

Clinical Prediction Rules for Knee and Patellofemoral Pain: An Overview with Implications for Orthopaedic Diagnosis and Management

Kumar Senthil P.*, Kumar Anup**

Author Affiliation: **Professor and Head, Department of Physiotherapy, School of Allied Health Science and Research, Sharda university, Greater Noida, Uttar Pradesh. **Associate Professor, Dept of Orthopaedics, Kasturba Medical College (Manipal University), Mangalore, India.

Reprint Request: Senthil P. Kumar, Professor and Head, Department of Physiotherapy, School of Allied Health Science and Research, Sharda university, Plot No. 32-34, Knowledge Park III, Greater Noida, Uttar Pradesh 201306
E-mail: senthilparamasivamkumar@gmail.com

Abstract

This short communication was aimed to highlight the application of clinical prediction rules (CPR) or clinical diagnostic rules (CDR) for knee and patellofemoral pain in the field of clinical orthopaedics. There were two CPRs found on radiographic examination, one each for foot orthoses, patellar taping, hip mobilization, lumbopelvic manipulation and nonarthroplasty surgery. The identified CPRs would enable an evidence-informed orthopaedic clinical decision making in evaluation and management of patients with knee and/or patellofemoral pain.

Keywords: Clinical Examination; Lower Extremity; Clinical Prediction Rule; Clinical Orthopaedics.

This short communication was aimed to highlight the application of clinical prediction rules (CPR) or clinical diagnostic rules (CDR) for knee and patellofemoral pain in the field of clinical orthopaedics.

Radiographic Examination

Bauer et al [1] constructed a CDR to optimize the use of radiography in 213 patients with acute knee injuries who had 18 fractures. The CDR included five items: severe joint line tenderness, severe localized swelling, an effusion, ecchymosis, flexion <90 degrees, and an inability to bear weight. Fracture was not seen in all 76 patients without any of these criteria, which indicate a high specificity for this rule.

Seaberg and Jackson [2] developed a CDR for ordering X-rays in knee injuries by performing a retrospective chart review of 201 consecutive patients receiving knee radiographs in the emergency department in a 10-month period. It was followed by a prospective validation study on 133 consecutive patients with knee injuries, who received

radiographs to validate the decision rule. "History of fall or blunt trauma mechanism had a sensitivity of 92%, specificity of 57%, with a false-negative rate of 0.9%. The addition of inability to ambulate and age (younger than 12 or older than 50 years of age) yielded a sensitivity of 92% with a specificity of 63%. The prospective study found the combination of fall or blunt trauma with either inability to ambulate or age (younger than 12 to older than 50 years of age) was 100% sensitive, with a specificity of 79%."

Foot Orthoses

Vicenzino et al [3] performed a post-hoc analysis of 42 patients in one treatment arm of a randomised clinical trial to develop a CPR to identify PFPS patients who were more likely to benefit from foot orthoses. The potential predictor variables were: age, height, pain severity, anterior knee pain scale score, functional index questionnaire score, foot morphometry (arch height ratio, mid-foot width difference from non-weight bearing to weight bearing) and overall orthoses comfort. Specifically, three out

of four variables including age (>25 years), height (<165 cm), worst pain visual analogue scale (<53.25 mm) and a difference in mid-foot width from non-weight bearing to weight bearing (>10.96 mm) had a positive likelihood ratio of 8.8 to improve the success rate from 40% to 86%.

Patellar Taping

Leshet et al [4] determined the predictive validity and interrater reliability of selected clinical exam items and developed a CPR to determine how 26 out of 50 patients with PFPS responded successfully to patellar taping. The CPR had two examination items (positive patellar tilt test or tibial varum greater than 5 degrees), with a positive likelihood ratio of 4.4 to improve the probability of a successful outcome from 52% to 83%. Application of the CPR improved fifty-eight percent of the lower extremity measures and both were associated with moderate to good reliability.

Hip Mobilization

Currier et al [5] developed a CPR for identifying 60 patients with knee pain and clinical evidence of knee osteoarthritis (OA) with favorable short-term response to hip mobilizations, and determined the predictive validity of individual clinical tests for identifying these same patients. Five variables were identified by the CPR: (1) hip or groin pain or paresthesia, (2) anterior thigh pain, (3) passive knee flexion less than 122 degrees, (4) passive hip medial (internal) rotation less than 17 degrees, and (5) pain with hip distraction. Two out of five variables had a positive likelihood ratio of 12.9 with 97% probability of success.

Lumbopelvic Manipulation

Iverson et al [6] in their prospective cohort study of 50 subjects with patellofemoral pain syndrome (PFPS) developed a CPR to determine how 22 patients had a positive immediate response to lumbopelvic manipulation. Side-to-side difference in hip internal rotation range of motion greater than 14 masculine was the most powerful predictor of treatment success with a positive likelihood ratio of 4.9, which improved the chance of experiencing a successful outcome improved from 45% to 80%.

Nonarthroplasty Surgery

Solomon et al [7] studied 103 patients presenting to orthopedic surgeons to examine the factors

associated with clinical judgment to benefit from nonarthroplasty knee surgery. The authors found the following characteristics: a history of sports-related trauma, low functional status, limited knee flexion or extension, medial or lateral knee joint line tenderness, a click or pain noted with the McMurray test, and a positive Lachmann or anterior drawer test. These items were combined into a clinical prediction score, and low-, medium-, and high-risk categories were identified. Independent evaluation by surgeons indicated that only 8% of patients in the low-risk category but 84% of patients in the high-risk category were judged likely to benefit from surgery."

There were two CPRs found on radiographic examination, one each for foot orthoses, patellar taping, hip mobilization, lumbopelvic manipulation and nonarthroplasty surgery. The identified CPRs would enable an evidence-informed orthopaedic clinical decision making in evaluation and management of patients with knee and/or patellofemoral pain.

References

1. Bauer SJ, Hollander JE, Fuchs SH, Thode HC Jr. A clinical decision rule in the evaluation of acute knee injuries. *J Emerg Med.* 1995; 13(5): 611-5.
2. Seaberg DC, Jackson R. Clinical decision rule for knee radiographs. *Am J Emerg Med.* 1994; 12(5): 541-3.
3. Vicenzino B, Collins N, Cleland J, McPoil T. A clinical prediction rule for identifying patients with patellofemoral pain who are likely to benefit from foot orthoses: a preliminary determination. *Br J Sports Med.* 2010; 44(12): 862-6.
4. Leshet JD, Sutlive TG, Miller GA, Chine NJ, Garber MB, Wainner RS. Development of a clinical prediction rule for classifying patients with patellofemoral pain syndrome who respond to patellar taping. *J Orthop Sports Phys Ther.* 2006; 36(11): 854-66.
5. Currier LL, Froehlich PJ, Carow SD, McAndrew RK, Cliborne AV, Boyles RE, et al. Development of a clinical prediction rule to identify patients with knee pain and clinical evidence of knee osteoarthritis who demonstrate a favorable short-term response to hip mobilization. *Phys Ther.* 2007; 87(9): 1106-19.
6. Iverson CA, Sutlive TG, Crowell MS, Morrell RL, Perkins MW, Garber MB, et al. Lumbopelvic manipulation for the treatment of patients with patellofemoral pain syndrome: development of a clinical prediction rule. *J Orthop Sports Phys Ther.* 2008; 38(6): 297-309.
7. Solomon DH, Avorn J, Warsi A, Brown CH, Martin S, Martin TL, et al. Which patients with knee problems are likely to benefit from nonarthroplasty surgery? Development of a clinical prediction rule. *Arch Intern Med.* 2004; 164(5): 509-13.