An Evidence-Based Approach for Patients With Patellofemoral-Pain Syndrome

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Patellofemoral-pain syndrome (PFPS) is the most prevalent knee disorder among adolescent and young-adult athletes. Despite its prevalence, PFPS remains one of the most problematic musculoskeletal disorders for sports-medicine practitioners to manage. Conservative rehabilitation strategies including exercise therapy, taping, bracing, foot orthoses, biofeedback, physical modalities, and activity modifications have been advocated to reduce PFPS symptoms and to restore premorbid functional status. Although these treatment options are quite plausible, many sports-medicine practitioners rely on anecdotal evidence to support these interventions. An effective strategy for managing the care of patients with PFPS is to establish a plan of care based on the strongest evidence available. This approach is known as evidence-based practice.

Evidence-Based Practice

What is evidence-based practice? Sackett is credited with coining the terms evidence-based medicine and evidence-based practice. Evidence-based practice (EBP) is defined as a method of integrating individual clinical expertise with the best available evidence from clinically relevant research to make decisions about the care of individual patients. An important premise of EBP is that clinical decision making should not be based on either clinical experience or research evidence in isolation of the other component. It has been reported by several investigators that the process of EBP consists of the following five steps: (1) defining the question, (2) searching the literature, (3) evaluating the evidence, (4) applying the results to the patient, and (5) evaluating the outcome of EBP.

A couple of key terms such as level of evidence and critical appraisal must be considered in order to understand the process of EBP. Confidence in making a clinical decision regarding an intervention depends strongly on the supporting evidence for that intervention. Sports-medicine practitioners often refer to the level of evidence as an indication of the type and quality of evidence found in the literature. The levels of evidence consist of the following types: systematic reviews, randomized controlled trials, cohort studies, case-control studies or case reports, and expert opinions. The evidence available to support a clinical procedure can be given a grade of recommendation based on Grades A thru D. Evidence that is consistently supported by systematic reviews of randomized controlled trials is designated by the recommendation Grade A. Grade B evidence represents a consistent level of findings among cohort studies or systematic reviews of
The VMO allows the muscle to function primarily as a medial stabilizer of the patella during terminal knee extension.\textsuperscript{11,14} The concepts of VMO and VL motor-activation differences and muscle-strength differences have prompted many sports-medicine practitioners to establish VMO-isolation exercises as the cornerstone of PFPS rehabilitation.\textsuperscript{19} Current evidence indicates that there is considerable doubt that the VMO can be selectively isolated.\textsuperscript{11}

In a systematic review of PFPS rehabilitation, Lohman et al.\textsuperscript{11} concluded from the reviews of numerous studies that the VMO is not selectively isolated during traditional quadriceps isometrics or during leg raises with various thigh positions. In addition, they concluded that there is limited evidence in the current literature that demonstrates significant differences in activation timing of the vasti muscles in patients with PFPS. Witvrouw et al.\textsuperscript{16} supported these findings in a prospective investigation of 60 patients with PFPS. Patients were randomized into a 5-week OKC exercise group or a CKC exercise group. Reflex-response times of the VMO and VL were assessed with electromyography (EMG). The investigators found no significant alterations in reflex-response times of the VMO and VL in either group despite significantly decreased knee pain.

In an investigation of VMO motor activity on patellar kinematics, Powers\textsuperscript{17} employed the methodology of kinematic magnetic-resonance imaging and EMG to assess 23 women with nontraumatic PFPS while they performed OKC knee extension. The investigators found no difference in the VL:VMO motor-activity ratio between PFPS patients and controls. Also, the VL:VMO ratio was not predictive of patellar motion at any point in the range of knee flexion for the participants. Although there is evidence indicating that the VMO cannot be selectively isolated, sports-medicine practitioners should appreciate the importance of quadriiceps strengthening as a whole for patients with PFPS.\textsuperscript{10,11,13} Evidence for this clinical guideline is supported by a 7-year prospective follow-up study by Natri et al.,\textsuperscript{13} who found that restoration of quadriiceps strength is important for successful long-term outcomes in patients with PFPS.

The quality of evidence relative to VMO/VL selective activation and timing differences supports a recommendation Grade B. The literature does not consistently support selective activation of the VMO or VMO/VL timing differences at terminal knee extension. There appears to be little evidence to support isolation of the vasti muscles with specific exercises.