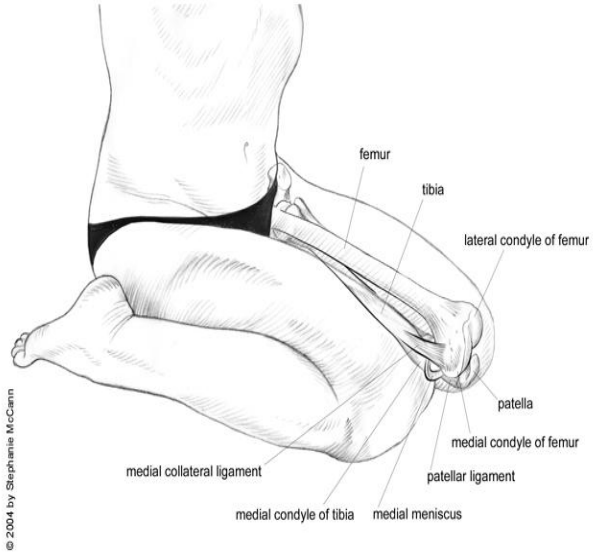
Keep Knees Healthy in Virasana (Asana Techniques)

Popular opinion has it that Virasana is a no-no for the knees. But might the pose do those joints some good? Read on for a detailed exploration of the anatomy of the knee, plus instructions on how teach Virasana to a variety of students.

By Roger Cole



"Ten Exercises You Should Never Do." Every once in a while, you'll see a headline like this blaring from the cover of a women's magazine in the supermarket checkout line. One of the "exercises" you'll sometimes find on the blacklist--along with some of your other favorite yoga postures--is **Virasana** (Hero Pose). The article will caution that kneeling like this will injure your knees. How can it be, then, that many of the world's most respected yoga teachers routinely recommend this posture as one of the best ways to keep your knees healthy? Let's look at the anatomy of Virasana to see whether it really could damage your knees, and to learn how you can help your students safely get the most out of this simple yet powerful pose.

The knee joint is the junction between the femur (thighbone) and the tibia (shinbone). At the knee, the end of the femur bulges to form two large, rounded structures called the medial (inner) and lateral (outer) condyles. The femoral condyles are covered with cartilage to help them glide over corresponding condyles on the tibia. The tibial condyles are slightly concave on top, nearly flat, so their shape does little to accommodate the large, convex femoral condyles that rest on them. To partially make up for this deficiency, two crescent-shaped cartilages, the medial meniscus and the lateral meniscus, lie atop the tibial condyles to improve their fit with the femoral condyles. These cartilages help keep the bones lined up and help distribute the weight of the femur more evenly over the tibia, but they provide very little stability to the knee.

Because it is a shallow joint, the knee relies on strong ligaments and muscles to hold it together. The medial collateral ligament runs from the inner side of the femoral condyle to the inner side of the tibial condyle. It keeps the knee from bending sideways toward the midline (into the knock-kneed position). The lateral collateral ligament runs from the outer side of the femoral condyle to the head of the fibula (the fibula is the long, narrow bone that runs parallel to the outer tibia; its head is just below the outer knee). The lateral collateral ligament performs a function similar but opposite to the medial collateral: it prevents the knee from bending outward (to a bowlegged position). However, there is an important difference between the medial and lateral collateral ligaments. The medial ligament is fused to the medial meniscus, while the lateral ligament does not touch the lateral meniscus.

This makes the medial meniscus more vulnerable to injury than the lateral one in two ways. First, it limits its mobility, so if your student accidentally applies a strong force to her medial meniscus, it is less likely to slide out of harm’s way than her lateral meniscus would be under similar circumstances. Second, if your student forces her inner knee open strongly enough to tear the medial collateral ligament, she may tear the medial meniscus at the same time, because the two structures are not separate but blend seamlessly into one another. Tearing the lateral collateral ligament would not tear the lateral meniscus because they are not connected. As we will see, the vulnerability of the medial meniscus can be a significant issue in Virasana (although it's not difficult to keep it safe). But before we explore that, let's first consider the other major ligaments of the knee, the anterior and posterior cruciates.

Figure 1
The Anatomy of the Knee
View in Detail

The cruciate ligaments attach the end of the tibia to the end of the femur. They both start on the tibia between the menisci. Both ligaments end on the femur between the condyles. As your student straightens her knee fully, her anterior cruciate ligament pulls taut to prevent hyperextension. Both collateral ligaments also become taut when the knee is straight, adding more stability. When the knee bends, the two collateral ligaments go slack, but the two

cruciate ligaments are arranged in such a way that in most positions of bend, at least part of one of them is taut. In this way, they help keep the knee stable throughout its range of motion.

The muscle group that straightens the knee is the quadriceps. As its name implies, it has four parts. Three of them originate on the front of the femur, the fourth on the front of the pelvis. All of them attach to the kneecap (patella). The kneecap, in turn, attaches by a strong ligament to a bulge on the front of the tibia just below the knee (the tibial tuberosity). When your student contracts her quadriceps, they pull her kneecap up, her kneecap pulls on her tibia, and her tibia moves toward the straight knee position. When she bends the knee to sit in Virasana, her tibia pulls her kneecap down, her kneecap pulls her quadriceps away from their origins, and they get longer. The three parts of the quadriceps that arise from the femur (vastus lateralis, vastus intermedius, and vastus medialis) all stretch to their maximum length when the knee is fully flexed. The fourth part (rectus femoris) will not stretch completely unless your student combines full knee flexion with full hip extension, as in backbends such as **Supta Virasana**.

Every joint needs to be moved through its range of motion regularly to keep it healthy. Moving one joint surface over another keeps the cartilage lining on each intact. Disuse often causes the cartilage, then the bone underneath it, to deteriorate. Bending and straightening the knee all the way rolls the entire, cartilage-lined joint surface of the femoral condyles over the tibial condyles and menisci, which is healthy for the joint, while limiting knee flexion or extension leaves some parts of the joint surfaces unused. One major way that Virasana helps the knees is by bringing them through their complete range of flexion, nourishing joint surfaces that might otherwise be neglected.

How much flexion is good for your students' knees? Most people would agree that bending the knees far enough to sit on the heels is healthy (this pose is sometimes called Vajrasana, or Thunderbolt Pose). This raises two questions. First, is it safe and healthy for a student whose knees don't ordinarily flex that far to work the hips down to the level of the heels? Second, is it safe and healthy to separate the feet and lower the hips between the ankles to place the sitting bones on the floor, as in the full Virasana pose?

The answer to the first question is that it is usually beneficial for a student whose sitting bones don't reach her heels to work her way down over a period of weeks, months, or years. If her limitation is simply tight quadriceps muscles, the pose offers an excellent way to stretch them out to normal length and restore full range of motion to the knees. One obvious caveat is that she should not progress so quickly or practice so aggressively that she tears one of the quadriceps or causes some other injury.

It is usually best for a student whose sitting bones don't reach the level of her heels in Virasana to first support her pelvis on a prop, such as a stack of folded blankets. The stack should be narrow enough to fit between the heels without forcing them wider than the hips. She should align her thighbones parallel to one another (her knees won't quite touch each other), place her shinbones directly under her thighbones, and point her feet straight backward in line with the shinbones. She can then work her sitting bones gradually down to the level of her heels by reducing the height of the blankets very slightly from one practice session to the next. This will stretch her quadriceps bit by bit

and make it easy for her to stop if she feels any pain.

The reason your student should point her feet backward in the same line as the shins when practicing Virasana is to avoid twisting her knees. Turning the feet outward (so that the toes point to the sides) rotates the tibias too far outward, misaligning the knee joint surfaces, severely overstretching the medial collateral ligaments, and, in extreme cases, possibly damaging the medial menisci. Turning the feet inward rotates the tibias inward but not so far, because joints in the feet do most of the movement. The modest inward rotation of the tibias that occurs when the feet turn in slackens the medial collateral ligaments but increases tension on the lateral collaterals. Turning the feet inward in Virasana is not as hard on the knees as turning them outward because the rotation of the tibias is not as great. Some students (those with certain types of medial knee problems) might even benefit from the slack it creates on the inner knee ligaments, although this must be weighed against the risk of overstretching the outer knee ligaments. Most students will experience the best balance between tension on the inner and outer knee ligaments (and the best alignment of the knee joint surfaces) if they keep their feet pointing in the same line as their shins, thereby keeping their tibias in a neutral, non-rotated position.

Another caveat for a student who is gradually working her sitting bones down to the level of her heels is that she should adapt the pose appropriately for any pre-existing injury. Most students with knee injuries can benefit from systematically lowering the pelvis, although it may not be appropriate to let it descend all the way to heel level in some cases. It's best to ask a health professional who understands both yoga and the individual student's injuries to help you and your student decide how far to bring the hips down. In addition to support blankets, other props can be useful for injured knees, but not all props are appropriate for every student. For example, a student with a torn meniscus may benefit from placing a rolled washcloth behind her knee because it may increase the space between her femur and her tibia, reducing the likelihood of pinching her meniscus, whereas a student with a torn cruciate ligament might not benefit from the same washcloth because increasing the distance between her femur and tibia

might apply too much stretching force to an already overstretched ligament.

The biggest question about Virasana, though, is not whether it is healthy to bring the hips down to the level of the heels, but whether it is healthy to move the feet aside, lower the hips beyond the heels, and place the sitting bones on the floor between the ankles. This action has two crucial effects: it flexes the knees several degrees more than sitting on the heels does, and it creates an angle between the tibia and the femur (whereas before these bones were parallel to one another, the femur directly atop the tibia).

The increased flexion caused by bringing the hips to the floor could theoretically be good for the knees by allowing contact between joint surfaces that would otherwise be left unused. This might help prevent deterioration of the cartilage linings on the rear-most part of the femoral condyles. On the other hand, since flexion pulls one or both cruciate ligaments taut, it is conceivable that the additional flexion produced in the last stage of Virasana might overstretch the cruciates in some people. It's not clear whether this actually happens, though.

The angle created between the tibia and the femur when the feet move out to the sides of the hips is probably of greater concern than the extreme flexion in full Virasana. It creates a sidebend that opens the inner knee by widening the gap between the medial femoral condyle and the medial tibial condyle. This pulls the two ends of the medial collateral ligament away from one another. If the pose is performed in a way that keeps the inner knee gap small (for example, by rotating the thighbones inward and keeping the feet close to the sides of the hips), then the only thing

the opening of the inner knee is likely to do is take up the slack that typically forms in the medial collateral ligament when the knee is bent. In fact, bending the knee to full flexion produces more slack in the medial collateral than any other position, so Virasana has a built-in margin of safety against overstretching this important ligament. However, if the pose is practiced in a way that makes the inner knee gap very large (for example, by taking the feet far out to the sides, leaving a space between the feet and the hips, or by turning the feet out so the toes point sideways), or if the student doing the pose has a particularly short medial collateral ligament, then sitting between the ankles might overstretch the ligament. This might gradually destabilize the knee or, if done too quickly and forcefully, might even tear the ligament and its attached medial meniscus. No one knows how often this occurs (if it occurs at all), but there are some simple things you can do to protect against it, and to avoid other possible problems in Virasana. Read **Practice Tips for Virasana** for specific advice that will help keep your teaching safe and effective.

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