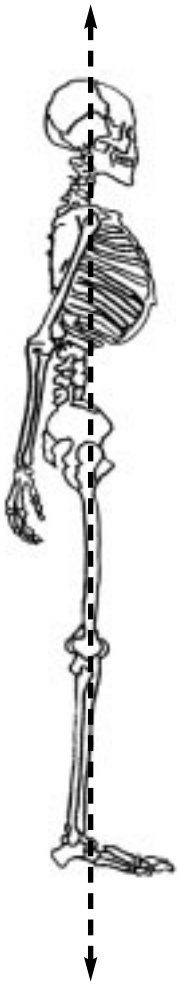
GETTING HIP TO GYMNASTICS

This article discusses the lumbopelvic hip area and will review the anatomy and the functional relationships of the musculature. The article also describes stretches and exercises to address the problems described in the lumbopelvic hip area.

The lumbopelvic hip area consists of the lumbar spine, pelvis, and hip joints. The major muscles include the low back, abdominals, gluteals, and hip flexors. Optimal strength and flexibility are required for all parts to function efficiently and harmoniously in an effort to complete a task. Compensation patterns and faulty movement occur as a result of flexibility deficits and muscle imbalances. This in turn leads to decreased performance and increased risk of injury. The hip flexors, calves, hamstrings and chest muscles are most prone to tightness simply due to the patterns of daily living. For example: sleeping in the fetal position 6-8 hours per night, sitting in school all day, driving, sitting to read, eat, study, etc. Not to mention fatigue and over training. The human body is very adaptable and efficient. When flexibility deficits or muscle imbalances are present, the system cannot operate efficiently. But the body will find a way (compensate) to get the job done. For example; when the hip flexors are tight, the gymnast will not be able to fully extend the hip and will compensate by increasing extension through the low back. Over time this can lead to low back pain and stress fractures.

Many female gymnasts are observed to have an increased curvature of the low back, a pelvis that tilts forward and a lengthened abdominal area. Let's look at the functional relationships of this posture and discuss how this can lead to a myriad of movement/performance problems.

An anteriorly tilted pelvis is usually associated with tight hip flexors, weak abdominals, tight low back muscles, tight hamstrings and weak gluteals. Tight hip flexors will pull the pelvis forward. As a result, the curve in the low back increases which puts increased stress on the joints. This stress coupled with the repetitive back bending and twisting can lead to pain and stress fractures. Also, any time you need to extend through the hip (move the hip forward or the leg backward), the tightness in the hip flexor will not allow it and guess where you will get the extension…that is right, through the low back.



When the pelvis tilts forward it increases tension in the hamstrings by causing them to lengthen. This creates a higher risk of hamstring strains and contributes to weakness/decreased control of the abdominals. Ultimately leading to poor trunk control.

An interesting neurological phenomenon occurs as a result of muscle tightness. It is called reciprocal inhibition. Simply stated, it means that if a major muscle is tight it will inhibit the muscle that opposes it. In our example, when the hip flexor is tight it will limit the gluteus maximus muscles function. That would mean the gluteals ability to powerfully extend the hip (take off, jumping), absorb shock upon landing, and control motion of the entire lower extremity, especially rotation would be diminished. You can imagine the performance and injury risks this poses to the athlete. Tightness in the low back will inhibit the deep abdominal muscles that are important for trunk and lumbar stability.

So, not only does tightness lead to compensation but also interferes with strength. For example, when doing a split leap, the front leg is at risk for a hamstring strain because it is tight from the anteriorly tilted pelvis and it will be very difficult to get the fully extended position of the back leg/hip due to tightness of the hip flexor.

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Additionally, the gymnasts will have decreased strength to push off the ground to get airborne and the gluteus maximus will not have the strength (reciprocal inhibition from the tight hip flexor) to extend the hip by pulling the leg back. The gymnast will most likely compensate by extending through the low back, not to mention hurry to get her feet back on the ground due to lack of height off the ground from a diminished push off. One more thing, while we are on the subject; tightness in the hip flexor will limit maximum extension of the hip while jumping in which the body will compensate, often by hyper extending the knees thereby leading to patellar tendonitis and knee pain. Keep in mind there are just a few examples relating to the hip/pelvis that can lead to compensation, injury and poor performance.

With proper stretching and strengthening many of the above mentioned problems can be avoided and proper muscle activation and control can be achieved. With gymnastics requiring a combination of flexibility, strength, power and balance/control; it is important to recognize the functional relationships and devise exercise strategies that are effective in optimizing performance and minimizing injury.

Hopefully, this article shows how one tight muscle can lead to a series of compensations and altered muscle firing patterns that effect strength and control around the hip/pelvis area.

Now we will focus on a few flexibility and muscle activation exercises to address the problems identified above.

Initially, once a muscle tightness is identified it should be stretched utilizing the "traditional" static stretches. Paying close attention to posture and form to ensure the appropriate area is being stretched. Unfortunately this is the only way many continue to stretch. The next step should be to incorporate dynamic multi plane flexibility exercises. Knowing that gymnastics requires dynamic movement in all three planes of motion simultaneously, a question to ask is why do we only do static stretching that is isolated to one plane of motion? Yes, it can increase flexibility, but is it the best way to improve, maintain and carry over flexibility to performance? Maybe not.

What we will present here are a few examples of how to stretch muscles dynamically in all three planes of motion to better prepare a muscle to move in those planes and complete a skill such a back hand spring without unwanted compensations that could lead to injury. The benefits of dynamic stretching include increased neurophysiologic input to the system which enhances its ability to perform a task or series of tasks and maintain flexibility. This is because the muscle and the joint are getting stimulated similarly to the activity taking into account momentum, gravity and ground reaction forces in three planes. These are the things that turn on and drive the muscles.

Calf Stretch Figure A

Lean forward onto wall keeping back heel on ground until stretch is felt. Arms should be shoulder height or higher. Bring front knee/hip high into flexed position. Rotate body from side to side in controlled manner 20-30 times. Repeat 3-5 sets.

Figure A

Hip Flexor Stretch Figure B

Place front foot on block. Back leg should be straight and turned in. Reach arms high overhead and back. Once stretch is felt in upper thigh/hip, gently side bend (towards forward leg side) and return 20-30 times. Repeat 3-5 sets.

Figure B

(continued on page 8)

Rectus Femoris Stretch Figure C

Place back leg behind on block or chair and position front leg under the body in stable position. Bend front leg to get desired stretch on anterior thigh/hip of back leg. Place arms behind head with body upright or reach up overhead. Gently rotate body from side to side in controlled manner 20-30 times. Repeat 3-5 sets.

Figure C

Transverse Abdominal Activation Exercise Figure D

Lay on back with knees bent. Pull belly button in towards spine (drawing in) and hold 30 seconds. Do 3-5 sets. Use Styrofoam cup over belly button for visual feedback. Should see cup move downward if done correctly. Can add ball squeeze between knees to increase pelvic floor strength/activity. Progress to all fours and tall kneel.

Figure D

Single Leg Balance with Overhead Posterior Reach Figure E

Great for balance, functional abdominal and hip training. Stand on one leg with arms overhead. Push hips forward and try to reach backwards as far as able and return without loss of balance. Can toe touch opposite foot if unable to maintain balance. Watch for excessive arch in low back or pain possibly due to tight hip flexor. Allowing opposite knee to be lifted can decrease stress in low back. Keep in comfortable/controllable range. When mastered can add small weights in hands. 12-15 reps for 3-5 sets.

Figure E

Again, these are just a few examples but hopefully provide an introduction to the concept of dynamic stretching and peak your interest to investigate further.

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