SOCCER
INJURY PREVENTION

Soccer produces relatively few major knee ligament injuries through the high school years. Both indoor and outdoor soccer have little contact below the waist however, it’s our experience that indoor soccer has produced more injuries than the outdoor sport. Perhaps this is because of the smaller enclosed field that forces the player to make sudden directional changes and sudden stops as well as the faster pace of the indoor game.

The injury prevention techniques discussed in this paper relate to the anterior cruciate ligament. The anterior cruciate ligament is one of the major stabilizing ligaments in the knee. Without a functional anterior cruciate, athletes are unable to participate in sports, develop degenerative arthritis, and must maintain lifetime restrictions in order to extend the life of the knee. When torn in the young athlete, the anterior cruciate requires surgical reconstruction and restricts the athlete from any participation for one full year. Because of this, it is important that athletes should be informed of measures they can take to prevent them from tearing this ligament. A recent analysis of our data that combined several sports, excluding North American football indicates that 89% of all anterior cruciate tears occur without a direct hit at the knee. This football data shows that 50% of the injuries to the anterior cruciate in football occur without contact while 49% had contact at the knee. This type of injury often involves the "blue chip" player with exceptional ball handling ability.

Most injuries to the anterior cruciate ligament involve one of three main injury-producing situations (plant and cut straight knee landing, one step stop) and often includes a combination of these. The load, which injures the anterior cruciate ligament results from the posterior slope of the patellar tendon when the knee is between the position of straight to 30 degrees of flexion. This causes extreme loads on the anterior cruciate ligament when the quadriceps muscle contracts, as the knee is near straight. This is why in all injury prevention instruction covered in this paper, emphasis is placed on bending the knee.

1. Plant and Cut
The plant and cut may combine a sudden decelerating maneuver with a twisting movement that can further load the anterior cruciate ligament causing a tear.

2. Straight Knee Landings
When coming down from a jump, the player who lands stiff-legged or does not continue to bend his knees as he lands is very likely to damage his anterior cruciate.

3. One Step Stop
This is a sudden decelerating movement with the knee near straight that places the ligament in a dangerously tight position and often ends in a tear of the anterior cruciate. Deceleration in one step or with the knee near straight, is dangerous.
Our purpose is to define the play situations where this injury is most likely to occur and demonstrate improved player technique, which not only improves the player's performance but also decreases the risk of knee injury.

I. TURNING

ACCELERATED ROUNDED TURN TECHNIQUE

The program is begun by learning proper rounded turn technique. The turn is actually begun with the inside foot not the outside foot. That is the foot towards the direction of the turn not the foot away from the turn. This is called the preparation step. The turn is continued on the outside foot with the player feeling like he is accelerating through the turn. It is obvious that when you are decelerating you cannot be accelerating. Remember decelerating is dangerous. Many of our players say the words out loud—inside-outside” as they are proceeding through the turn. this helps with proper technique in the turn.

Injury Producing Situation

Plant and Cut
Turning .... Offense

Often, an offensive player will be placed in a situation requiring him to make a directional change in order to avoid the defender. If done incorrectly this may result in an injury to the anterior cruciate ligament. The following picture demonstrates an offensive player dribbling the ball down field. He is approached head on by a defender, forcing the offensive player to attempt a directional change. This illustrates the improper technique that involves a plant and cut move on the outside (left) leg. Although the player may have made this move many times with no resulting injury, the move loads the anterior cruciate ligament to the point close to failure. Only a slightly harder effort with the same move will result in a tear of the ligament. A lot of the athletes we see have stated, "I have done this move many times with no injury but this time I planted a little bit harder", this time I twisted a little more." This little difference in the way they normally make their move, is all it takes to tear the ligament. Anytime an athlete makes a turn or change of direction he must remember to KEEP HIS KNEES BENT AND HE MUST NOT PLANT ON THE OUTSIDE LEG. THIS MOVE IS A HIGH RISK MOVE AND WILL TEAR THE ANTERIOR CRUCIATE LIGAMENT IF DONE WITH TOO MUCH FORCE. If the proper technique cannot be performed in the turn, the athlete must option to go straight ahead. It is unsafe to ever make a plant on the outside foot to make a turn.

Note that the outside (left) knee is straight which increases the chance of tearing the anterior cruciate ligament. This not only loads the anterior cruciate, but it slows (decelerates) the player to almost a complete stop. This in combination with the position of the outside leg, causes the player to lose one full step on the defender. Often one step can mean the difference between getting a shot off on goal or not.
Injury Producing Situation

Note: (1) Player approaches defender at high speed. (2) Player plants on outside (left) foot involving a deceleration. (3) Player loses one full step on the defender.

Accelerated Rounded Turns
Improved Player Technique

The key to making a good move on the defender is to approach the defender head on at a steady pace and accelerate past him making your turn in multiple steps. If you approach the defender at full speed and then try to get past him you have lost the element of surprise acceleration. By adjusting your speed to allow for a slower more steady approach, and then using acceleration to make your move, you have the element of surprise on your side. Another key thing to remember when making a rounded turn is to approach the defender straight on. Don't lean as you make your approach as this will show the defender, which way you are turning. It is acceptable to incorporate a head fake with this but you should be careful not to extend and plant on the outside leg.

The next picture demonstrates an offensive player approaching a defensive player. The offensive player is controlling the ball but must get past the defender. He approaches the defender at to ^A speed. When he is ready to make his move, he will accelerate past the defender. To do this he should make his preparation step on the inside foot pump his arms as he rounds the turn, and accelerate past the defender. He may incorporate a head fake as he approaches the defender by dipping his left shoulder as he pushes the ball towards the right and makes his turn off the inside (right) leg. This maneuver is done at a much lower risk of injury than the "plant-and- cut", move.
Note: (1) Speed should be of accelerated speed at turn. (2) Do not lean into the turn, make a straight approach. (3) A head fake may be done by dipping left shoulder. (4) Preparation is made on inside foot (5) Accelerate through turn.
Another potentially hazardous situation occurs when a defensive player reacts to a kicked ball. If the defender is caught off guard or is caught in an upright (poor defensive) position, he may react by pushing hard on his outside leg in order to move to the inside (towards ball). Example, a player is caught standing up and the ball is kicked hard towards him and slightly to his left. In an attempt to make a header, he pushes hard on his right (outside) leg in order to get there quickly. The combination of the extended knee and the rapidly contracting quad (thigh) muscle, will often tear the anterior cruciate ligament. This can also relate to a goalkeeper who is attempting to make a save. If he starts his move in a poor defensive position or pushes hard on the near straight outside leg, he is placed at high risk. The next picture illustrates this move.

Note: Player is caught standing upright and in an attempt to move to his left pushes hard on outside (right) leg.

Improved Player Technique
Accelerated Rounded Turn

The following picture shows the improved player technique for approaching a kicked ball. Anytime a player reacts to a kicked ball he must keep his knees bent and avoid the temptation to push off with his outside eg. Instead, he should keep his knees bent and with both feet on the ground, push off, pushing harder with the Inside leg. Example, goalkeeper reacts to a ball kicked towards him and slightly to the left He pushes off using good technique and makes the save.
Note: (1) Keeper approaches top of box in a good defense (bent knee) position. (2) Ball is kicked by offensive layer to the left of keeper. (3) Keeper reacts by pushing off the both legs to move left pushing harder on inside

The accelerated rounded turn can be practiced by the soccer player by using a cone as a defender and approaching the cone as you would in competition. Practice making the turns smooth and rounded at first. Next you can incorporate a sharper turn and a head fake to make the move more realistic.

II. LANDING

BENT KNEE LANDINGS

Jumping and landing is not as common in soccer as it is in other sports such as basketball. However, a soccer player may find himself in a situation that requires him to jump over a downed player, jump to do a header, or a goalie may find himself jumping in a crowd of players in order to catch a loose ball. In either case the result is the same that is a knee bent landing. A knee bent landing is a very basic technique. Even so, many athletes are injured because they land stiff-legged and fail to continue bending their knees to absorb the force of impact as they land. It is necessary that the athlete realize the importance of landing with both knees bent and continue bending with the landing.

Often a player will attempt to make a directional change on one leg as he lands. When doing this the player will most likely land with the leg straight or near straight and twist his knee as
he lands in order to make a sharp turn. This twisting movement in combination with the stiff landing on the straight or near straight knee, usually results in a torn anterior cruciate ligament

**Landing …. Jumping Over Tackle**

**Injury Producing Situation**

**Straight Knee Landing**

The following picture demonstrates a player jumping over a defender who is attempting a tackle. The offensive player jumps clear of the defender but lands stiff-legged thus placing the anterior cruciate at a high risk of injury. This may also include the twisting movement mentioned earlier which can place the ligament at an even higher risk.

**Landing …. Goal Keeping**

A goalkeeper is often placed at a high risk of injury by jumping to retrieve a shot on goal. The next picture shows a keeper jumping to catch a loose ball and at the same time he tries to avoid a downed player. As he lands, he fails to bend his knees thus stressing the anterior cruciate.
**Landing .... Heading**

Many times when making a header, a soccer player will attempt to flip the ball in a certain direction or he may attempt to twist his body in mid air to direct the ball. This move by itself is a safe and very common soccer maneuver, however, it should be completed with a well-executed bent knee landing.

The next picture shows a player who is not using injury prevention technique as he jumps to do a header. As the player lands, he fails to bend his knees, which would allow him to absorb the shock of impact.

![Injury Producing Situation](image)

Note: (1) Player jumps making a good header, but lands with knees straight stressing the anterior cruciate.

**Improved Player Technique**

**Bent Knee Landing**

The next picture demonstrates the improved player technique for a proper landing after a header. Note. the player lands with his knees bent and they continue to bend to absorb the shock. This technique must be used with all situations that involve jumping and landing.

![Improved Player Technique](image)
Note: (1) Player jumps and makes a good header, (2) and completes the move by utilizing a bent knee landing. (3) This move should be used with any situation that involves a jump and landing such as a jump over a downed player, or a keeper jumping to catch the ball.

Landing.... Trip

Another situation that includes a landing that may occur in soccer is when a player is tripped from behind by the defender. The offensive player must react to this foul situation immediately by grabbing his knee with both hands and rolling over on the back of his shoulders. Learning to tuck and roll will keep the player from getting hurt and the severity of the foul will still likely be seen by the official. If a player in this situation tries to keep his balance, he may extend his leg which could overstress the ligament. In other words, never over extend your leg to catch yourself when landing off balance. The following picture demonstrates the improved player technique using the tuck and roll.

Note: (1) The offensive player (^20) is tripped from behind by the defensive player (^15). (2) Player ^20 reacts immediately by grabbing his knee and going into a tuck and roll. (3) He pulls out of the roll and is in a ready.

III STOPPING

THREE STEP STOP

The three-step stop is used when a player needs to come to a stop, or when he needs to change direction. Imagine the defensive player who finds himself in a situation that requires him to make a sudden deceleration in order to move with the offensive player. The improved player technique allows the player to reduce his forward speed by bending his knees and lowering his center of gravity, and decelerating in at least three steps. He is now in a position of balance that prepares him for any directional change.

Stopping .... Defense
Injury Producing Situation
One Step Stop

Too often a player will decide to make a sudden stop by planting or extending his leg. Because the knee is not bent and the quadricep (thigh) muscle is rapidly contracting, the
anterior cruciate is placed at high risk. This often occurs when a defensive player is trying to come to a stop after closely approaching an offensive player that has the ball. Another situation that involves stopping is when a player needs to make a quick change of direction. Often this is done by planting one leg and trying to stop on that leg. This of course is not recommended because it is a high-risk stop.

The following picture shows a defender approaching an offensive player who has just been given the ball. The defender tries to get the ball by lunging to a one step stop. Doing this commits the player to attempt a blocked kick and doesn't allow him to react quickly enough to the offensive player's next move.

Note: (1) Player jumps to block shot (2) and lands on one leg, which places the leg in an extended position (3) Player is committed to attempt a blocked shot and is not in a good position to recover.

**Improved Player Technique**

**Three Step Stop**

The next illustration shows the improved player technique for decelerating. Anytime a player needs to stop, or needs to make a directional change, it should be done using the three step technique.
Improved Player Technique

Note: (1) Defender approaches offensive player. (2) and starts his break down with knees bent to 90°, at a point that allows him to come to a three-step stop. (3) Player is now in a good ready position.

Discussion

The popularity of soccer has greatly increased in the U.S. over the past few years. Along with that the injuries from soccer have been on the rise. Since many players start soccer at a very early age and continue laying into adulthood, it is very important to incorporate these injury prevention skills as early as possible. Although soccer is currently a low injury producing sport for the anterior cruciate, it is certain that unless injury prevention is introduced to these athletes, more and more injuries will be reported as the popularity of the sport increases.

These basic improved techniques can be applied to any playing situation. You must improve your skills by applying these techniques to practice situations. Injury prevention is not limited to these three basic techniques accelerated rounded turns, bent knee landings, three step stop); however, these are the most common ones we -use in our practice. There are other general injury prevention techniques that involve stretching and strengthening that are important but are not discussed in this paper. These techniques will not prevent further injury to a knee when the anterior cruciate ligament has been previously torn.

It is common to see many players with knee braces intended to stop rotational instability. These braces are often used after an anterior cruciate tear in order to attempt to return the athlete to sport. The injury prevention techniques will work only when you have two stable knees. The use of braces does not significantly change the stability of the knee when measured with sensitive arthrometers. It is also well documented that these derotation braces are unsuccessful in protecting the meniscus in the unstable joint. A second problem is the favoring of the injured leg, which is enhanced by such a brace. Forty-two percent of the patients presenting to our clinic wearing a brace on their anterior cruciate deficient knee, tore the cruciate in their other knee within two years, after they returned to sports. Statistically,
even with a brace, 98% of these players who are playing with an anterior cruciate deficient knee. will tear one or both menisci within one year. By continuing to play after an injury to the anterior cruciate. even with a modern derotational brace, both knees are still at risk. The incidence of a meniscus tear while wearing a brace is not changed in the injured knee, and the risk of tearing the anterior cruciate ligament in a good knee is likewise not reduced. Thus, we cannot recommend playing with an anterior cruciate deficient knee. Of the athletes in our study, 22% that have torn one of their anterior cruciates, and did not have surgical reconstruction, ultimately tear the cruciate in their other knee when they return to sports.

The meniscus is the cartilage in the knee that provides stability, tracking and padding for the femur and tibia (the thigh and shin bones). When the cartilage is torn, it will deteriorate rapidly (3-5 years), thus leading to early degenerative arthritis. Every attempt must be made to repair the meniscus. If the meniscus is surgically removed, partially or completely, the knee is destined for early degenerative arthritis.

The purpose of explaining injury prevention techniques is obvious. Athletes involved in any sport should be aware of these ideas. It is the responsibility of schools, coaches and parents to convey these skills to athletes promoting safe athletic activities.
Injury Play Situations for the Anterior Cruciate Ligament

SOCCER N = 61

Shifting on defense          12
Running, plant to get open or get ball          11
Hit          10
Plant to kick      7
One step stop to reverse or change direction        4

Foot stuck in carpet           3
Jumping over a downed player         3
Tackled low            3
Landing from a header       2
Running for ball, bumped off balance      1
Dribbling ball, got tangled up       1
with opponent
Kicked ball the same time as opponent 1
Knocked off balance      1
Slipped in mud          1
Injury situation not known  1

Not Hit = 51 = 84%
Hit= 10 = 16%