

Selected Topics: Emergency Radiology

PEDIATRIC LATERAL PATELLAR DISLOCATION: IS THERE A ROLE FOR PLAIN RADIOGRAPHY IN THE EMERGENCY DEPARTMENT?

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Abstract—Background: Osteochondral fractures are reported to complicate patellar dislocations in 5–95% of patients. For this reason, post-reduction radiographs are recommended for the routine evaluation of patellar dislocations in all patients. To date, no data have been reported regarding the impact plain radiography has on the Emergency Department (ED) management of pediatric patients with lateral patellar dislocations. **Study Objectives:** To estimate the incidence of fractures detected by post-reduction plain radiographs in pediatric patients presenting with unreduced lateral patellar dislocations and to examine differences in ED management between patients with and without radiographically apparent fractures. **Methods:** Retrospective review of records for pediatric patients who presented to an ED, received a diagnosis of lateral patellar dislocation, and underwent a reduction procedure. **Results:** Of 80 patients who met criteria for inclusion in the study, 8 patients (10%; 95% CI 3–17) had a fracture identified. All patients, regardless of their radiographic findings, had their dislocation reduced uneventfully and were discharged with knee immobilization and a plan for outpatient follow-up. There were no statistically significant differences between those patients who had a detected fracture as compared to those without in terms of intravenous line placement ($p = 1.000$), parenteral analgesic administration ($p = 0.965$), procedural sedation administration ($p = 0.922$), ED length of stay ($p = 0.706$), or provision of a prescription for an oral analgesic upon discharge ($p = 0.103$). **Conclusion:** Osteochondral fractures were detected by plain radiography in 10% of patients presenting with lateral patellar dislocation and did not

alter ED management. Pediatric patients with lateral patellar dislocations may be candidates for discharge from the ED after reduction without plain radiography. The modality by which to best determine the presence of a complicating osteochondral fracture (i.e., plain radiography, computed tomography, magnetic resonance imaging, or arthroscopy) may be left to the discretion of the orthopedic surgeon accepting the child in follow-up. Further study is needed to determine if forgoing plain radiographs in the ED decreases length of stay and reduces patient costs. © 2013 Elsevier Inc.

Keywords—patella; dislocation; child; adolescent; radiography

INTRODUCTION

Patellar dislocation is an acutely painful injury that typically presents to an Emergency Department (ED) if spontaneous reduction does not occur. It most commonly affects adolescents and is reported to have an incidence of 29/100,000 in this age group (1). Review of the literature, however, demonstrates that recommendations for the acute management of unreduced patellar dislocations are based on few published data.

Osteochondral fractures have been reported to complicate patellar dislocations in 5–95% of affected patients, depending on the population studied and the diagnostic

modality used (2–4). Post-reduction plain radiographs are currently recommended for all patients who have suffered patellar dislocation to assess for the presence of fracture (5,6). However, a number of reports document that plain radiography is insensitive to the presence of osteochondral fractures when compared with magnetic resonance imaging (MRI) or examination at arthroscopy (3,4,7,8).

Because unreduced patellar dislocations are typically clinically apparent without pre-reduction radiographs, and because post-reduction plain radiographs are poorly sensitive to the complications of interest, the value of any plain radiographs in the ED management of patellar dislocation is questionable (5,6,9). Conversely, forgoing routine radiographic examination would save patients from additional painful manipulation of their acutely injured knee, potentially improve their throughput times in the ED, and potentially reduce cost.

The objectives of this study were to estimate the incidence of fractures detected by post-reduction plain radiographs in pediatric patients presenting with unreduced lateral patellar dislocations and to examine differences in ED management between patients with and without radiographically apparent fractures. We hypothesized that the incidence of radiographically apparent fractures in pediatric patients with lateral patellar dislocation would be low and that there would be no significant differences in the ED management of patients with and without such fractures.

MATERIALS AND METHODS

Study Design, Study Setting and Population

We performed a retrospective chart review of all patients younger than 21 years of age who presented to the ED of a tertiary care children's hospital between January 1, 2000 and December 31, 2010 and received an International Classification of Diseases-9th Revision code related to patellar dislocation (i.e., 836.3 and 836.4). To be included in the study, a patient must have received an ED diagnosis of patellar dislocation and had the dislocation reduced during the same encounter. Patients who had medial or intra-articular dislocations, and those who experienced spontaneous reduction, were excluded. This study was approved by the institutional review board of our institution; the requirement for written informed consent from subjects was waived.

Study Protocol

Data from the records of those patients satisfying both inclusion and exclusion criteria were abstracted by a single unblinded research assistant who, before data collection, was provided training that included general information

regarding patellar dislocation and its management, the organization of the ED and Radiology records, and the mechanics of the standardized electronic data collection form. Each specific data point and possible variations were detailed in a data dictionary. Each data point included a suggested response of “unclear” if the research assistant was unsure of the data point. Such data points were resolved by majority consensus of the investigators. Data points for which no data were recorded were recorded as “no data” and, when applicable, considered in the negative. Physician-generated data were recorded instead of nurse-generated data in the event of a discrepancy.

Data abstracted included patient demographics, mechanism of injury, history of previous patellar dislocation, history of diseases associated with patellar dislocation (i.e., Rubenstein-Taybi syndrome, nail-patella syndrome, and connective tissue diseases), patient-reported pain score (1–10 scale), physical examination findings (i.e., patella visible or palpable laterally, knee swelling/effusion, knee held in flexion, tenderness of the medial patella or medial femoral epicondyle), analgesics and sedatives administered, reduction, orthopedic consultation, ED length of stay, and discharge plan. Radiographic findings were taken from the dictated report entered into the medical record by the attending, board-certified, pediatric radiologist. When the radiologist noted a “probable” or “suspected” fracture, these injuries were deemed to represent true fractures for the purposes of this study.

Outcome Measures

The main outcome measure for our study was the presence or absence of a radiographically apparent fracture detected on post-reduction X-ray studies. Secondary outcome measures were differences in ED management between patients with and without radiographically apparent fractures.

Data Analysis

Patient characteristics, plain radiograph utilization, pain score, medication use, and follow-up information after discharge from the ED were summarized using frequency (percentage), mean (SD), or median (range). The chi-squared test or Fisher's exact test were applied to examine the association between fracture and demographic factors, including gender, and dislocation history. *t*-Test or Mann-Whitney was applied to compare the mean or median age and length of stay between patients with and without fracture. The fracture status was determined by the radiologist's reading of patient radiographs. A *p*-value < 0.05 was used for significance level. All statistical analyses were conducted with SPSS 15.0 software (Chicago, IL).

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