

Variable Criteria for Patellofemoral Bracing Among Sports Medicine Professionals

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Objective: To examine whether the frequency of bracing, geographic region, clinical specialty, or percentage of practice devoted to knee pain influences the criteria used by sports medicine professionals to determine whether a brace should be prescribed for treating patients with nontraumatic patellofemoral pain syndrome.

Design: Cross-sectional study.

Setting: Sports medicine practices in the United States.

Participants: A total of 1307 athletic trainers, physical therapists, and sports medicine physicians recruited from the e-mail listings of the American Medical Society for Sports Medicine, the American Osteopathic Academy of Sports Medicine, the American Physical Therapy Association Sports Physical Therapy Section, the International Patellofemoral Study Group, the International Patellofemoral Retreat list, and National Collegiate Athletic Association Division I athletic team registries.

Interventions: Not applicable.

Main Outcomes Measures: Thirty-seven potential patellofemoral bracing criteria encompassing history and function, alignment, physical examination, previous treatments, and radiographic evidence.

Results: A total of 1307 of 7999 providers replied (response rate, 16.3%). Mean bracing frequencies were 19.8% for athletic trainers, 13.4% for physical therapists, and 25.1% for physicians. The mean number of total bracing criteria used was 10.5. The 10 most commonly cited criteria for prescribing a patellofemoral brace in descending order of frequency were: (1) hypermobile patella on physical examination; (2) positive J sign on physical examination; (3) failure of previous rehabilitation; (4) pain when performing squats or going up/down stairs on history; (5) success with previous taping; (6) pain with running activities on history; (7) pain with jumping activities on history; (8) increased dynamic Q angle; (9) vastus medialis oblique deficiency in timing or strength; and (10) positive apprehension sign on physical examination. No statistically significant trends were noted with regard to experience or percentage of practice devoted to knee pain. Increased bracing frequency was significantly associated with an increased number of bracing criteria ($r = 0.89$, $P < .0001$).

Conclusions: This study identified little overall consensus and showed that significant differences exist in the criteria used to prescribe a brace for patellofemoral pain syndrome among specialties and in relation to bracing frequency.

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INTRODUCTION

Patellofemoral pain syndrome (PFPS) is a common diagnosis in sports medicine clinics that is characterized by peripatellar or retropatellar pain brought on by activities such as running, squatting, traversing stairs [1], or prolonged sitting [2]. Data suggest that PFPS occurs in 7%-10% of all young athletes [1] and accounts for roughly 16% of all running injuries encountered in sports medicine clinics [3]. However, despite extensive investigation, a clear understanding of the inciting mechanisms remains elusive [2]. A variety of different possibilities have been identified that may lead to the same, or very similar, presentations of anterior knee pain seen in patients with PFPS. Of these possibilities, the

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most commonly cited are repetitive microtrauma (overuse) and abnormal patellar alignment and tracking [4-6]. Particular attention has been directed at malalignment and maltracking [2,6], which may cause pain through increased patellofemoral joint stress [6] and altered joint contact area [7].

Because of the potential multifactorial [8,9] causes of PFPS, effective treatment options are correspondingly varied [8]. A common nonoperative treatment option is use of a patellofemoral brace. These braces are designed to maintain patellar alignment [10,11] and resist lateral (or, rarely, medial) displacement/subluxation of the patella [11,12]. Studies with contradictory findings [13] abound with regard to the effectiveness [4,14-18] and ineffectiveness [7,19-23] of these braces. However, because of variations in radiographic techniques, measurement methods (qualitative versus quantitative), and testing of different brands of braces, making comparisons across studies is exceedingly difficult [11].

In addition to demonstrating maintenance (or lack of maintenance) of alignment, previous studies of patellofemoral braces have demonstrated great variation in the degree of decreased pain (56% [20], 24%-93% [12], and none [21]). Multiple contributory factors have been suggested to play a role in the effectiveness of bracing, including patellofemoral biomechanics, temperature, proprioception, and neuromuscular factors (eg, stimulating the quadriceps to contract, thereby stabilizing the knee) [7,11,12,15,17]. With use of real-time magnetic resonance imaging, Draper et al [24] analyzed patellar joint kinematics and suggested that only patients with patellar maltracking or other abnormal patellar kinematics benefit significantly from the use of patellofemoral-stabilizing braces, with the brace reducing lateral displacement and patellar tilt in patients classified as maltrackers. The idea that patients with maltracking experience the most benefits from patellofemoral braces also corresponds with current guidelines found in the literature [12,14,25,26]. These guidelines advocate use of patellofemoral braces in patients with "obvious" lateral subluxation. However, in the aforementioned real-time magnetic resonance imaging study, of the 14 patients with patellofemoral pain diagnosed with patellar maltracking by clinical examination, 3 of these patients did not have an abnormal bisect offset (a measure of medial-lateral displacement of the patella) as demonstrated with advanced imaging. In addition, of the 9 patients who were not diagnosed with maltracking by clinical examination, 5 had an increased bisect offset compared with control subjects [24], which demonstrates that even careful clinical examination may not predict who will benefit from bracing. With improvement dependent upon choosing the optimal treatment modality, it is often difficult for a practicing sports medicine professional to develop a concise evidence-based treatment algorithm for when to prescribe a patellofemoral brace [12].

Unfortunately, recent clinical research has not provided uniform guidance regarding when to prescribe a brace for patellofemoral pain. Lun et al [21] showed that braces alone

offer no significant difference in functional improvement compared with home exercise alone, home exercise with a brace, or home exercise with a knee sleeve. In another randomized study in which bracing was compared with either use of knee straps or no additional support, the authors found no significant difference after 6-8 weeks of physical therapy and use of anti-inflammatory medication [22]. Other recent research has shown that quadriceps strengthening with and without bracing showed no statistical difference in pain improvement [27]. In contrast, Timm [16] found significant improvement in patellofemoral congruence, function (according to the Kujala score), and pain (according to the visual analog scale) when comparing a randomly selected group that underwent patellofemoral bracing and control subjects.

Because the existing literature is unclear with regard to when, if, or for whom braces work, this study was performed in an attempt to determine which criteria are used by sports medicine physicians, physical therapists, and athletic trainers when they are deciding whether to prescribe a patellofemoral brace for atraumatic patellofemoral pain. Specifically, we aimed to discover whether trends existed with regard to different specialties, geographic regions, percentage of practice devoted to knee pain, the frequency of bracing, or years of experience in an attempt to better understand how practicing sports medicine professionals are interpreting the existing, often contradictory information regarding the use of braces.

METHODS

A literature review was completed to determine commonly cited criteria in diagnosing atraumatic PFPS. Potential bracing criteria were selected on the basis of existing clinical benchmarks for PFPS [28], and an online survey was developed. The survey was then pilot tested with 14 sports medicine professionals encompassing the fields of athletic training, family medicine, orthopedic surgery, physical medicine and rehabilitation, and physical therapy. A revised version of this survey was approved by our institutional review board and sent to athletic trainers, physical therapists, and sports medicine physicians via available e-mail listserves. Respondents were allowed to provide write-in comments in response to all survey questions.

Potential participants were recruited from the American Medical Society for Sports Medicine (n = 1089), American Physical Therapy Association Sports Physical Therapy Section (APTA, n = 5040), International Patellofemoral Study Group (n = 50), International Patellofemoral Retreat list (n = 37), and American Osteopathic Academy of Sports Medicine (n = 151). In addition, athletic training personnel, physical therapists, and team physicians with listed e-mail addresses on National Collegiate Athletic Association Division I sports Web sites also were included (n = 1839). Care was taken not to send multiple study invitations to potential

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