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EDITORIAL

Should peripheral structures be addressed in ACL reconstruction?

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So, there is "too much research" on the anterior cruciate ligament, correct? Because, we should not be doing so many ACL reconstructions on athletes of all ages, levels, and whether their knees are grossly unstable or not, correct? Well, there was a time when we were discussing "copers" and "non-copers" [9]. To be "coping" with ACL injury means that the patient does not experience persistent instability and can manage the injury with non-operative treatment. Many factors have been proposed to play a role in a patient's ability to cope or not. Those are proprioceptive, hormonal, muscular, associated injuries, bony morphology, and of course activity level. Besides, it is not just the ACL that gets injured, but also the soft tissue structures in the periphery. Can we quantify these injuries?

In this issue of *KSSTA* Araujo et al. [2] are introducing the concept of individualized ACL reconstruction based on individual and quantitative parameters of rotatory knee laxity. In their study they are introducing the concept of non-invasive assessment of pivot shift testing using software loaded on a tablet computer [6]. This quantitative pivot shift test can be used pre-operatively to help grade ACL injury; intra-operatively to help adjust ACL reconstruction in real time; and post-operatively to track ACL graft function during rehabilitation. A multicenter prospective international validation of outcome technology study (PIVOT trial, funded by the International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine, ISAKOS) is currently underway and will help establish a large database on dynamic laxity patterns of the ACL injured knee. Using numbers established in this database, individual laxity patterns will be able to be grouped. Then recommendations can be made on the type of reconstruction to be performed and therefore input can be given for true individualization of ACL reconstruction surgery.

Persistent instability following ACL reconstruction is quite frequently reported, with pivot shift tests predictive of poor outcome in 10–30 % of cases. History has shown that the incidence of post-operative instability is not influenced by graft choice, surgical technique, number of bundles reconstructed, or whether extraarticular surgery was added. In November 2013 a white paper article emerged pointing to the anterolateral capsule structures and their role in restraining rotatory knee laxity. The claim was that the anterolateral capsule would control the pivot shift, in turn reducing persistent instability. This created excitement

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in the research community and since then much scientific evidence has been published regarding the anterolateral capsule structures.

One has to understand history as well as foster future rigorous research. There have been many scientific articles in the past pointing out that a distinct ligament in the lateral capsule is only inconsistently present. However, the importance of the lateral capsule structures and their relationship in controlling the pivot shift have been pointed out and it was once thought that reconstructing the lateral capsule, so-called extraarticular tenodesis, is necessary to achieve successful outcome in ACL injuries. The technique fell out of favor, in part secondary to producing stiff and over constrained knees, and in part secondary to high-level evidence lacking measurable benefit over intraarticular ACL reconstruction [1].

The resurgence of extraarticular tenodesis in recent years was led by Philippe Neyret who showed excellent long-term results [8] and Stefano Zaffagnini who was able to provide compelling evidence for improved dynamic laxity behavior of the extraarticularly reconstructed knee [4]. But it will be up to systematic clinical research and basic science research to further our understanding of rotatory knee laxity and the effect of different surgical procedures on clinical outcome of our patients.

It is at this juncture, that we as clinician scientists and peer reviewer of scientific journals are asked to critically evaluate what is appraised. Our patients demand 100 % perfect outcome. However, we can only hope to strive for our athletes' return to sport rate of around 90 %. The answer to our patients' requests will lie in further research. One has to understand that the anatomy of the ACL is the foundation for basic science and clinical research. It is important to understand what the general principles of anatomic ACL reconstruction surgery are, restoration of native ACL anatomy, insertion sites, and tension pattern [10]. Augmentation of an isolated bundle rupture and stump preservation is an anatomic concept leading to good clinical outcome [7].

We need to establish treatment algorithms for ACL surgery and define what role certain additional procedures, such as extraarticular tenodesis, or repair of a torn ACL [5] have in the treatment of knee instability. While recent evidence shows that early ACL reconstruction helps preserve articular cartilage and menisci, we must also continue to research factors that would influence a patient's ability to cope with ACL injury and possibly avoid ACL reconstruction surgery. We are now able to understand the importance of dynamic laxity measurements [3, 11]. It is this parameter that might be responsible in detecting copers. Therefore, more rigorous basic science and clinical science research is needed to improve outcome for our patients.

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