

THE KNEE AND HIP IN THE BALLET CLASS

Since classical ballet technique is based on the outward rotation of the leg, and since this rotation affects both the knee and the hip joint, evaluating the amount of turnout is important from the beginning of training. A simple way to determine a dancer's "natural" turnout is to have the dancer lying on her back, with the spine and pelvis in alignment, knees bent and open, and the soles of the feet together. Allowing the muscles associated with the hip joint to relax and benefit from the use of gravity, the amount of turnout will be evident. For those dancers with good natural turnout, building the strength and discipline to fully use and hold it is going to be their chief concern. For the rest, outward rotation is a daily project and must be carefully encouraged through the use of specific stretches, and not forced beyond the body's capability.

It is through the correct execution of technique that the development of flexibility and strength of muscles, tendons and ligaments around the hip can be accomplished without injury. Turnout should be considered a movement rather than a position. The whole leg is rotated in one piece, with the relationship of all its parts remaining the same. The rotation should be motivated from the hip downwards, not from the feet upwards. It must be maintained throughout an entire movement, originating and returning to a properly placed standing position. Forcing turnout beyond the dancer's present capabilities may result in incorrect body alignment contributing to the possibility of injury or damage to the spine, hips, knees, ankles or feet.

III. THE KNEE AND HIP

BASIC STRUCTURE OF THE KNEE AND HIP JOINTS

The Knee

The knee is one of the most complex joints in the human body. Dance, as well as most sports, places extreme stress on the knee, so it is one of the joints most often injured. In addition to its two principal movements of **flexion** and **extension**, it also has **rotation** functions. The bones of the knee are the tops of the **fibula** and the **tibia**, the bottom of the **femur** (the large thigh bone), and the **patella** (knee cap). These bones articulate in several places and are stabilized by several ligaments. These ligaments are of three types: the **cruciate ligaments**, which cross within the cavity of the joint and contribute a large portion of the stability of the joint; and **capsular** and **collateral ligaments** which, in addition to contributing to stability, direct movement. Stress on the knee is cushioned by two oval, fibrous cartilages called **menisci**, which are located where the condyles (bumpy extensions at the bottom of the femur) meet the top of the tibia. There are also as many as two dozen **bursa** around the knee joint; they are sacs the function of which is to reduce the friction between muscle and bone, tendon and bone, tendon and ligament, etc.

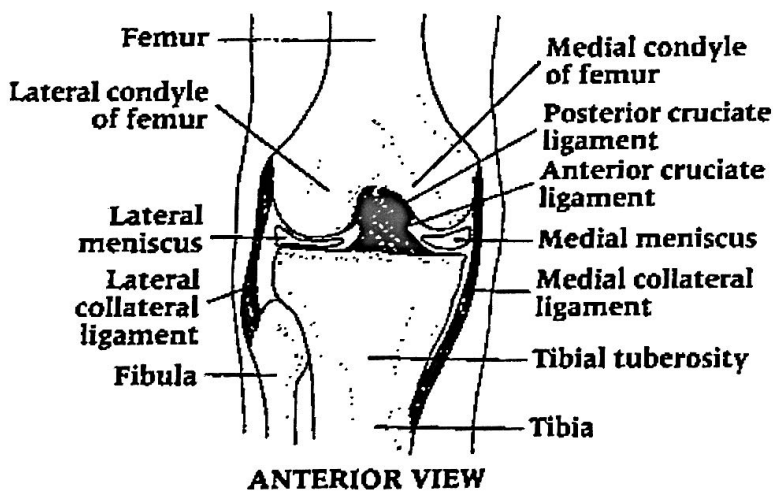
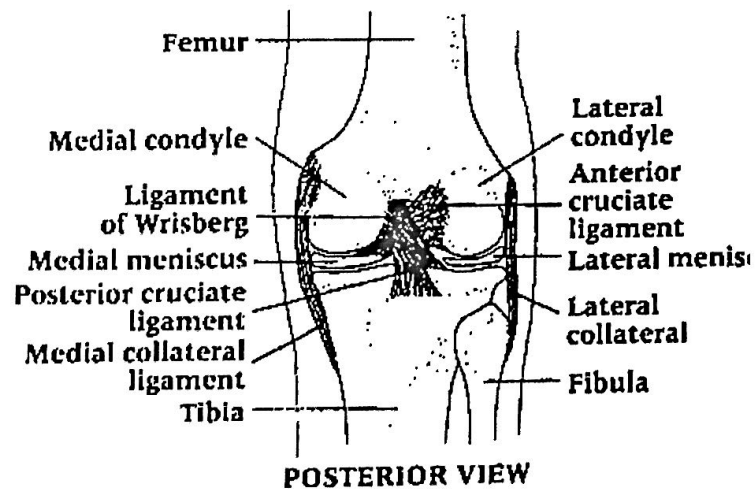


Fig. 1. The bony and ligamentous arrangement of the knee



The Hip

The pelvis is a bony ridge formed by the two **innominate** (hip) bones (each consisting of the **ilium**, the **ischium** and the **pubis**), the **sacrum** and the **coccyx**. The function of the pelvis is to support the spine and trunk and transfer weight to the lower limbs. The hip joint is formed by the articulation of the femur with the hip bone. The spherical head of the femur fits into a deep socket, the **acetabulum**, which is padded at its center by a mass of fatty tissue. It is secured to the femur by very strong ligaments, of which the most significant to a dancer is the Y-shaped **iliofemoral ligament**. The degree of turnout is very much affected by the flexibility and strength of this ligament. Also affecting the range of turnout is the bony structure of the hip, which can vary considerably from one individual to another; the shape of the femoral neck and the angle at which it is set into the hip socket are factors affecting the degree of turnout.

Fig. 2 – Individual variations in the angle of the femoral neck

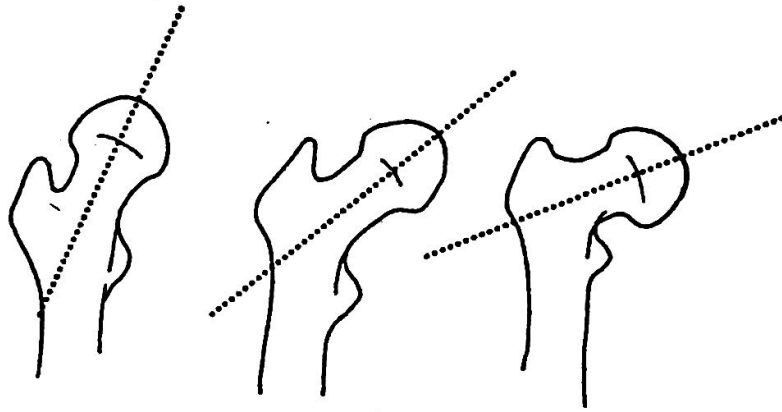
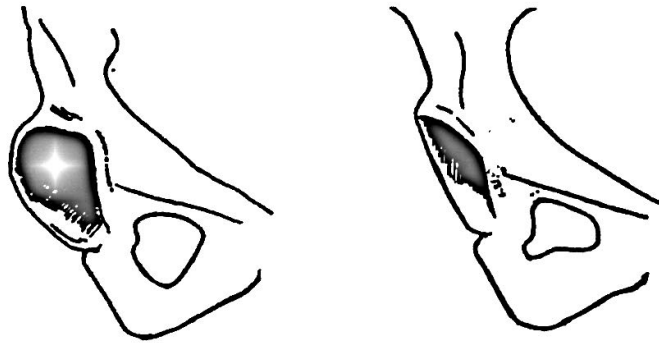


Fig. 3 – Orientations of the hip socket



COMMON CONDITIONS OF THE KNEE AND HIP OF INTEREST TO THE DANCER

Hyperextension - A condition that occurs when the knee joints are easily pushed back beyond 180 degrees, causing a “swayback” appearance of the legs. (Hyperextension can occur in other joints as well.)

Bowlegs - A structural condition caused by the outward curving of the legs which prevents the knees from touching.

Knock -knees - A condition in which there is an inward curving of the legs, allowing the knees to touch but preventing the heels from meeting; an inward curving of the legs.

Tibial Torsion - A condition wherein there is a rotation of the tibia. With the feet planted forward, the knees face inward giving a “cross-eyed” look to the knees (winking patellae).

Osgood-Schlatter’s Disease - An inflammatory condition of the apophysis (bony growth region) of the tibial tuberosity. It usually appears in children from the age of ten through late teens. Jumps and leaps aggravate this condition. Rest will usually relieve the pain, but in extreme cases the condition can be chronic.

ACL Tear - A tear of the anterior cruciate ligament located within the knee joint. A forced turnout, rolling over on pointe, and dropping the thigh inward when rising from the plié can contribute to the weakening of the ligament increasing the probability of this injury. This condition greatly affects knee stability.

Chondromalacia - A painful, degenerative condition of the cartilage on the underside of the patella (also known as patella-femoral pain syndrome).

Meniscus Tear - An injury to the cartilage (meniscus) between the femur and tibia. It is most common medially where it often accompanies a tear of the medial collateral ligament, and is caused by an improperly aligned landing from a jump that allows a twisting movement of the flexed knee.

Medial Tibial Stress Syndrome (shin splints) – An overuse injury characterized by persistent and acute pain the entire length of the medial (inside) aspect of the tibia (shin). It is, in fact, an inflammatory condition of the anterior tibialis tendon, which is located at the medial aspect of the tibia. It can be caused by overwork, scanty warmup, or jumping on unsprung floors.

GLOSSARY

Bursa - A sac or cavity containing lubricating fluid which reduces friction between tendon and bone, tendon and ligament, or other structures where friction may occur.

Femur - The thigh bone, which is the longest bone in the body.

Fibula - The small bone in the lateral lower leg.

Gluteus Maximus - The largest and strongest muscle in the buttocks region; its principle use is to extend the hips (align the pelvis and the thighs), and to realign them after flexion.

Gluteus Medius - The muscle which covers the greater trochanter and is a stabilizer of the pelvis.

Hyperextension - Extension of a joint beyond its normal range.

Meniscus - Cartilage within the knee joint.

Patella - The triangular, bony body that protects tissue within the knee joint, most commonly known as the kneecap.

Pelvis - The bowl-shaped bony structure which supports the spine, into which the femurs articulate.

Quadriceps - The large muscle group in the front of the thigh; its principle uses are to flex the hip and extend the knee.

Rotation - Circular movement around an axis; in classical ballet, “turnout.”

Tibia - The large bone in the lower leg, also known as the shin bone.

SAMPLE QUESTIONS

1. What incorrect technique or conditions might contribute to shin splints?
2. Discuss some differences in leg shapes.
3. Explain what structures in the hip are relevant to turnout.
4. What adjustments occur in the hip socket during ronds de jambe exercises, either à terre or en l’air.