How to wear a harness

I treat many climbers who suffer from thoracic pain – they are not getting this pain from falling into harnesses and it is quite unusual in the normal population so how are they getting it?
This is an addendum to the article I wrote in 2011 where I stated that to avoid back pain then you should:

“Wear your harness correctly – your waist belt is designed to provide support to your lumbar region in the event of the harness being weighted. Wearing it too low (as is often the case) will put excessive strain through QL.”

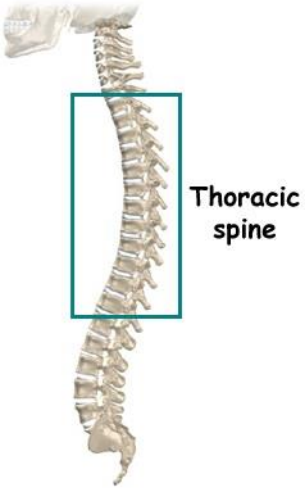
Having asked around and done some ‘on the job’ research I have decided to change my advice in the case of thoracic pain for mountaineering instructors – to be specific, if you spend most of your days in the mountains with gear on your harness and a rucksack on your back and you have pain on the upper part of your spine then this article is for you.

Fig 1. Harness and rucksac below the waist line

Fig 2. Note high position of rucksac straps

My advice is now to wear your harness just above your pelvis (Fig 1) and below your waist as opposed to around your waist (Fig 2). Even if you have already developed back pain – this may well aid your recovery.
Please see a physiotherapist if you have any questions.

My reasoning?



The thoracic spine consists of 12 vertebrae, each with a rib attached and as you can see from Fig 3 the inherent shape of the vertebrae means that it rotates well and bends forward well. The position of the spinous process ensures that an extension movement in the thoracic region is not as well accommodated. Most extension occurs at the lumber region.

Ordinarily the role of the harness is to catch a falling climber and transmit the shock load through the body in a way that causes as little trauma as possible. A high waist loop ensures that the majority of the force is taken by the legs and that inversion is avoided. By pulling high on the lumber region there is little danger of the climber's spine being forced into extension suddenly. The thoracic spine by its very design resists extension and in this situation is less prone to extension and therefore injury whereas the lumber spine extends very easily but is relatively weak in this direction.

For the instructor the harness serves a different purpose. We are not expecting to fall off and we all are generally working well within our comfort zone – we are, you might say quite relaxed. As well as this we may be wearing a rucksack adding between 5 and 10 kg to our upper spine (a working sac with 1st aid kit, spare jacket and butties) however we may have the heavy stuff around our waists. We often spend a lot of time hanging in our harnesses; sometimes just partial weight, as on a stance or sometimes full weight as in jugging up a rope. Add to this the work rate required, let's say short roping with full mountain kit, 2 nervous clients and a taut rope whilst moving and providing support. There is an awful lot of force at both ends going from your feet and hands into your spine.

The support from your spine should be seen as a continuum from:

- The muscles crossing the pelvis to the legs i.e. psoas.
- The muscles from the pelvis to the spine i.e. quadratus lumborum

Through the spinal muscles such as:

- Spinalis muscles and multifidus

All the way to the muscles that originate at the spine and insert elsewhere such as:

- Trapezius and latissimus dorsi

Which transmit this force through other muscles to the arms i.e.

- Biceps and triceps

If you remove one element of that continuum then you apply a greater force through the surrounding areas as they take up the slack. As well as this the strong, superficial muscles (see previous article) also often transmit forces which bypass the core, stabilising muscles – the classic being the latissimus dorsi. By wearing your harness around your waist I contend that we 'switch off' some core stabilising muscles and in particular the quadratus lumborum. QL supports the thorax directly from the bottom rib and also by supporting the lumbar spine it gives a stable base to work from. If this support becomes reduced then muscles such as latissimus dorsi would be more active and could contribute to forces through the body which cause problems and pain. As well as this, by having the harness high we also limit the effective range of the back and need to provide more flexion (bending forward), extension (bending backwards – or more likely maintain a straight but

firmly fixed posture) and rotation through a smaller amount of spine – i.e. 12 vertebrae as opposed to the usual 17.
Again, this would require a greater movement from the vertebrae that were being activated which could easily cause problems.

By wearing the harness lower we move more naturally employing the full length and range of movement of the spine. We also tap into those gross movement patterns which we have developed and trigger muscle activation in the correct order and, importantly the feedback we are receiving from our joints (proprioception) is normal which allows us to more correctly gauge the forces we are working with. Imagine a harness is like an ankle support that you wore for too long – a great idea until you come to remove it then you have a correspondingly weaker ankle.

I have found the harness in this position to be effective and have chatted to a few other mountain professionals who concur and I think, on balance it is fairly normal for the harness to move to this position throughout the day. However I must stress though that if you are climbing and there is a danger of you falling off then the harness should be around the waist as per the manufacturers recommendations.

Danny John Brown
A physiotherapist and instructor based in Bristol.
dannybrownphysio.com