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Research Paper

Paediatric First-Time Patella Dislocators: An Approach to Conservative Management

兒科首次髕骨脫位：保守治療進路

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ABSTRACT

Background: First-time lateral patella dislocations are generally treated nonoperatively. However, the ideal form of conservative management and immobilization remains unknown. We compare the clinical outcomes after different immobilization methods.

Methods: Paediatric-age patients that met our inclusion criteria, and presenting with a first episode of lateral patella dislocation to our hospital from 2006 to 2013, were enrolled. Different immobilization methods included brace, backslab, or cylinder cast. A retrospective review was performed to compare bracing against other immobilization methods, using a primary outcome measure of redislocation rate, and secondary outcome measures like progression to surgery, range-of-motion, pain, and weight-bearing status.

Results: A total of 142 patients (with 147 affected knees) with minimum 1-year follow-up were included in the study. Bracing was found to be superior to other immobilization methods in preventing repeat dislocations, and need for subsequent surgery. At 6 weeks, patients treated with the backslab had the highest incidence of pain. There were no differences with regards to range-of-motion or weight-bearing status.

Conclusion: We recommend the use of a brace, with a progressive rehabilitation protocol in the management of first-time lateral patella dislocators. This study is also unique, in that it specifically addresses nonoperative management of first time patella dislocators in a paediatric-age population group.

中文摘要

背景：治療第一次側髕骨脫位通常是採用非手術的保守治療。然而，什麼是最理想的保守治療方案和固定的方法仍然未知。我們比較了不同固定的方法的臨床效果。

材料和方法：研究包括了符合我們的納入標準，並在 2006 年至 2013 年間因第一次外側髕骨脫位需要到我們醫院接受治療的兒童患者。不同的固定方法包括支架(Brace)、背托(Backslab) 或圓柱石膏繃帶(Cylinder Cast)。我們回顧性地比較了支架和其他固定方法的分別，主要結果指標是再脫位率，次要結果指標是：進行後續手術比率、關節活動範圍、疼痛分數和負重狀態。

結果：納入了 142 例 (147 受影響膝蓋)，隨訪期至少一年。支架被發現在再脫位率和進行後續手術比率兩方面優勝於其他固定方法。在 6 個星期，接受背托治療的患者的疼痛發生率最高。在關節活動範圍和負重狀態則沒有分別。

結論：我們建議使用支架，配合逐步康復訓練，來治療第一次側髕骨脫位的患者。這項研究也非常獨特，因為它明確地指出在兒童患者上使用保守治療的果效。

Introduction

Acute patella dislocation is a common injury encountered in the paediatric population. Incidence is 5.8/100,000 individuals, with a peak incidence of 29/100,000 individuals in the 10–17 year-old age group.¹

With the exception of specific circumstances, like the presence of a loose osteochondral fragment or a large avulsion fracture, first-time patella dislocations (FTPDs) are usually treated non-operatively. This is due to several prospective studies over the past few years showing similar outcomes of operative versus nonoperative management.^{2–5}

However, despite this knowledge, there has been a relative lack of research with regards to the ideal type of nonoperative treatment of first time patella dislocators. The evidence at present is

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scarce and conflicting. Maenpaa and Lehto⁶ suggested that a posterior splint was superior to cylinder casting or bracing. Rood et al⁷ found taping to be superior to the cylinder cast. Even meta-analyses have been unable to answer this question, as the immobilization methods and durations vary greatly between studies.^{8,9}

Furthermore, these studies were conducted in a mixed, but predominantly adult population. This is surprising, since the highest incidence of FTPDs occur in the teenage years.¹

Our study compares the outcomes between different forms of immobilization used in the treatment of FTPDs in a paediatric population.

Methods

The hospital Institutional Review Board approved this study. All patients who presented to our hospital for patella dislocations between January 2006 and August 2013 were assessed.

Inclusion criteria include the following: (1) age ≤ 17 years; (2) an acute episode of patella dislocation (defined as: definite dislocation as identified by attending physician or paramedic or definite dislocation seen on X-rays or patella dislocation requiring manual relocation, with significant pain and swelling post reduction); and (3) first episode on the affected knee.

Exclusion criteria include the following: (1) neuromuscular abnormalities; and (2) syndromic (e.g., Down's syndrome, Marfan's syndrome, Nail-patella syndrome); and (3) congenital or habitual patella dislocations.

Case notes and online radiographic images of patients who met the study criteria were reviewed.

After reduction of the dislocation, all study participants were treated with a backslab (Plaster of Paris) for a week. During the outpatient clinic review at 1 week, each patient was further immobilized in one of the following ways: (1) backslab (fiberglass material) in approximately 10 degrees of flexion for another 3 weeks; (2) cylindrical cast (fiberglass material) in slight flexion for another 3 weeks; and (3) knee brace (Breg T scope Premier Post-Op Knee Brace) for another 6 weeks, with a stepwise increase in the maximal allowed range-of-motion. Range-of-motion from 0 to 30° was permitted in the first 2 weeks. This was increased to 60° in the next 2 weeks, and 90° subsequently.

All patients were allowed to ambulate as tolerated on crutches. Patients were assessed for presence of significant pain, weight-bearing status, and ability to attain full range-of-motion at 6 weeks. After the period of immobilization, the patients were continued on physiotherapy with progressive strengthening exercises. All patients were followed up for a minimum period of 1 year, and any episodes of recurrent dislocation and progression to surgery noted.

Statistical analysis was performed using SPSS version 19.0 (IBM Corp. Released 2010. IBM SPSS Statistics for Windows, Version 19.0. Armonk, NY: IBM Corp.). Chi-square test was performed for the comparison of treatment outcomes. Analysis of continuous data was performed through the ANOVA test. A p value < 0.05 is considered significant.

Results

A total of 142 patients (with 147 knees) met the inclusion and exclusion criteria, and were included in the study. The demographics of our study participants are shown in Table 1.

The mean age for FTPDs in our study was 13.8 years old. There was a slight predilection for females (56.3%) and for the left knee (54.9%), although this was not statistically significant. It is of interest to note that there was an increased incidence in the Indian race (23.9%), as compared to their representation in the general population (9.1%).

Of the 147 knees that were treated, 105 knees (71.4%) were treated in the brace protocol. Another 13 knees (8.8%) and 29 knees (19.7%) were immobilized in backslab and in cast, respectively. Demographics of the patients treated with the different immobilization methods were comparable.

The overall redislocation rate in our study was 16.3%. Table 2 shows a summary of various outcome measures. Use of the brace significantly reduced redislocation rates (8.6%) as opposed to the use of backslab [46.2%, relative risk (RR) 5.18] and cylindrical cast (16.3%, RR 3.60). This also translated to significantly lower surgical rates with use of a brace (4.8%), as compared to the use of backslab (30.8%, RR 6.22). Surgical rates were not lowered significantly when compared against the use of a cylindrical cast.

During the assessment at 6 weeks postinjury, all patients were assessed for presence of pain, any limitation of range-of-motion, and weight-bearing status. Those treated with a backslab were significantly more likely to be still in pain (RR 3.24). There was no statistical difference between range-of-motion or weight-bearing status between the three groups.

Discussion

Despite all the recent advances in the understanding of patellofemoral pathology, there remains until date, a lack of high-level research data that help us answer two simple questions: (1) is immobilization necessary; and (2) if so, which form of immobilization is superior?

Immobilization or early mobilization

Traditional teaching has been to manage first-time patella dislocators in a cylinder cast for 6 weeks duration.¹¹ This period of immobilization allows the soft tissues (including the medial retinaculum) to heal, repair, and fibrose.

Advocators of early mobilization believe that a period of immobilization would result in muscle atrophy, with secondary effects on joint proprioception, pain sensation and joint contractures.

Two recent meta-analyses in 2010⁸ and 2012⁹ could not give us conclusive answers due to a paucity of literature. After thorough literature searches, Smith identified only two studies that met their inclusion criteria,^{6,12} and van Gemert et al⁹ found an article by Maenpaa and Lehto⁶ (1997) to be the only study that met theirs. Smith's conclusion in his review article was that there was insufficient evidence in size and quality to justify the use of immobilization following a lateral patellar dislocation.

The group from Northampton has attempted to address this question with a pilot feasibility study.¹³ Although they showed a trend towards superior short-term functional outcomes for those not immobilized, their study, unfortunately, recruited only eight study participants, and was unable to provide statistical evaluation.

Sillanpaa¹⁴ in Arthroscopy 2011 compared immobilization against free range-of-motion in a knee brace prospectively. They found that early mobilization with the help of a knee brace did not increase recurrent dislocations, and instead, improved the return of range-of-motion.

Without higher-level evidence emerging, our opinion is that first-time patella dislocators should still be managed with initial controlled immobilization.

Which form of immobilization

Several immobilization techniques exist. These range from cylinder casts, to posterior splints (backslab), knee braces, to patella taping. The ideal immobilization technique has not been identified. An article by Maenpaa and Lehto⁶ showed that the posterior splint

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