

Out of Kilter - Par 3

by Ian King | Fri, Nov 28, 2003

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In the first two installments of this series, Ian wrote about **postural imbalances** and **back pain**. This time, he'll tackle a problem common to just about anyone who pounds the iron long enough — knee pain.

Small Area, Big Problems

The goal of this article is to reduce the incidence of knee pain. This is both a short term and a long term goal. Not only can knee pain or injury cost you training time, if you look at your elderly parents or grandparents, you'll note that reduced function around the knee is one of the most common mobility limiters as we age.

Put simply, the knee is a very small surface area that takes a lot of load, and we spend most of our day, all of our lives, relying on these surfaces to allow us to move. Mess this joint up and your quality of life changes very fast!

The condition of the soft tissue impacting the knee joint will be the number one factor to control for knee health. Failure to do this increases the rate of damage to the knee. Once the knee is damaged, it impacts the condition of the soft tissue negatively. It makes it harder to contract and fire the muscles around the knee, and the cycle begins all over again.

It's this cycle we must break if we wish to be pain-free. Safeguarding the knee becomes a game of controlling the length and tension of the soft tissue and accelerating the repair of any damaged bone surfaces if needed. This is my simple yet effective approach to preventing and managing knee pain.

If you have knees with no prior trauma, you're well positioned to prevent this vicious cycle from occurring. You'll probably pay more attention to the injury prevention segment of this article. If you have current or previous knee trauma, you'll want to break the cycle, then prevent it from re-setting. Therefore, you'll want to focus on both the injury rehab and injury prevention sections.

In my last article in this series, I spoke of the difference between good and bad pain. Good pain included muscle discomfort during and following training. Bad pain includes joint pain. Joint pain in and around the knee is something you want to avoid, but when it does occur, I aim to teach you how to respond to it. And applying ice is rarely the answer!

Types of Injuries to the Knee

Remember, there are two basic types of injuries: chronic and traumatic. Most knee pain from strength training alone will be chronic. This usually involves some kind of localized inflammation and pain. However, well before this occurs, you can have inhibition of function of the muscles around the knee, which are very important for stabilizing the joint. In fact, the slightest of swelling or subconscious level pain can impair muscle firing around the knee.

If you're using strength training in conjunction with a sport, you may be rehabbing an injury which occurred in that sport, and this may include traumatic injuries, most commonly meniscus or ligament damage.

Levels of Injury

Now, remembering my model of levels of dysfunction from the last article, it's critical that you identify a challenge early on, say in stage one or two. Once it's reached level three and above, you've had it for some time, and therefore the time from identification to full recovery will be longer!

Let's take a look at each level:

- 1) Subconscious pain: At this level you probably won't be aware of any problems, but the effects are beginning to manifest. The slightest swelling or subconscious pain can impair muscle firing around the knee. This places the joint in a dangerous condition, more likely to wear on the surfaces and less stable.
- 2) Conscious pain: At this level you probably are aware of some low level discomfort, but you invariably misdiagnose and ignore it. For example, you may feel one aspect of the knee to be hurting. Let's say the inside (medial) joint line. You may ice it or similarly address the joint surface. This is nice, but particularly in early stages of the discomfort, chances are you'll be addressing the symptom not the cause. I'll teach you how to address the soft tissue which impacts that area as one of your more important strategies.
- 3) Higher level pain: At this stage you're probably out of training or should be out of training, or you're loading up on anti-inflammatories which allows you to train without feeling the pain. But the damage is continuing, as you'll find out when you come off these drugs.
- 4) Immobilization, bed-ridden, long term training interruption: By this stage you're stuffed! If you got this far, it usually means you don't know how to fix it, nor does anyone with whom you're working. At this time you're really going backwards and losing gains.
- 5) Surgery: Surgery is rarely the answer, but the most common solution offered in our injury-based, rehab-skilled but not *prevention-skilled* medical environment.

Examples of Dealing with Knee Injuries — Level 1

At this level, you'll miss the signs unless you're really switched on to your status in various

areas. Here are some cues to guide you:

Expression of power: If you feel one side in a bilateral movement is "down" relative to the other, you could have a problem. For example, in a squat or deadlift, you feel one side isn't firing on all cylinders. This takes experience and/or the observation of a good spotter.

Visual feedback from a spotter: This is a reinforcement of the above. If, for example, when you rise out of the squat, one side of the barbell is lower than the other, you probably have a strength imbalance. The high-bar side is usually the weaker side, as it has shifted part of its load to the weak side.

Connective tissue length: If you detect changes in length, this can serve as a great warning sign. Two ways you can do this—if your range is less than usual, you need to be mindful. Even more importantly, if you find a difference between sides that wasn't there before, take heed!

The tissues that impact most on chronic knee pain are the quads and hip flexors. There are three positions you need to master:

1. Stretch around the knee, mainly a stretch of the quads.
2. Stretch around the hip, mainly a hip flexor stretch and the quad muscles that go over the hip.
3. Stretch the knee and the hip in the one stretch, stretching the double joint muscles and the connective sheaths and nerves (rarely performed but the most impactful of all three stretches.)

Muscle tone: If you can identify areas of tissue that have unusually high muscle tone, no matter how localized they appear, this can inhibit muscle function around that area. Using self-massage or massage by a masseur can help identify these potential problem areas and return the tone to the optimal level.

If you do pick up on this subconscious pain, use the steps I outline below to address the condition.

Examples of Dealing with Knee Injuries — Level 2

At this level you're fully aware of the pain, but may ignore or misinterpret it. You may think, "My knee is a bit sore" and do nothing. Or perhaps you do the easy things like apply ice or take an anti-inflammatory. Both have a role, although ice in my opinion is overused. These things aren't enough in themselves. They're, in many cases, simply masking the symptoms, not addressing the cause.

So what should you do?

1. Identify the cause

Remember the vicious cycle — you've either damaged the joint surfaces or you've impaired function in the muscles that impact the knee. Whichever one you started with, if left alone, it'll impact the other. Knowing which one of these two the knee pain started with is helpful, but second to taking action as soon after the onset of whichever commences first. In other words, if you can identify the problem early, you can head the vicious cycle off at the pass!

For the pain to commence with joint surface damage, you're more likely looking for an impact event, like jumping down off a high object. Secondly, you may have fallen and twisted the leg. Thirdly, you may have been hit by an external object or person—the latter two unlikely to happen in the gym.

If you suspect an impact injury (hit or twisted), I recommend you have an appropriately qualified person assess the joint to determine if the ligaments or meniscus have been damaged. (Hopefully you'll meet with more competence than I did when, in 1982, I was repeatedly told by doctors and physiotherapist I'd strained my ligament and to go away and strengthen the muscles around the knee. Turns out the ACL was no longer connected!)

For the pain to commence with impaired function of the muscles that support the knee, you're looking for either reduced length of the connective tissue or heightened tension in connective tissue. The hip flexor and quads are the single greatest cause of injuries around the knee. The external rotators/lateral abductors and the medial adductors/rotators can also be a cause of knee injuries.

How can you use this information to connect cause and effect? Here's a guide:

- When the hip flexors/quads shorten or tighten, they increase the compression of the patella (knee cap) on the femur (upper thigh bone). They also can pull the tibia and femur closer than ideal, reducing the joint gap. So if the pain is under the kneecap or in the joint, stretching/adjusting the tension in these tissues may help.
- When the external rotators/lateral abductors (in particular the ITB and the glutes) shorten or tighten, they increase the pull on the lateral joint surface and can also override the ability of the VMO to control the tracking of the patella. So if the pain is lateral, medial or under the kneecap, stretching/adjusting the tension in these tissues may help.
- When the internal rotators/medial adductors (in particular the long and short adductors and similar muscles) shorten or tighten, they increase the pull on the medial joint surfaces. So if the pain is medial or under the knee cap, stretching/adjusting the tension in these tissues may help.

2. Treat the cause

If you believe your joint pain is a result of impaired function to the muscles that impact the knee, your treatment should include the following. If you believe it began with damage to the joint, see the "Stabilize the Joint" section below, but respect that chances are the vicious cycle has begun and you may need to apply the following steps to counter changes that have occurred in the surrounding tissue:

A) Lengthen connective tissue. Lengthen connective tissue to optimal length through stretching and other techniques to gain the same result. Here are some examples:

Quad: Lying on your side on the ground, pull your heel to your butt.

Quad/Hip flexor: Kneel on the ground just in front of and facing away from a low bench. Place a rolled up towel under the knee as a cushion. The stretch side leg has the knee bent, knee on the towel, and foot up on the bench behind you. Move your butt towards the stretch side heel. If this is easy, add the pelvic tilt, i.e. suck the top of the pelvis in or backwards, and push the bottom end of the pelvis forward.

Quad/Hip flexor/ITB: Whilst in this pelvic tilt position, take the stretch-side hand up and over the head, and push the stretch side hip laterally away from the centerline of the body. You should feel not only the hip flexor/quad stretch increase, but also a stretch down the outside of the stretch side upper leg (ITB) and from the armpit to the hip on the stretch side (lats).

Hip Flexor: Same kneeling position with back foot on the bench, but take the foot of the non-stretch leg out further away from the bench, put your hands on your head, and lower your pelvis down as low as it can go (your stretch side foot is still up on the bench behind).

Adductors: Sit on the ground. Back up against a wall, soles of feet together, apply gentle pressure to just above the knee joints to take the knees closer to the ground. Here's another: Legs apart and straight, alternate between taking your trunk towards the ground and moving your legs further apart.

Glutes: Lie on your back. Lift one leg, bent at the knee, and take the lower leg across the body. With the same-side hand, push the knee away, and with the opposite hand pull the foot towards the head. Take the foot across to the other hip, holding the ankle with the opposite side hand. With the same side hand, pull the knee across your body towards the opposite shoulder.

Now lift the non-stretching leg up until the stretching leg is pressed up against the bottom of the quads. Take the same side hand through the "d" shape formed by both legs ("through the hole") and the opposite side hand goes down and pulls the non-stretch side leg up towards the chest by holding onto the top of the shin, just below the knee.

B) Lower tissue tone to optimal. This will involve stretching, massage and other modalities including heat. I expand more on some simple heat techniques later in this article.

C) Stabilize the joint. The key stabilizers of the knee include:

- The vastus medialis oblique (VMO), the small teardrop muscle just above the knee on the inside of the thigh.
- The hip flexors, in controlling the swing of the thigh forward.
- The gluteals, in controlling the swing of the thigh backwards.

You can perform specific drills to selectively recruit and train these muscles, then progress to

drills that aren't as isolated and more dynamic to retrain the integration of these muscles into daily human movement. However, if you have a knee injury, don't assume gross strength training movements will adequately recruit and retrain the motor patterns of these stabilizers.

3. Treat the symptom area.

If the injury was initially the result of trauma to the joint surfaces, the following steps should be considered. They should also be considered where the pain may have commenced in the impairment of surrounding tissue, but has been there for a time or to a severity that may have now caused some changes in the joint surface.

A) Apply therapy modalities: Work with therapists to apply modalities from hands-on techniques to ultra-sound, with the intent of reducing inflammation and accelerating joint surface repair.

B) Anti-inflammatories: Where appropriate, consider the use of prescriptive anti-inflammatory agents. My tips here include:

- Use one that doesn't cause you GI disturbance/damage.
- Use for no longer than three to five days in a row, after which most lose their effectiveness anyway.
- Vary the brand/type until you find the one that gets you the best result for that condition.
- Look to minimize their use and wean off them as fast as possible.
- Work with a doctor whose philosophies reflect that he or she is a smart and progressive thinker, not simply a salesperson for a drug company!

C) Regenerative/protective agents: Look to ingest through diet or supplement agents that will accelerate the recovery and protect the joint surfaces. These include but are not limited to:

- Glucosamine: Well established as a slower acting but longer lasting anti-inflammatory and joint surface regenerator. You can use this substance long term with fewer side effects, benefits prescriptive anti-inflammatories don't offer!
- Chondroitin: Some, including Dr. Theosadakis (who wrote the *Arthritis Cure* book) are big fans of this, but the jury is still out in some circles.
- Omega 3's: Gaining support for their role in joint surface protection. T-Mag experts rates 6-9 grams as the minimal amount needed to really see the joint surface benefits.
- Antioxidants: As with omega 3's, my readings lead me to believe you need high dosages of antioxidants to provide optimal protection of the joint surface. Most over-the-counter brands lack the dosage, or in some cases, the truth in labeling vs. what's in the bottle. (Not that this is a rare problem in the food supplement industry!)

- Anabolics: There are anabolics with propensity to act similar to anti-inflammatories and regenerate the joint. They may suffer the same fate as anti-inflammatories in that they may mask the condition, encouraging you to train further and ultimately cause more long-term damage than you realized. If you're going to use these agents, use them in the same way you would use anti-inflammatories—short-term to break through to new plateaus of function.
- GH: There's ongoing discussion on the ability of GH to regenerate specific joint surfaces.

D) Heat and ice: I'm not a big fan of ice in injury rehab of the knee. The greatest challenge in rehabbing the knee is the lack or limited blood flow in the joint surface areas. Why slow it down further with ice?

If the joint is hot, you do need to act because heat and swelling go hand in hand, and swelling will inhibit muscle function. Heat may also increase the rate of osteophyte formation. So you do need to drop the joint temperature, but short-term use anti-inflammatories may be smarter than ice. If the knee isn't hotter (and the quickest way to check is to compare it by hand feel with your other knee, provided it's healthy) yet still needs some rehab, I like to raise the temperature and circulation with the use of knee sleeves.

4. Avoid any activity or loading that reproduces the pain.

This is common sense but that's not too common! Don't just think about what goes on in the gym, but also in everyday life. Are there any occupational or recreational activities that may be contributing to knee pain or slowing down the rehab? It may be as simple as particular activities in your garden, or washing your SUV (climbing up and down from the side-steps).

This may mean avoiding exercises, reducing range and/or load, or a combination of all. For example, I find the leg press and deadlift in many cases less aggravating on the knee than the squat. And for some, the leg extension hurts less than the squat, despite this contradiction of the dominant paradigms of the last decade. You really need to individualize what damages you and what makes you stronger and better.

5. Return the joint position to a healthy state.

This includes negating any negatives developed during the injured period, including joint surface damage. Supplements such as glucosamine, fish oil, and high dose antioxidants have a major role to play here. You need to determine what's optimal length, tension, stability, and joint position/relationship for each of your "at risk" joints so that you can achieve this step or criteria. Good luck with the latter. I haven't found too many who've mastered the relationship between optimal length and tension and joint health.

6. Progressively return to the range, exercise and/or loading you want to be exposed to in order to achieve your goals.

Now it's time to strengthen the movement again. The key word is *progressive*! After all, lack of appropriate progression in loading parameters is one of the greatest contributors to chronic

injuries!

Now this doesn't mean you get to go back to any exercise, full range, any loading, all at once. There may be a progression in which these variables are reintroduced. You'll find your program should change every few weeks. Many small changes result, in time, to a lot of bigger changes.

And be prepared to recognize when you've erred. Stop, backtrack, and regroup. I've found that if you aggravate the knee on any given day, it's shot for the day. It's unlikely to feel better for a day or so. So recognize your error and back off.

7. Understand that an error in decision that results in reproduction of the pain is a setback.

For me, the goal of a rehab program is primarily to avoid reproducing the pain. If I achieve this goal, I've assisted the body's natural healing process. Don't underestimate the seriousness of this step!

Examples of Dealing with Knee Injuries — Level 3 and Above!

As an example, let's deal with what most describe as a "traumatic" knee injury. Cases like this should be rare in the gym, but let's go over what you can do in the event you feel you've done serious damage.

Here's what I suggest you do:

1. Stop the lift or whatever you're doing.
2. Don't place weight on that leg. Sit, lie, or be carried off to bed. Even though this may seem melodramatic, it's better to err on the side of caution.
3. Make arrangements for an appropriately qualified person to assess the condition.
4. Under their guidance, I expect you'd commence a course of anti-inflammatories or similar.
5. Be prepared to go to crutches.
6. From there progressively reduce the reliance on crutches, only as pain allows. In other words, don't do anything that causes reproduction of the pain!
7. Commence the two-pronged treatment of the joint surface and the surrounding connective tissue as discussed above, using options that don't aggravate the injury.
8. Continue to work with the services of appropriately trained and effective physical therapists and medical professionals.
9. Remember, you only have two knees and you'll want them to work for you for quite a

while. Knee replacements aren't a comforting option.

Prevention of Knee Injury

Now, finally to where I wanted to be—focused on prevention, not rehabilitation! Below are my top keys to preventing knee injury.

1) Maintain optimal length in the hip flexors and other muscles around the hip. In addition to determining what's optimal for you, there's the second issue of maintaining the length and tension bilaterally. So whilst looking for the answer of what's optimal in absolute terms, focus on keeping them similar (relative) right to left. This also means you need to learn how to stretch effectively. Those who discard this advice will pay the price, not a matter of *if* but *when*.

2) Maintain optimal tension in the hip flexors and other muscles around the hip. Stretching can achieve varied degrees of tension reduction in different muscles, but in the ideal world needs to be complemented with massage and similar techniques. The ITB is an example of a muscle that you rely more on massage than stretching to achieve optimal tension.

3) Maintain optimal stability in the VMO and gluteals. Whilst these aren't the only knee stabilizers, they may be the most important two. There are ways to determine if you have adequate ability to selectively recruit these. In fact, I teach upper body and lower body drills to be conducted regularly to ensure the ability to stabilize key injury-prone joints.

4) Balance your lower body training between hip dominant and quad dominant exercises. For every quad dominant exercise, have an equal and opposite hip dominant exercise, alternate the sequencing of them. (Don't always lead with quad dominant exercises.) This point was relative for the lower back, and is also relative for the knee. Dominating in quad dominant exercise results in excessively short and tight hip flexors and quads, which plays absolute havoc on the knee joint!

5) Be progressive in loading. Understand also that you need phases of sub-maximal loading to teach recruitment, alternated with more loaded phases.

6) Review your posture — lying, seated and standing! You train for one to two hours a day, every second day, yet you lie for an average of eight hours, sit for some two to six hours a day, and stand for the rest. Standing, sitting, or lying with externally rotated legs shortens the ITB, which negatively impacts on the knee function and may cause or contribute to knee pain. This is just one tip in the area of posture.

7) Consume joint regenerating nutrients. Ensure your diet and supplements include glucosamine, Omega 3's, and high dose antioxidants minimally.

8) Warm the joint up before each lower body workout. Use the stationary bike or similar for 15 to 20 minutes of light to medium load to raise the body temperature and knee joint temperature before each lower body workout. Follow that by stretching to ensure that when you load, you have optimal joint relationships and that the optimal tension gained from

stretching enhances function.

(Yes, I know, this is a different approach than the latest scare tactics used by those who influence opinions, *until* they finally master the concept of stretching themselves. Then it will be branded as a good thing to do!)

9) Wear knee sleeves before and during the warm-up and workout. This will increase the joint temperature and maintain it during periods of rest/lower level activity during the training session proper. I can't fathom those who don't heed this advice!

10) Consider the psychosomatic possibilities. Keep an open mind and note any possible psychosomatic connections. To guide you here, I suggest books by Louise Hay, Brandon Bays, and Deepak Chopra.

11) Keep doing the above things even after the pain goes! It's so common to see a person cease his injury prevention/management techniques as soon as he thinks all is okay, only to see himself right back where he started. Don't drop your guard! Keep some or all of these going *all* the time!

Conclusion

I know there's a lot of information here. Keep it minimalist by doing this: if you have a clean bill of knee health, just focus on the prevention tips. If you have a history of knee pain, I assume you'll be committed to mastering the rehab guidelines as well as the prevention tips. If not, I simply conclude you have an attachment to having knee pain and I wouldn't want to get in the way of a happy relationship!

Remember this, I tell you things that many won't or can't. Years later you'll recognize the wisdom of my advice. I take no delight when individuals say years later, "You were right; I should've listened to you." Don't be one of these.

And what qualifies me to provide these guidelines? In addition to professional experiences, I've made many mistakes in relation to personal knee rehab, in part because of the lack of information on this topic when I needed it. You can learn from my lessons, if you want. The cost of humility will be far less than the cost of your own lessons!