Functional Ankle Assessment

eBook by Chris Newton
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Introduction

The foot and ankle make up a complex area with many joints that require good mobility. But more and more people present in therapy clinics around the globe with injuries that can stem from poor use of these joints.

The medial arch of the foot gets by far the most attention in the press, with an array of sports shoes and off-the-shelf or custom orthotics offering support to raise this arch. These keeps the fire of debate well fuelled between the ‘foot up’ therapists and the ‘hip down’ therapists, with their differing of opinions towards the aetiology of pronation.

Whatever your belief, the reaction in the body remains the same. Pronation in the foot, causes eversion in the subtalar, causes a valgus knee, causes medial rotation of the femur, causes anterior tilt of the ilium, causes lordotic stress at the low back etc. Implement motion and the higher forces further grow that list as the body shifts around to maintain movement. And don’t just think this applies to Joe Bloggs off the street, top level athletes show the same traits.
Supination, on the other hand (or foot!), is far less common and often goes with varus knees (or bow legs). This does usually need orthotics to resolve but you’d be wise to check for any lateral rotator tightness.

A functional assessment goes a long way to learning how the client uses their foot and ankle. Think of it like this - If we use an orthotic to stack everybody up with better joint alignment, yet muscular strength and motor control patterns are dominant in the valgus knee position, we’ve now removed anywhere for the valgus forces to go. Now in milder cases this isn’t a problem as the nervous system usually adjusts to the new joint position, but in more extreme cases, you’ve just blocked motion and will cause more problems elsewhere (especially the knee).

**So What Do We Look For in a Functional Assessment of The Ankle?**

As with many assessments we can look at the ankle with and without motion. Without motion allows us to look at how the client stands and sits, which is a very important initial assessment. Static posture can be thought of as the position from which movement begins and ends. If the client sits with the lower legs externally rotated and the Subtalar everted, then you can guarantee their knees will knock together as they stand up again. Many chronic SIJ issues can be fixed simply by correcting this movement pattern.

In motion, we need to look at how the ankle responds as the body moves across the foot. We can also look at when this occurs during the movement. For example, if somebody stands with a neutral ankle but pronates as they squat past 45 degrees of knee flexion, we may want to look at the hip, knee or ankle to see if restriction in one or more of these areas is causing the reaction as the body tries to get round the blockage.

Functional assessment should be simple! Full gait analysis is so complex and so difficult to read that slow motion cameras are needed to look at movement frame by frame. And let’s face it, most clinics don’t have a full gait analysis suite kicking around. Therefore we need to make functional screens simple so it is obvious to us where the patterns break down. To do this we challenge the body with everyday movements, starting local to the ankle and progressing more globally to the whole body. The more global however, the more difficult they are to read.
Mobility or Motion Control?

I like to do a full ROM assessment before checking any movements because restriction in tissues is the number one cause of poor movement choice. You need about 30 degrees of dorsiflexion to squat or run with any efficiency. If a client has no dorsiflexion available they will have to deviate in some way. This usually involves turning the feet out so they can roll over their heels to allow the knees to track forwards.

When somebody presents with full ROM in all their joints, yet they still pronate, then motor control needs to be worked on. They’ll need to learn how to maintain alignment in static and dynamic postures.

By completing a ROM assessment on your client, the bells can start ringing before you make your functional assessments and you’ll have a better idea of what to look for. Is that knee restricting flexion and migrating valgus or are they losing control over it because they’re too loose? Your ROM should give some basic clues.

Standing and Seated Assessments

How is your client standing or sitting? This gives us the first clues into how they use their body for movement. I mentioned above that this static posture is the position from which we begin and end movement. If the client is standing or sitting still with pronated feet then it is highly likely that they finished were in pronation as they
finished their movement. I personally have never seen a client move through their ankle in neutral until they finish the motion, then relax into pronation. Take a look at where the feet are pointing in relation to the knees. Sometimes the feet point straight whilst the knees point medially. Sometimes the knees point straight and the feet turn laterally. When the feet are turned out, this could be a sign that there is a limit to dorsiflexion so we roll over the heel. If the feet are straight but the knees are together, then there could possibly be poor motor control but adequate dorsiflexion. With the ROM assessment you can start piecing this together.

Functional Screening Assessments

The Feeling Foot - Sitting and Standing

This assessment looks to see if a client can learn the motion required to maintain a neutral ankle. The motion requires the client to externally rotated the Tibia. As the Tibia rotates, Tibialis Posterior engages and lifts the hind foot into the correct alignment. The ability to quickly pick up this movement shows a high level of motor control in the client. Many people just can’t find what it is you are asking them to do, so motor control exercises may be indicated to gain better awareness of the foot.

I begin with this exercise because I’ll be asking the client to find neutral before and during their home exercises. If we can’t find neutral in the first place the client will
likely cheat the movements I’m asking them to do at home. Therefore their first home exercise would be to gain some motor control.

To do this exercise, sit on a chair with the ankle relaxed into pronation. With one hand palpate the fibular head and with the other feel for the dimples just anterior to both malleoli. These dimples should feel the same depth but in pronation the medial one will feel much more shallow. The trick now is to find a way to rotate your tibia, using your muscular strength, so the arches raise. Ideally you don’t want to see the Tibialis Anterior tendon popping out or the head of the first metatarsal and hallux come off the floor. This would show that the client is just supinating the foot, rather than correctly aligning the joints whilst keeping the balls of the foot relaxed and in touch with the ground. The foot should be able to remain relaxed whilst the arches are raised by muscles further up the leg.

This is a challenging coordination exercise for many people, and some can’t find a way to perform the movement. In those cases I stand the client up, place them into a neutral ankle by externally rotating the lower leg, and have them stand their holding this for a while. After just a few seconds, the muscles working to hold this position will start to ache, giving the client the proprioceptive input needed to contract these muscles by themselves. When they master standing I’ll go through the same process for sitting, which will they tend to find more quickly now.

Once we have the client accessing a neutral ankle without help, we can then move on to more challenging home exercises that require them to hold this neutral position during motion.

Knee to Wall Test
This is an adaptation of the classic ROM assessment for the ankle. Rather than looking purely at how far they can reach we use this test to look at how far they can reach before the ankle slips into pronation or supination.

Firstly I ask the client to perform the exercise without any major instructions. This way I see their natural movement. Then I place their ankle into neutral and ask them to hold this whilst they reach the knee forwards. The point at which they lose neutral is the point at which mobility or control have reached threshold. They can then work on this motion up to that point, attempting to increase the distance over time.

What to look out for:
Watch how they address the exercise with limited instruction.
• Do they point the foot directly at the wall or is it slightly laterally rotated?
• Does the knee touch the wall in front of the toes or are they touching somewhere inside of this?
• Do they start in pronation or do they pronate during the movement?
• How quickly does the heel lift?

Now give them instruction to keep the ankle in neutral.
• How well do they hold this position as they reach the knee forward?
• Do they lift the heel sooner than they did before?

These give you all the major pieces of information you need to know to see how the ankle reacts to forward motion of the knee. Any fault here is likely to show up in gait and squatting activities so you’ll pick up much of what you need to know.

The test can then become the exercise. The client just works on holding neutral as they reach the wall. Over time they attempt to reach further whilst keeping good form. If mobility is the issue you just need to get them stretching.
Physio Lunge - Modified Split Squat

This test progresses on from the last because a greater degree of balance and body weight is involved. It can be done as either a split squat or a lunge, so start with the split squat then progress up to the greater ‘Ground Reactions Forces’ that a lunge develops.

Unlike any other split squat or lunge, the idea here is to allow the knee to move forwards over the toes, as if touching the wall like in the last test. You do this by driving the arms forward and keeping the torso at a similar angle to the lower leg. This puts 70% of your body weight over the front leg and makes the ankle work harder.

What to look out for:
Watch how they address the exercise with limited instruction.
• What angle are the feet at? Are they both pointing forwards or are they turned out?
• How does the knee track compared to the direction the foot is pointing?
• Does the knee drop inwards? Does the ankle pronate? Does the hip excessively abduct on the involved side? And does the contralateral hip drop?
• Does the heel lift up so they end up on their toes?
• Do the toes excessively grip the floor, trying to stabilise the movement?

Now give them instruction to keep the ankle in neutral.
• What happens to the movement now you’ve corrected it?
• Does the heel raise sooner?
• Can they maintain neutral at all?
Again, this test shows what would happen to the ankle when placed under a greater degree of stress like in running. Introducing the lunge version if they pass the split squat brings Ground Reaction Forces into play. These forces amplify as motion speeds up but the reaction at the ankle, knee and hip also gets more difficult to see. However, any issues here are bound to increase in running gait so theirs limited need for a full gait analysis.

The Box Squat

The box squat is a movement that gets performed many times a day by even the laziest of couch potatoes. You box squat to sit into chairs, to get into bed and to sit on the toilet every day. I think it comes a close second to walking as the most primal movement we make.

When the knees knock together we reduce force production through the SIJ because the G’max doesn’t fire. I’ve seen clients line themselves up with nice straight feet then have no idea how they are going to sit down. I mean know idea! The change in foot position throws off their motor engram to such an extent that their brain doesn’t even recognise the movement anymore. So if this isn’t at the top of your list of important assessments then you’re missing a big part of client movement.

What to look out for:
Watch how they address the exercise with limited instruction. I usually do this when they sit down to chat to me at the start of their session, then again as they get back up.
• Do they turn their feet out to sit down?
• Do their knees knock
• Do they lean forwards excessively?
• Do they drop the last few inches into the chair?
• Do they have to put their hand on the chair to aid themselves down?

Now straighten their feet and place the knees over the feet. Ask them to hold this alignment and stand up. What happened?
• Did they get a little stuck?
• Did they lean further forwards to compensate for the lack of stability or ROM in their Achilles?
• Did they turn their feet back out after you aligned them straight?

If the client has poor dorsiflexion the knees can’t come forwards far enough. Most people need to get their knee in line with the tips of their toes so they can get over their centre of mass. If the knees can’t get that far forwards then they will need to drive through the back of the heel, which will make them fall backwards as they stand up. To compensate for that the torso gets thrown right forwards to shift their centre of mass more anterior. The other option is to turn their feet out so that the knees can roll forwards without the feet getting in the way. They then roll over the heel into pronation. Years of doing this drives a strong motor program into the client which is hard to break, and you will never break it before ROM is restored to allow correct motion.

Others simply just don’t activate their glutes as they sit down or stand up, even though they have plenty of dorsiflexion. It’s much quicker to deal with these clients because you just need to get them working on improving the movement.

**Exercises to Correct.**

There’s a simple rule in corrective exercise that goes like this:

**Flexibility** before **Stability** before **Strength** before **Power.**

You need to clear the client of each ability in this order. If theirs is a flexibility issue then stability can’t be fully addressed. The box squat ROM issue we spoke about earlier is a perfect example of this. So if the client shows signs of inadequate flexibility then start there. That doesn’t necessarily mean ankle ROM though. The following video shows how the ankle reacts to restrictions at other joints. You’ll see
how pronation occurs if a client has limited hip flexion. Click the video below to watch what happens.

[Image]

So begin with stretching to whatever area you feel is creating deviation in the ankle then re-test the screen when things improve.

If the client has no flexibility issues, they are likely to be displaying poor control over their joints. Stabilising the ankle in neutral comes from slightly externally rotating the femur. That’s why so many movement specialists are hip down people rather than foot up. By engaging the hip external rotators, and externally rotating the femur, the arches naturally lift and the subtalar sits more squarely under the tibia. All your muscles are now in their optimal position so they can now become more active.

This is why the classic towel scrunching exercise doesn’t work for people with reduced arches. If the muscles are all in a lengthened position, as they are in pronation, then you are asking a muscle to work at a mechanical disadvantage. If you place the femur into external rotation, enough to lift the arches and maintain neutral, all the muscles are at a mechanical advantage and the towel scrunch exercise then becomes achievable.

Start by holding posture in both sitting and standing so that the client gets used to the feeling of this position and the muscles will begin to strengthen up to hold it.
Once the client can achieve neutral ankles on their own we then need to introduce motion. Start simple with movements like stepping forwards and backwards, then progress this through multiple directions.

Box squats can be used to improve squatting into a chair. I like to place a belt around the knees and have the client press out into it as they sit down. They may need some support from a door frame or a broom stick at first but you should slowly reduce their need for support until they can perform without aids. Then remove the belt and practice the movement without it. Again, they may need to return to a supported environment for a short while until they perfect sitting. I have clients perform a ‘knees out’ squat every time they sit in a chair and stand up again. If they forget, they are to stand back up (correctly) and repeat with proper form. This not only has them exercising throughout the day but it also gets their brain rewiring the neural pathways that govern this movement.

Split squats and lunges can be done in a similar way. First have the client learn to go through the movement keeping the ankle in neutral. Again, give support from a wall, door frame or broom stick to make the task easier to master.

I then like to use a theraband that pulls the knee medially whilst performing the split squat or lunge. They are then to abduct the knee until they reach a neutral ankle then perform the exercise. This really works the hip muscles and teaches the nervous system how to activate these muscles correctly. Placing the theraband to pull the knee laterally, inducing the adductors, also helps to create stability in the hip. The client now has to learn to stabilise against over compensation into supination.

**Case Study**

Client A presented in the clinic with recent pain in the right navicular region and chronic lower back pain (3yrs). When she sat down for the history taking it was noticed that she pronated heavily in both feet and the knees were pressed together. Testing her ROM she was hyper-mobile except for a hypo-mobile right SIJ. This leg presented 10mm shorter than the left. The sacrum was in a L on R torsion and the right ilium posteriorly rotated. Right hip flexor and piriformis both test weak in manual muscle testing.

She stands with the feet in pronation and slight valgus knees. She has a positive knee to wall test because she couldn’t maintain any degree on neutrality when manually placed into a good position.
Physio lunge was positive in the split squat version so the lunge version was not tested.

Box squat was already positive when noticed at the start of the session, so when retested specifically she could just about sit down without the knees knocking but the ankles could not be maintained in neutral.

The SIJ issues were resolved through manual therapy and she was initially sent home with exercises to stabilise this. At the same time we began educating her to hold a neutral ankle in sitting and standing.

Once the client’s SIJ remained stable between sessions we progressed to more strength based exercises.

A copy of the exercises performed by the client over stages 1 and 2 can be seen with the links below. In this case, these were all that were needed for the client to remain pain free. The client went home having been instructed in good form, but this was reinforced with access to these videos through their own private login, so that the client could remember the exercises correctly.

You can view what we did using these logindetails:

www.exercise-lab.com/login
email: casestudy@exercise-lab.com
Password: password

Conclusions

Using functional movements, to assess how the ankle is responding to motion, shows up the degree of stress placed upon these joints as we go about our daily movement. Many clients won’t be able to tell you of a particular incident that started their pain but through these assessment techniques we can see where repetitive strain may occur.

Functional assessments should be as simple as you can make them, then increase in their complexity to find the point at which the client fails to keep good form. By making them simple you also make the assessment easier to read.
Please log in to view the exercises we gave Client A. The use of videos to educate your clients when at home, is a great tool for any therapist. We spend years studying the body and how it moves, but our clients often have very limited body awareness. Whilst remembering exercises can be easy when you know how the body works, and why you’re doing the exercise, for the lay person it can be overwhelming and impossible to remember once they leave your clinic door. Home exercise videos bridge this gap and allow the client to do their exercises safely at home with good form.

We hope you enjoyed this eBook and find it possible to put into practice the information in these pages. ExerciseLab however offers several courses designed to teach therapists Movement Screening, Muscle Testing and Home Exercise techniques. Please click here for more details of our upcoming courses.

You are very welcome to a free month trial of the ExerciseLab library. Our members benefit from a growing database of home care exercises, which are designed with client interaction in mind. Your clients will never forget to do or how to do their stretches and exercises again. We also produce lots of CPD worthy educational content that members get for free, so you can clock up some extra points throughout the year in the comfort of your home.