82% of these injuries involved the upper extremities that required time off playing.[3]

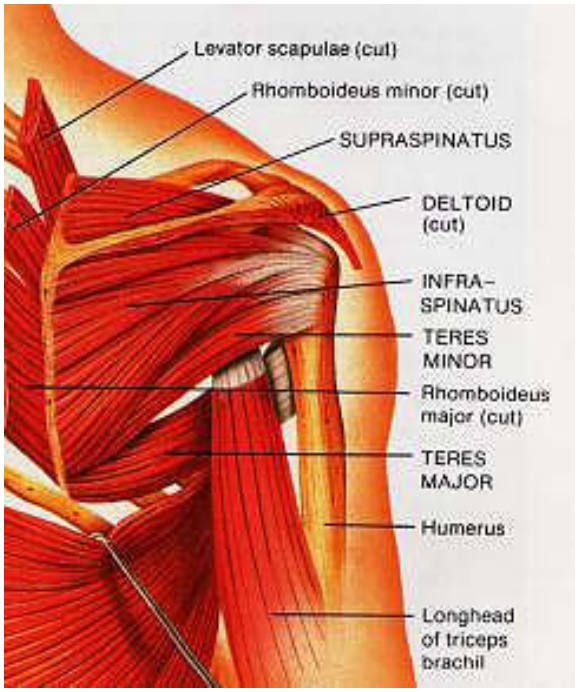

Illustration courtesy of http://www.thestretchinghandbook.com

There are four phases in the windmill pitch: windup, stride, delivery, and follow-through. Of these phases, the delivery and follow-through appear to have the greatest potential for injury because of the torque, forces and velocities involved. While the internal rotation velocity during delivery doesn't quite approach that of overhand baseball pitch, it is still of extremely high magnitude.[3] This phase involves the pectoralis major and subscapularis muscles. Follow-through involves maximum elbow flexion torque and compressive forces. Extreme pronation of the forearm also has been observed during this phase and may be a factor contributing to fatigue or stress fractures of the ulna in softball pitches.[3] Muscle activity in all shoulder muscles decreases, with the teres minor maintaining the highest activity, probably to decelerate the internally rotating humerus.[3]

*Baseball Pitching and overhead throwing*

Shoulder/Rotator Cuff. Inflammation of the rotator cuff tendons and/or the tendon of the long head of the biceps is extremely common in throwers. Prolonged inflammation of the rotator cuff may lead to partial or full thickness tearing of the rotator cuff. Partial thickness tearing is common in athletes who use overhand motions. Full-thickness rotator cuff tears are primarily seen in players over 40 years of age and usually requires surgery to correct.[3]

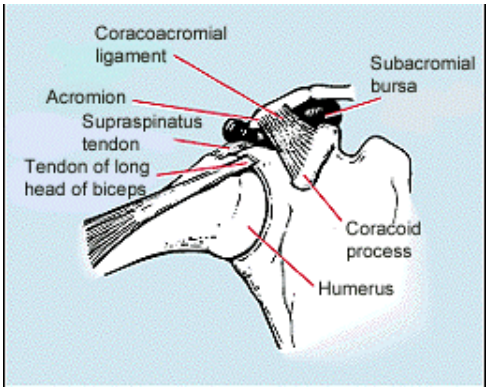

Illustration courtesy of Reference 9

There are two types of impingement disorders of the rotator cuff.

1) External impingement is a bursa-sided irritation due to decreased space between the rotator cuff and the acromion. This can be caused by bursitis, tendinitis, and acromial spurring, which all decrease the space available for the rotator cuff.[3]

2) There is a ring of cartilage around the glenoid cavity of the scapula into which the humeral head fits. This ring of cartilage is called the labrum and has the effect of deepening the glenoid cavity.[14] Internal impingement of the rotator cuff causes fatigue, which leads to a cumulative effect of repetitive microtrauma to the anterior capsule and labrum. This results in the over stretching of these structures. Consequently, there is an anterior translation of the humeral head, eventually causing fraying and tearing of the glenoid cavity and labrum.[3]

Throwers with labral injuries usually complain of anterior shoulder pain and a "click" is often associated with range of motion.[3]

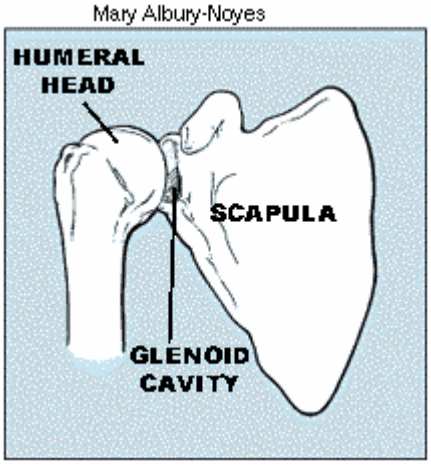

Illustration courtesy of Reference 10

Elbow. The elbow is injured less often than the shoulder in throwers because of the inherent stability of the bones in the elbow joint.[3] However, the elbow is subjected to extreme stress during throwing, so injuries do occur. Overuse injuries of the elbow usually involve the muscle/tendon units of the elbow. This can result from repeated throwing and cumulative microtears, or it can result from one overly forceful muscular contraction with a macrotear. If this goes untreated, it can lead to elbow joint instabilities and eventually osteophyte formation and/or fracture causing loose bodies within the elbow joint.[3]

Ankles and feet. The repetitive motion of pitching can lead to overuse injuries to the feet and ankles.[1] Pitchers need to be coached on the proper way to come off an elevated mound with their back foot and land on an incline with the front foot.[1]

***Outfielder Injuries***

Gastocnemious-soleus complex and Hamstring muscle group. Players in the outfield positions are required to go from a dead start to a sudden sprint.[3] Tremendous stress is placed on the muscles and tendons of the lower extremities.[3]

Achilles tendons. The stop and start activities of baseball and softball often create pain and tightness in the calf and aggravation of the Achilles tendon.[1]

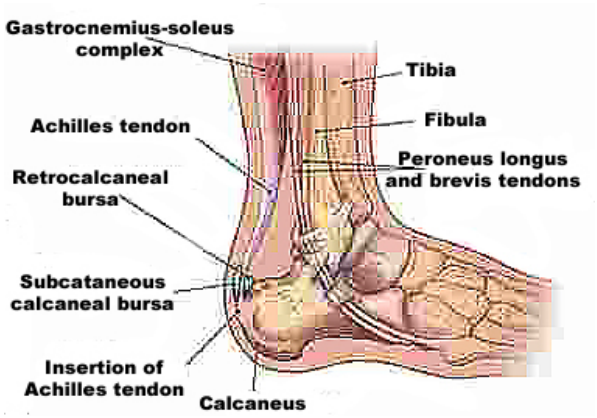

Illustration by Renee L. Cannon, courtesy of Reference 11.

***Infielder Injuries***

Low back injuries. The shortstop and second baseman are at risk for low back injuries.[3] Their positions require leaning forward in an unsupported stance, and then over reaching or twisting.[3]

Gastocnemious-soleus complex and Hamstring muscle group. As with outfielders, but to a lesser extent, infield players must go from a dead standstill to lunging or sprinting for the ball, with an associated risk to the gastrocnemious-soleus muscles and hamstrings.

Achilles tendons. Infielders may experience the same problems as outfielders (see above).

***Catcher Injuries***

Knee Injuries. Catchers spend a great deal of time in a deep squat position which can lead to injuries of the meniscus, especially the posterior horn (back portion) of the meniscus.[3]

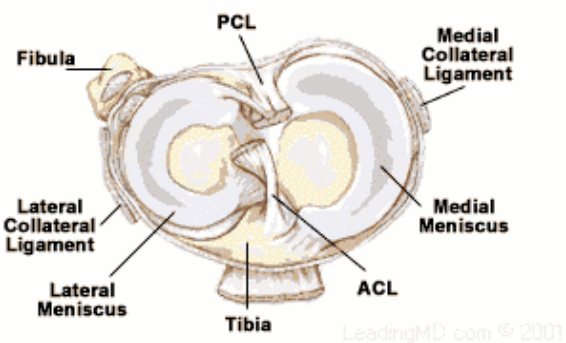

Illustration courtesy of Reference 12.

Elbow injuries. Catchers must frequently throw from their knees, which doesn't allow them the advantage of using their legs and trunk to position their upper body for the throw.[3] This tends to increase the stress placed on the elbow and can lead to a higher risk for elbow injuries.[3]

Ankles and Feet. Squatting behind home plate for extended periods of time also increase the risk of damage to the ankles and feet of catchers.[1] Catchers are especially prone to plantar fasciitis, arch pain often resulting from inflammation on the bottom of the foot. [1] A related condition, hell spur syndrome, causes the plantar tendon to pull at its attachment to the heel bone, sometimes leading to calcification and formation of a bone spur.[1]

***Runner Injuries***

Ankles and Feet. While cleats or spikes may improve traction and enhance play, they also increase the odds of ankle injuries from twists and turns.[1]

Gastocnemious-soleus complex and Hamstring muscle group. As with the other positions, base running requires a full sprint from a dead standstill. Sliding and "stopping on a dime" are also associated with gastrocnemious-soleus and hamstring injuries.

***Batting Injuries***

Little attention has been given to batting mechanics since it accounts for very few overuse injuries in baseball.

READ THE NEXT ARTICLE TO LEARN HOW TO AVOID AND TREAT THESE INJURIES.

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