

Information and opinions supplied by the staff at
UP and RUNNING (Sports Injury Clinics) Ltd

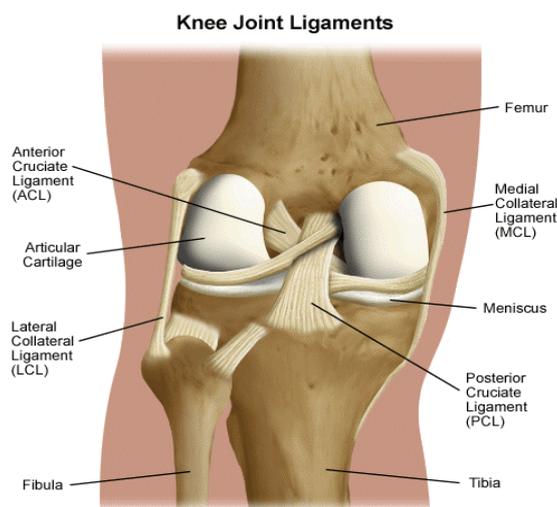
Article 5: Knee Ligament Injuries

What are ligaments and what is their function?

As mentioned earlier the knee joint is a very complex joint and the following is a simplistic guide to the structure and function of ligaments.

Stability of any joint relies on several factors. The shape of the bones at the joint can contribute to stabilisation such as the depth of the hollows and the height of the Inter-Condular Notch of the Tibia where the Femur articulates in the knee. Then there are passive or static stabilisers called ligaments and dynamic stabilisers namely the muscles. 3. 4. 8.

Ligaments are known as passive or static stabilisers because unlike muscles they cannot contract. 1. 10. Ligaments act across joints attaching from bone to bone. The knee has four major ligaments whose job it is to stabilise the joint. These four ligaments are the Medial Collateral Ligament, the Lateral Collateral Ligament, the Anterior Cruciate Ligament and the Posterior Cruciate Ligament. 1. 6. 9.



Left Knee From Behind
(Image courtesy of Yale Medical Group, 2010)

The Collateral Ligaments help prevent unwanted lateral (sideways) movement whilst the Anterior Cruciate Ligament prevents the Femur (thigh bone) slipping backwards on the Tibia and the Posterior Cruciate Ligament prevents the Femur slipping forwards on the Tibia. 2. 5. 7. If any of these ligaments are completely ruptured then there is a high risk of the knee being unstable.

Ligaments have high tensile strength being made from collagen, a strong structure made of protein fibres. Ligament tears are graded 1, 2 and 3 for severity, 3 being a complete or almost complete rupture. Amazingly complete ruptures are often less painful than partial tears due to the nerve ends being severed as opposed to being damaged. 3. 4. 9.

What causes ligaments to tear?

Ligaments can become damaged when various forces, that are too great for them to withstand, are applied to the knee. These forces are generated either intrinsically, such as when landing from a jump but without the control needed to cope, or extrinsically such as when a player is tackled. 6. 7. 10. The fibres are stretched to breaking point and either some or all of the fibres tear. A sprain is when some fibres are torn; a rupture is when all fibres are torn.

If you have experienced an incident where a large force may have been applied to the knee and you are now suffering from pain in the knee, instability of the knee and swelling, it may be worthwhile to see a physiotherapist or GP for advice and a diagnosis. 2. 3. 5.

The knee joint is surrounded by a protective joint capsule called the Synovia. This synovial membrane produces synovial fluid, which helps to lubricate and reduce friction within the knee joint. 7. 9. 10.

What can be done about ligament tears?

Ligaments are capable of healing as they have a blood supply but they are not as rich in blood supply as muscles therefore it takes longer for the healing to take place. 1. 4. 6.

As with any injury however in the early stages of injury there is a need to reduce blood flow in order to minimise blood loss and tissue oedema (swelling). Rest, Ice, Compression and Elevation (R.I.C.E.) is a pretty good standard treatment but, be very careful with ice application. There are two potential problems with ice application. The first is an ice burn. Do not apply ice directly on to the skin. Ensure there is a barrier between the skin and the ice and try to use ice that is melting slightly. Secondly, ice application causes vaso-constriction, (closing of the blood vessels) in the first instance but after approximately ten minutes the body's reaction is to vaso-dilate (open the blood vessels). This means greater blood flow and therefore potentially more swelling. 8. 10.

It is very important that you protect your knee from further damage as it may become quite unstable with ligament tears. Unlike injured muscles, ligaments should not be stretched during the rehabilitation stages. Rest and gentle mobilisations in the correct anatomical plane for that joint should be performed as pain allows. 3. 5. 9.

Ligaments can take up to several weeks to repair. It is advised develop muscle strength around the injured ligament to help to stabilise the joint using the muscles as dynamic stabilisers. 2. 3. 8.

Where ligaments have completely ruptured it is likely that surgery may be required. 7. 8.

Authors View

If you think that you may have suffered ligament damage it is recommended that you see a health professional. Diagnosis can be relatively simple with a few tests carried out by the medical practitioner. For more complex cases, diagnosis may require MRI or ultrasound scans.

Input from a physiotherapist or sports therapist can be beneficial as treatment of ligament injuries can be tricky. Finding the right balance between rest, gentle stretching and strengthening is necessary for optimum healing, stability of the injured knee and prevention of subsequent injury.

Reference List:

1. Gianotti, S. M., Marshall, S. W., Hume, P. A. & Bunt, L. (2009). Incidence of anterior cruciate ligament injury and other knee ligament injuries: A national population-based study. *Journal of Science and Medicine in Sport*. 12(6), 622-627.
2. Kim, Y. J., Kim, J. G., Chang, S. H., Shim, J. C., Kim, S. B. & Lee, M. Y. (2010). Posterior root tear of the medial meniscus in multiple knee ligament injuries. *The Knee*. 17(5), 324-328.
3. Fanelli, G. C., Stannard, J. P., Stuart, M. J., MacDonald, P. B., Marx, R. G., Whelan, D. B., Boyd, J. L. & Levy, B. A. (2010). Management of complex knee ligament injuries. *The Journal of Bone and Joint Surgery*. 92(12), 2235-2246.
4. Koga, H., Nakamae, A., Shima, Y., Iwasa, J., Myklebust, G., Engebretsen, L., Bahr, R. & Krosshaug, T. (2010). Mechanisms for noncontact anterior cruciate ligament injuries: Knee joint kinematics in 10 injury situations from female team handball and basketball. *The American Journal of Sports Medicine*. 38(11), 2218-2225
5. Hirschmann, M. T., Iranpour, F., Muller, W. & Friederich, N. F. (2010). Surgical treatment of complex bicruciate knee ligament injuries in elite athletes: What long-term outcome can we expect? *The American Journal of Sports Medicine*. 38(6), 1103-1109.
6. Terauchi, M., hatayama, K., Yanagisawa, S., Saito, K. & Takagishi, K. (2011). Sagittal alignment of the knee and its relationship to noncontact anterior cruciate ligament injuries. *The American Journal of Sports Medicine*. 39(5), 1090-1094.
7. Alentorn-Geli, E., Myer, G. D., Silvers, H. J., Samitier, G., Romero, D., Lazaro-Haro, C. & Cugat, R. (2009). Prevention of non-contact anterior cruciate ligament injuries in soccer players. Part 1: Mechanisms of injury and underlying risk factors. *Knee Surgery, Sports Traumatology, Arthroscopy*. 17(7), 705-729.
8. Marx, R. G. & Hetsroni, I. (2012). Surgical technique: Medial collateral ligament reconstruction using Achilles allograft for combined knee ligament injury. *Clinical Orthopaedics and Related Research*. 470(3), 798-805.
9. Morelli, V., Bright, C. & Fields, A. (2013). Ligamentous injuries of the knee: Anterior cruciate, medial collateral, posterior cruciate and posterolateral corner injuries. *Primary Care: Clinics in Office Practise*. 40(2), 335-356.
10. Boden, B. P., Sheehan, F. T., Torg, J. S. & Hewett, T. E. (2010). Noncontact anterior cruciate ligament injuries: Mechanisms and risk factors. *Journal of the American Academy of Orthopaedic Surgeons*. 18(9), 520-527.