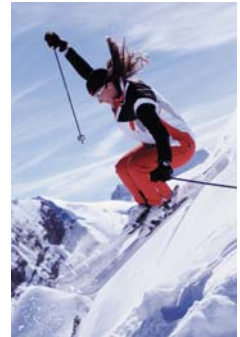


Recognizing, Treating, and Preventing an ACL Tear During the Ski Season

By Sanaz Hariri, MD

Ski season is fast approaching. Before you head out to the garage to dig up your skis and boots, take a moment to educate yourself on how to minimize the chance of a serious injury this season. You can share these prevention strategies with your family and friends so that you can spend your vacation on the slopes rather than in the emergency room. As an orthopedic surgeon, I will offer you advice on recognizing and treating a common knee injury – and telling you how to avoid seeing me! While medial collateral ligament (MCL) injuries are the most common significant knee skiing injury, they almost all heal on their own with bracing. However, anterior cruciate ligament (ACL) tears often require surgical treatment, and so the ACL will be the focus of this article.



What is the ACL?

You might have heard about ACL tears in famous athletes such as Jerry Rice, Tiger Woods, and Tom Brady. The ACL is a ligament located in the middle of your knee joint that connects the femur (the thigh bone) to the tibia (the shin bone). It is called the anterior cruciate ligament because (1) it is anterior (“in front of”) the posterior (meaning “situated behind”) cruciate ligament (PCL), (2) it crosses the PCL to form an “X” (the Latin word *crux* means cross), and (3) it is a ligament (i.e. it connects two bones). It plays a critical role in knee stability by preventing the tibia from sliding in front of the femur and providing rotational (twisting) stability.

How is the ACL Torn?

ACL tears are most commonly non-contact injuries (i.e. nobody/nothing hit you). Most often, the ACL tears when the foot is planted and the knee twists. This can occur in football players making a sudden cut or in skiers when they fall but the binding does not release. ACL tears can also occur when the knee is hit from the front or side.

How do I know if I sustained an ACL tear?

Most people will report hearing or feeling a very distinct “pop” followed by acute pain. The knee will swell up considerably well within 12 hours because, when the ACL tears, the artery that supplies the ACL and PCL will pump blood into the knee. This creates a hemarthrosis (i.e. a joint full of blood). In about 75% of cases where there is an immediate hemarthrosis, the skier has sustained an ACL tear. The knee will feel unstable when you stand and try to walk. It might feel like it will give out on you.

See a doctor immediately if you look down and there is an obvious deformity of the knee, you cannot put weight on the knee and walk four steps, your knee significantly swells up within a few hours, you cannot fully straighten the knee, and/or you have a lot of pain when you press on a particular area of the knee.

Please do not try to ski if you experience these symptoms. You can cause further damage and compromise your chances of having a full, successful recovery. Have your companion flag down the ski patrol and get you to the medical clinic. The doctor will examine you and likely put you in a brace and give you crutches. You may even need an x-ray to look for a break/fracture.



You do not necessarily need to get an MRI right then and there. You can go home and see a local orthopedic surgeon for evaluation and treatment. An MRI will confirm the diagnosis and can identify associated ligament, cartilage, and meniscus injuries. You will likely have bone bruises as well.

I have an ACL tear, now what?

As with almost any soft tissue injury, your best bet is the RICE protocol:

Rest (Your ski day is over – do not try to ski or you risk damage to your other knee structures. Your knee could be unstable, and so the movement can damage your meniscus and cartilage)

Ice (but never directly on the skin)

Compression (e.g. an ace wrap)

Elevation (Keep the foot elevated above the level of your knee. Keep your knee above the level of your hip - and preferably above the level of your heart. This decreases swelling.)

Non-steroidal anti-inflammatories (NSAIDs, such as ibuprofen or naproxen) can be helpful to decrease swelling and pain, if you do not have contra-indications to these medications. Make sure to take these medications with food to protect your GI tract.

Do I need surgery?

You do not necessarily need to have surgery. Surgery is reserved for those who have active lifestyles involving sports (e.g. basketball and soccer) or occupational activities that require side-to-side motions. In all cases, I would send you to see a physical therapist to help reduce the swelling, regain your range of motion, and to work on your quadriceps control. This is critical for your recovery – whether or not you need surgery.

After we discuss all the options, you may decide not to reconstruct your ACL. In general, there is a “rule of thirds.” About a third of patients will compensate adequately and are able to pursue largely straight-ahead recreational activities, such as jogging. About a third of patients will compensate but find that they give up recreational activities that they used to enjoy. About a third of patients will find that the knee is too unstable – sometimes even with just normal activities of daily life, such as walking. They will usually then decide to pursue surgery.

For those who decide on surgery, the good news is that it is a very successful procedure that could get you back on the slopes the following year. DO NOT undergo ACL surgery until you have regained your knee motion and the swelling has largely subsided. Otherwise, you are at significantly increased risk for a stiff knee after the surgery. Again, the role of physical therapy cannot be overemphasized.

The ACL is not repaired – it is reconstructed. This means that I either use a cadaver graft (allograft) or your own tissue (autograft) to replace your torn ACL with a new ligament secured by screws. A key to your success is a dedication to therapy. You will almost immediately start physical therapy, first to regain your motion, then to start working on your strength. The critical members of your team are the orthopedic surgeon, the therapist, and you.



That doesn't sound fun. What can I do to prevent an ACL tear?

- During the off-season, work on your general conditioning, core strength, and quadriceps and hamstring stretching and strengthening. Your regimen should emphasize lower extremity strength, agility, and balance. Closed-chain exercises (e.g. leg presses, squats, lunges) and a regular cardiovascular workout (e.g. stationary bike or elliptical cross-trainer) are highly advisable. You might want to find a trainer to help develop a few protocols for you. Please do not sit on the couch all year and then decide to impersonate Bode Miller or Picabo Street for a weekend. You are setting yourself up for a serious injury.
- Warm up before hitting the slopes. Pretend you are getting ready to go for a jog. In particular, stretch your hamstrings and quadriceps.
- You are most vulnerable to injury at the end of the day when you are fatigued. Take it easy in the late afternoon. If you are tired or in pain – stop! The Jacuzzi is calling to you!
- Equipment:
 - o Make sure that your boots fit you.
 - o Make sure the ski length is appropriate for you.
 - o Double-check your binding release tension. This is incredibly important. Remember, if your bindings are too tight, your foot will be stuck in place when you fall, and your knee will twist, injuring your ligaments. If the binding releases appropriately, there is less stress on the knee as you fall. To correctly adjust your release settings, you must take into account your weight, height, boot size, ski style, velocity, and slope incline – it's complicated! If you do not know how to adjust your release tension or pick your ski size, find a certified technician to do that for you in a store that specializes in ski equipment.
- Knee braces have not been shown to prevent ACL injuries if you have never had an ACL tear. However, bracing can decrease the risk of subsequent injury in skiers who have had significant ACL tears that have not been surgically treated (Kocher et al. J Knee Surg 2003) and those who have had an ACL reconstruction (Sterett et al. AJSM 2006).
- Be realistic about your abilities. Do not go on terrain that is more advanced than your ability. Do not let your buddies talk you into stunts or terrains that you cannot handle – listen to that little voice inside your head!
- Land/fall with your knee slightly flexed. You are at increased risk for an ACL tear when you land/fall with your knees straight.
- Stay down when you are sliding – do not try to get up until you are at a stand-still.
- If you must do jumps, look before you leap – do not jump until you know and are comfortable with where you are landing.
- ACL injuries usually occur when you fall to the downhill side of your skis with the tips spread apart. Try to keep your legs together, your arms in front of your knees, and fall uphill of your skis.
- Consider taking a ski lesson from a certified instructor each season so that they can point out technique flaws that can put you at risk for injury.

ABOUT THE AUTHOR

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