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In sports medicine, the role of the podiatrist is to provide a detailed assessment and sports-specific management approach. Podiatric biomechanics and gait analysis podiatrists offer a unique and valued specialist perspective in sport relating to foot, ankle and lower limb function.

Athletes are uniquely driven, and relatively small asymmetries and imbalances can have a profound effect on their ability to perform. In the field of imaging, ultrasound has allowed podiatrists to greatly enhance their anatomical and diagnostic skills; this is invaluable in diagnosing and treating many types of sports injury. Our ability to assess patients objectively and scientifically using a wealth of quantitative apparatus should be embraced.

A sports podiatrist should have a thorough understanding of the nuances of a specific sport and how injuries develop. Few patients are biomechanically perfect, and it is therefore important to establish whether gait information obtained from kinetic (force) and kinematic (motion analysis) data is relevant to their complaint. A good understanding of sports-specific equipment, especially footwear, is important. Diagnostic ultrasound is invaluable in confirming the diagnosis and allows for more accurate injections and minimally invasive surgery.

There is little doubt that a major part of our sporting success can be attributed to the use of technology. Its evolution over the last 25 years has been nothing short of astounding. When we started the business, our gait analysis room consisted of a treadmill with an analogue video camera and a TV. Eventually we invested in an F-Scan pressure system, which signified a huge step forward by providing athletes and their medical teams with an objective assessment of their foot function. Furthermore, we were able to objectively assess the effects of orthoses and shoes, and this made an impression on many of the professional athletes, doctors, physiotherapists and sports clubs who consulted us.

The greatest advancement within the centre has been the Vicon 3D motion capture system. The objective nature of

Ron McCulloch, Director of the London Podiatry Centre, which has treated hundreds of athletes over 25 years, discusses the use of technology in sports podiatry.

CHAMPIONS OF TECHNOLOGY



LEFT: Gait analysis offers a unique perspective on lower limb function
BELOW: The Vicon 3D system is invaluable in treating sports injuries

the tests has proved invaluable in sports injuries as well as complex injury management and medico-legal work where we have produced numerous expert witness reports for the legal profession.

The value of diagnostic ultrasound in sports medicine cannot be understated, and there are very few conditions and injuries of the foot and ankle that cannot be diagnosed with this imaging modality. In the US, diagnostic ultrasound has grown in podiatry more than in any other profession. Similarly, the UK has seen an increase in the number of practitioners using this technology, which is reflected by the number of courses available for podiatrists. The author lectures on this subject on a postgraduate ultrasound course at Bournemouth University and believes future podiatrists who fail to use ultrasound as part of their diagnostic repertoire will place themselves at a significant clinical disadvantage.

Why is technology not more universally adopted?

Some podiatrists choose not to invest in ultrasound and gait analysis technologies. The reasons for this may include cost, and cynicism over whether such technology will ultimately change the treatment approach. In gait analysis, some erroneously believe that observational skills are somehow comparable to the data that can be obtained from a modern gait facility. Others feel they will not get a return on their investment or that the time involved in using the equipment makes it impractical. In some cases, the complexity of the technology may be intimidating. In the case of diagnostic ultrasound, the cost and learning curve may be daunting.

From a personal perspective, I have never regretted the investments I have made, and the practice has grown exponentially, especially through offering a sports medicine service. It has made me a better, more questioning and more knowledgeable practitioner. In the early years, I often provided my services for free at sports clinics and clubs to get established and carve out a reputation. I also gave up holidays and other luxuries to expand the practice, but the investments have paid for themselves many times over as our reputation grew and referrals increased.



OTHER ADVANTAGES OF ULTRASOUND IN PRACTICE

Ultrasound engages the patient. Demonstrating the results of the scan in real time and using aids such as plastic skeletons allows them to obtain a better understanding of their condition. Furthermore, such an approach greatly helps the practitioner to develop their own anatomical skills.

Ultrasound is invaluable in the rapid diagnosis of acute injury. For example, ultrasound is excellent at picking up on acute fractures.

Ultrasound can be used for biomechanical analysis. It is excellent for finding surface markers during 3D gait analysis. It is also much more reliable for assessing certain biomechanical deficits, such as leg length discrepancies.

Ultrasound is a safe, effective modality in sport paediatrics and can prove very reassuring for concerned parents.

Benefits of investing in a gait analysis laboratory

The London Podiatry Centre uses 3D Vicon technology to analyse kinematic function, which can aid in the management of sports injuries. Baseline and post-treatment data can be collected and used to objectively assess the efficacy of treatments.

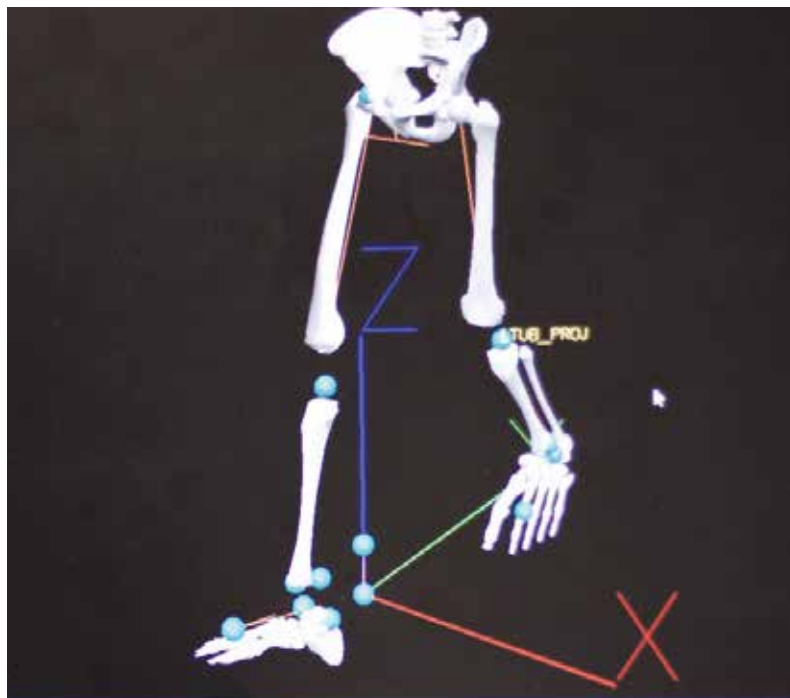
At our standalone clinic we can undertake multi-segmental modelling of the foot and ankle as well as assess the entire body. In sports medicine, computerised gait adds credibility to observational perturbations that are prone to error. Technology can add objectivity to what often amounts to little more than a theoretical concept. For example, a leg length discrepancy can be a significant finding in an athlete but in order to treat it effectively the dynamic effects must be understood.

Observation of frontal plane pelvic tilt (as opposed to 3D measurement) is unreliable and prone to practitioner error, and we have often had our observational assumptions dispelled by the 3D data. Another example relates to the diagnosis of abnormal pronation during gait where observations are, again, unreliable. Through 3D we can measure metatarsal height and calcaneal eversion, magnitude, duration and velocity to accurately measure dynamic pronation. This sometimes demonstrates that patients with normal foot posture scores will function abnormally while those with elevated scores show normal values.

Athletes and those involved with recreational sport often see us for a second opinion having already received orthoses. In such circumstances our in-shoe pressure system provides particularly valuable information on the effects of orthoses. Such tests can bring a sobering sense of reality to the difference between what a practitioner might believe an orthotic is achieving and what it is actually doing. Even simple objectives such as pressure redistribution can be deceptively difficult to achieve without pressure analysis, and yet this technology is underutilised within our profession.

The benefits of diagnostic ultrasound

Ultrasound is beneficial in providing a rapid, real-time diagnosis of the vast majority of sports injuries. With the exception of intra-osseous pathology and certain deep ligaments such as the posterior talofibular ligament and subtalar interosseous ligament most pathology can be readily diagnosed. Ultrasound may protect the practitioner from litigation, as solely relying on the clinical examination leads to greater exposure to error, and ultrasound more often than not takes the guesswork out of diagnosis. For example, we recently assessed a recreational golfer diagnosed with plantar fasciitis by other practitioners. The patient had already undergone extensive conservative care for the condition. An ultrasound scan showed the patient to have a very large plantar aneurism which was immediately referred on for vascular surgery.



RIGHT: 3D motion capture often dispels observational assumptions
BELOW: The F-Scan pressure system gives an objective assessment of foot function

PATHWAYS INTO SPORTS PODIATRY

If you are interested in sports and enjoy working in a sports environment, it is a very rewarding career. It is possible to start with relatively inexpensive equipment such as a pressure mat and a basic visual camera system.

Join a sports MSK special interest group and network with other practitioners that share your interest. Consider shadowing in clinics or with other professionals who work in sports podiatry. Also consider the MSc route, especially in diagnostic ultrasound and sports medicine. If necessary, consider giving your time for free initially to build up links, expertise and confidence from fellow practitioners.



In the case of diagnostic injections, ultrasound is invaluable. For example, a patient may present with two neuromas in one foot, but only one may be symptomatic. In such circumstances, an ultrasound guided diagnostic injection can clinch the diagnosis and guide treatment. Moreover, with injection therapy, it is only a matter of time before the vast majority of therapeutic injections of the foot will be performed under ultrasound guidance and there is evidence that such an approach is safer and more effective. The risk of inadvertent injury from injection is reduced, and it is important to perform such procedures in the best and safest way possible.

Conclusion

The profession is on the precipice of a huge expansion of technological advancement. The good news is that as technology advances, efforts are being made by manufacturers to make it more affordable and accessible. Gait systems such as Quantec and F-Scan offer a great introduction to gait analysis and sports injury treatment. Ultrasound technology improves year on year – more affordable units are now available, and are even being manufactured to work with iPads and iPhones.

As the profession develops and we become increasingly recognised and respected as foot specialists, we should embrace technology so as to offer the best possible care for our patients.