FOOT FOR THOUGHT

Why rowers should learn to love their feet

WORDS Dr. MEGHAN HESTER

Rowers come in all shapes and sizes. One aspect of this is that the anatomy of our lower limbs varies greatly. Some of us have incredibly long femurs (thigh bones), some have terrible ankle flexibility and some even have one leg longer than the other. This makes for an interesting challenge when trying to get individuals moving in the same way together. →

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We must especially recognise and appreciate the role the feet play in setting up the entire lower limb for the stroke. Podiatrists, osteos and coaches with a keen eye can identify and make small adjustments to the individual that include working out a weakness or restriction, changing equipment or implementing ergogenic aids. These adjustments can influence mechanics further up the chain, improving overall rowing efficiency and the synchrony of teammates. However, if the adjustments are done incorrectly, it can hamper performance and contribute to injury risk.

By observing advances in technology and performance in other sports such as running, we can understand why foot mechanics are so important and relate these concepts to the rowing stroke. For example, one of the primary components of a gait or running analysis is to examine the way in which the athlete’s foot contacts the ground. This is called the foot strike. It can be categorised as a “forefoot strike” if the athlete lands on their toes, a “midfoot strike” if they land on the balls of their feet or a “rearfoot strike” if the heels land first. The same motion can be observed when a rower first pushes on the footplate at the beginning of the drive.

Some rowers arrive at the catch with their heels raised off the footplate and initiate the drive through forefoot or midfoot first followed by heel contact. Enabling the heels to come off the foot stretcher at this point allows the rower to achieve greater compression at the catch and thereby increase stroke length. Sometimes this style is adopted as compensation for a lack of hip or ankle flexibility but it can also present when an athlete’s footplate is too low or the foot-stretcher angle is too flat for them. In many cases, even with greater stroke length, this style is not necessarily translated to greater speeds if the athlete cannot maintain a strong posture and utilise their large muscle groups. It is deemed an ineffective length when the rower begins to round the shoulders, over-reach and collapse in the core at this point.

By contrast, some athletes who have good ankle mobility and good posture can achieve full slide compression at the catch by only slightly raising the heel, or even not raising it all. This means they can more easily drive through their heels earlier in the stroke. This strategy often aids foot forces to be directed in a horizontal fashion, which is essentially – after all – the direction in which we want the boat to be travelling.

Both styles have pros and cons in terms of power output, length of stroke and direction of the foot forces (horizontal vs vertical). However, the extremes of toes-first rowing can involve technical, performance-hampering signs (signs of increased vertical foot forces) including moving shins beyond vertical, burying the blade deep and →

engaging the shoulders before, or in preference to, the lower trunk. In this case, the heels-first or heels-down method could be used to help cue the athlete to have a flatter drive. Conversely, if the athlete shows signs of cutting the stroke short at the catch, is unable to rock over from the hips or their blade is washing out at the finish due to an extended sit-back, the toes-first method or lowering the foot stretcher could be applied.

To take another perspective, we can learn how grounding and driving through the feet is as critical in rowing as it is in the sport of weightlifting. The motor pattern of rowing is very similar to that of weightlifting in that it requires full-body coordinated muscle contraction in a closed-chain environment under load. However, just imagine trying to perform a leg press or a back squat while only pressing through the toes of the feet. The result would be a movement that lacked power, shifted the athlete's centre of gravity away from the base of support and over-taxed smaller muscle groups in shins and calves.

If you want a more extreme example of toes-only foot contact, think about walking in a pair of high heels. Due to the reduced surface area contact of our feet with the ground, walking is infinitely more taxing on the smaller muscle groups of our legs, we are much less stable and the mechanics of our low back and pelvis become compromised. The concept of not having enough surface area contact with our feet whether it be rowing, weightlifting or walking in heels is worth considering for its effects on stability and injury risk. When our feet are grounded and the load spread across a broad contact area the window of opportunity for reactive and compensatory movements is minimised. We also maximise power transference. This is especially important because the footplate is one of only three points of union between the rower and the vessel alongside the seat and handle. By losing contact with any one of these three contact points we essentially break the link in the chain, which means the rowers' energy is being spent and not contributing to the speed of the boat – what a waste!

In conjunction with maintaining foot stretcher contact through the finish, having the ability to adequately extend the knees and anteriorly rotate the pelvis is essential in rowing. Studies suggest these two sequences are better achieved by elite rowers than novice rowers and that potentially explains why raising the foot stretcher height for some athletes (whether it be in the boat or on the ergometer) can increase their horizontal foot forces and net power output while for other athletes it does not. It's conceivable then, that boating equipment changes need to be made with regard to the athletes' current strength. Flexibility levels can be adapted as the athlete gets stronger and more able to achieve and maintain these body sequences under fatigue (as elite rowers can).

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While rowing can appear highly symmetrical there is evidence of asymmetry in the lower limbs at all levels, whether in the feet, knees or hips. In order to maximise performance and reduce injury risk we should screen for these asymmetries and work on stable bilateral muscle contraction through the drive. Starting from the feet we can assess the general mobility of each ankle and compare. Ankle dorsiflexion range motion is the movement of the ankle so that the angle between the top of the foot and the shin decreases. A lack of this can be worked on with some simple calf stretching, rolling out the plantar fascia (bottom of the foot) and concentrating on driving equally through both feet in the boat.

Lacking ankle dorsiflexion may disrupt the athlete's ability to compress at the catch as well as making early heel contact with the foot stretcher in the drive phase. Differing ankle mobility may also be a predictor for foot force discrepancies which, when well-established may be picked up by the coach when the athlete has developed a compensatory lateral lean or spinal rotation. Unfortunately because the feet are difficult, if not impossible for the coach to monitor while in the boat, these athletes can be looked at more closely on an ergometer or using an instrumented foot stretcher system as BAT Logic has for many years. Real-time feedback on foot force curves can help discovery of the best setup.

Quite often in rowing we see a functional leg length discrepancy. This means one leg is "functionally" longer than the other due to muscle strength and flexibility imbalances that have developed over time. These issues cause all sorts of stresses and strains on one side of the body as compared to the other and should be picked up and corrected before athletes continue to train with dysfunctional, asymmetrical motor movement patterns. Examples of compensatory technical errors that can be picked-up on are; a lean to one side of the boat, a lag in foot and therefore gluteal connection on one side of the body and other pelvic and spinal rotations and curvatures. The increased torsional and asymmetrical forces throughout the body often lead to injury and in crew boats can disrupt the technique and symmetry of fellow rowers.

A significant structural or "true" leg length discrepancy is far less common in the population and in rowers. A "true" one refers to having anatomically different length legs due to an individual's bone and joint structure. These cases potentially require an ergogenic aid such as a BAT Logic CustomPack shim or heel lift to help re-align the legs and pelvis. On the other hand, with functional differences priority should be given to strength and range of motion testing of the likes of the hips, pelvis, ankles, quadriceps, glutes and hamstrings to identify areas of weakness and restriction. From here, rehab, strength training, muscle activation and re-learning correct motor patterns and sequences with the help of health professionals and coaches can certainly help correct the discrepancy.

In sum, please don't forget to give the feet some thought. You might be surprised at how great the difference is that it makes. **ROW360**

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