Arthrography and arthroscopy of the knee in sports injuries

Teerawat Kulthanan BSc MD and Porntip Noiklang MD*
Department of Orthopaedic Surgery and *Department of Radiology, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok, Thailand

A total of 266 patients with injuries to the knee sustained during sports activities were managed by arthroscopy and/or arthroscopy. All of them received systemic examination and a standard battery of knee stability tests. Fifty-three were examined by arthrography and all underwent arthroscopy for surgical correction of the lesion diagnosed by both clinical examination and arthrography. Our study showed that clinical examination could give an accurate clinical diagnosis in 88.35% of cases and arthrography in 76.89%. No complication from arthrography was found. Injury occurred most commonly between 21 and 30 years of age and was more common to the right knee than the left. The sport in which most injuries occurred was football.

Keywords: Arthrography, arthrotomied knee, clinical diagnosis, sports injuries

Arthrography is an easy investigation to perform for knee injuries caused by sports activities and has few complications. This study aimed to compare the accuracy of arthroscopy with arthrography and the physical examination (standard knee stability test) of the injured knee resulting from sports activities. The results of the study may be helpful in the diagnosis and treatment of knee injuries.

Subjects and methods
A total of 266 players who sustained knee injuries during sports was managed by arthroscopy and arthroscopy at the Orthopaedic Department of Siriraj Hospital between 1985 and 1989. The patients were examined, investigated and operated on routinely as follows: (1) systemic examination; (2) standard knee stability test: (a) stress test (varus and valgus), (b) Lachman’s test and drawer test; (3) arthroscopy; (4) arthrography; (5) arthroscopy.

After systemic examination and a standard knee stability test, a provisional clinical diagnosis was made. Arthroscopy was done when it was indicated (i.e. there was a positive result in the standard knee stability test). A pathological diagnosis was subsequently made from arthroscopy findings in 53 cases.

Arthroscopy was carried out using Freiberger’s double contrast method as follows: (1) The injured knee was cleaned; (2) A suprapatellar aspect puncture was made by a no. 22 needle; (3) Inflation followed using 40–50 ml air or gas after synovial fluid had been aspirated; (4) 4–6 ml of water-soluble contrast medium was instilled into the joint; (5) The patient then walked around for 30s so that the contrast medium would coat the entire joint surface; (6) A fluoroscopic spot radiograph was done, using low KV: high mAs with a small collimator for meniscal views and high KV and a cross-table shot for the cruciate ligaments.

All of the total 266 patients were finally diagnosed and managed by arthroscopic surgery and/or arthroscopy, 53 were diagnosed by arthroscopy and subsequently confirmed at arthroscopy (Tables 1–4).

Table 1. Diagnosis by clinical examination and arthroscopy

<table>
<thead>
<tr>
<th>Clinical diagnosis</th>
<th>Arthroscopy findings (No. knees)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Positive MM</td>
<td>62</td>
</tr>
<tr>
<td>LM</td>
<td>35</td>
</tr>
<tr>
<td>ACL</td>
<td>184</td>
</tr>
<tr>
<td>PCL</td>
<td>36</td>
</tr>
<tr>
<td>Negative MM</td>
<td>37</td>
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<tr>
<td>LM</td>
<td>27</td>
</tr>
<tr>
<td>ACL</td>
<td>20</td>
</tr>
<tr>
<td>PCL</td>
<td>6</td>
</tr>
</tbody>
</table>

MM, medial meniscus; LM, lateral meniscus; ACL, anterior cruciate ligament; PCL, posterior cruciate ligament
Results

A total of 266 injured knees were reviewed [right 56.01% (149 knees); left 43.99% (117 knees)]. The male:female ratio was 11.7:1 (245 men, 21 women), the average age was 27 years. The sport associated with the most injury reflected its popularity – football 52.26% (139 knees) with the remaining 47.74% (127 knees) including volleyball, basketball, sepak-takraw* etc. There were no complications from arthrography. The diagnostic accuracy of clinical diagnosis alone was 89.19% (Tables 1 and 2) and the accuracy of arthrography was 76.89% (Tables 3 and 4).

*Sepak-takraw is a traditional Thai sport with a rattan ball played over the net on a court similar in size to that of badminton. The game calls for strong jump-kicking in place of the smash in badminton, made in mid-air from the highest possible position.

Discussion

The accuracy of diagnosis of the injury to the knee caused by sports by standard physical examination was 89.19% (the accuracy for torn medial meniscus was 82.33%, torn lateral meniscus, 88.35%, torn anterior cruciate ligament, 91.35% and torn posterior cruciate ligament, 96.24%).

Since there may be more than one pathology present in the injured knee, different methods of examination may give positive or negative findings. Compared with arthroscopy, the accuracy of standard physical examination was similar to that found by Bonamo and Shulmann1 (accuracy of torn meniscus was 85% and for torn ligament, 94%).

Arthrography is one of the tissue investigations that can help the examiner to show the pathology of the tissue and structure in the knee joint which cannot be demonstrated by radiography. The accuracy of arthrographic diagnosis in medial meniscus injury was 77.36%, lateral meniscus 84.90%, anterior cruciate ligament 56.60% and posterior cruciate ligament 88.68%. This technique was most commonly erroneous in the anterior cruciate ligament because of the difficulty of angulating the knee adequately for cross-table radiograph exposures to demonstrate this ligament. The overall accuracy of 76.89%, the sensitivity of 60% and the specificity of 87.12% were similar to those found by Selesnick et al.2 who showed an accuracy of 73.2% in 384 arthrographic patients.

Other studies by Bonamo and Shulmann1 of arthrography in the torn meniscus and anterior cruciate ligament showed an accuracy of 76%. The accuracy of diagnosis reported by De-Smet3 in 340 torn menisci was 95%. In the series studied by Reider
et al.\textsuperscript{4}, the accuracy of arthrographic diagnosis in cruciate ligament injuries was 88%.

There are many factors contributing to the accuracy of arthrographic diagnosis in knee injuries\textsuperscript{5}, such as the technique used for injection of solution and the evaluation of the image on the film. De-Smet\textsuperscript{1} pointed out that errors in arthrography commonly occurred at the posterior horn of both menisci.

In general clinical diagnosis, together with further investigations, will give higher accuracy. Selesnick et al.\textsuperscript{2} showed that the accuracy of diagnosis was 96.8\% by clinical examination combined with arthrography and arthroscopy.

Infections and allergic reactions from intra-articular contrast media were found in only 1:2000 by Neuberg et al.\textsuperscript{6}. In our study, there were no complications.

References