EULAR/EFORT recommendations for the diagnosis and initial management of patients with acute or recent onset swelling of the knee


ABSTRACT

Objectives: The European League Against Rheumatism (EULAR) and the European Federation of National Associations of Orthopaedics and Traumatology (EFORT) have recognised the importance of variation in diagnostic and therapeutic performance across disciplines, have found consensus in starting task forces aiming at achieving diagnostic and therapeutic uniformity, and have identified medical conditions with which representatives of both organisations will frequently be confronted in common clinical practice. The aim of the present work was to establish recommendations for the diagnosis and initial management of patients presenting with acute or recent onset swelling of the knee.

Methods: The EULAR standard operating procedures for the elaboration and implementation of evidence-based recommendations were followed.

Results: In all, 11 rheumatologists from 11 countries and 12 orthopaedic surgeons from 7 countries met twice under the leadership of 2 conveners, a clinical epidemiologist and a research fellow. After carefully defining the content and procedures of the task force, research questions were developed, a comprehensive literature search was performed and the results were presented to the entire committee. Subsequently, a set of 10 recommendations was formulated based on evidence from the literature if available, and after discussion and consensus building.

Conclusions: This is the first combined interdisciplinary project of rheumatologists and orthopaedic surgeons, successfully aiming at achieving consensus in the diagnosis and initial management of patients presenting with acute or recent onset swelling of the knee.

Many musculoskeletal issues that patients present with to healthcare workers go beyond the domains of one medical specialty. For example, patients with low back pain presenting to a general practitioner may be diagnosed and treated by the latter, or may be referred for further diagnosis and treatment to a neurologist, orthopaedic surgeon or rheumatologist. In several countries in Europe, the existing healthcare system allows a patient with low back pain to consult one of these disciplines at their own instigation. Increasingly, and often by virtue of cost considerations and patient safety, medical disciplines in Europe are urged to develop protocols for common medical conditions, in order to streamline the diagnostic process and eliminate diagnostic variation, to prevent unnecessary diagnostic action and to contain costs. Obviously, these medical disciplines tend to focus their diagnostic endeavours on diseases belonging to the core domains of their specialty. Orthopaedic surgeons may tend to focus on surgically remedi-able problems, while rheumatologists may focus on inflammatory causes of back pain.

Remarkably, the consequences of this heterogeneous diagnostic behaviour for the patient have rarely, if ever, been subject of scientific research.

The two professional organisations, the European League Against Rheumatism (EULAR) and the European Federation of National Associations of Orthopaedics and Traumatology (EFORT), have recognised the importance of variation in diagnostic and therapeutic behaviour across disciplines, have found consensus in starting task forces aiming at achieving diagnostic and therapeutic uniformity, and have identified medical conditions with which representatives of both organisations will frequently be confronted in common clinical practice. As a starting point, EULAR and EFORT agreed to try to find consensus in the diagnostic procedures to be performed with patients presenting with acute or recent onset of swelling of the knee. This topic was chosen for several reasons. First, acute or recent swelling of the knee constitutes a relatively frequent medical problem in rheumatological and orthopaedic clinics. Second, a wide spectrum of conditions and diseases belonging to both specialties may underlie the presenting symptom of swelling of the knee. Third, the definition of acute or recent onset swelling of the knee was considered to be relatively unambiguous.

It was decided up front that this first combined task force should follow the EULAR standardised operating procedures for the elaboration and implementation of evidence-based recommendations,1 appreciating that many relevant aspects may not find a solid basis in scientific literature but are nevertheless important with respect to finding consensus among experts across disciplines.

METHODS

The general approach to this project followed the EULAR standardised operating procedures for the
elaboration and implementation of evidence-based recommendations. The process started with the formation of an executive committee under the auspices of the presidents of EULAR (TKK) and EFORT (WP). The executive committee comprised the conveners (DvdH, KFG), a clinical epidemiologist (RL) and a research fellow (CI), who had been invited by EULAR and EFORT on the basis of previous expertise in the process of elaborating evidence-based recommendations. Subsequently, the executive committee invited 11 rheumatologists and 12 orthopaedic surgeons (the expert committee) that were selected on the basis of their field of interest and knowledge, while considering broad coverage concerning the content of the topic (eg, rheumatological experts covered early arthritis, imaging, reactive arthritis, crystal arthropathies and so on), as well as appropriate geographic distribution across Europe. The selected orthopaedic surgeons have been nominated by several European orthopaedic specialty societies involved in the management of patients with knee disorders (European Pediatric Orthopaedic Society (EPOS), European Bone and Joint Infection Society (EBIJS), European Rheumatoid and Arthritis Surgery Society (ERASS), European Musculo-Skeletal Oncology Society (EMSOs), European Society of Sports Traumatology, Knee Surgery and Arthroscopy (ESSKA), European Federation of National Association of Orthopaedic Sports Traumatology Society (EFOST)).

The expert committee met for the first time in October 2007 (first meeting) and for the second time in April 2008 (second meeting).

Definitions
During the first meeting, the experts rapidly obtained consensus about how to define the problem of acute swollen knee so that it would become accessible for literature research without differences in interpretation.

- The region of interest was defined as every anatomical structure of the knee, intra-articularly and periarthrically.
- Swelling was defined as an increase in volume of the region of interest.

The expert committee found it more difficult to conceptualise “acute”, because it was felt that the terminology acute has a connotation of emergency and danger that would imply that a patient should be evaluated without any further delay. Experts considered swelling of “recent onset” more relevant to be included in this exercise, and decided to focus on acute and recent onset swelling of the knee, rather than on acute swelling of the knee alone. The time point at which the patient recognises the problem that leads him or her to seek medical help (the precise time point of a sudden event (eg, trauma) versus the recognition of a definite change in a condition (eg, arthritis)) is important with regard to the definitions of acute and recent onset. How a condition with a sudden onset (eg, within hours or days) evolves over time is important with regard to the delineation of recent onset. There was consensus among experts about a reasonable time frame covering the concept of recent onset as being 4–6 weeks at most, but it was recognised that a precise delineation in terms of time frame could not be given.

During the first meeting, the experts also discussed the target population for these recommendations as well as the audience for whom these recommendations are primarily meant.

The target population was defined as follows: all patients newly presenting to a doctor with a history or examination finding suggesting onset of swelling (defined as an increase in volume) within a recent time (ie, up to 4–6 weeks) in every anatomical structure of the knee, intra-articularly and periarticularly.

The target audience for these recommendations was defined as follows: healthcare workers (allied health professionals, general practitioners, rheumatologists, orthopaedic surgeons, emergency department doctors, other medical specialists, students in related areas) working in the field of musculoskeletal diseases.

Scope
The expert committee also decided that this task force should constrain its efforts to the diagnosis and initial management of patients with acute or recent onset swelling of the knee. The committee recognised that further treatment of this condition is entirely dependent on the diagnosis, and therefore refers to recommendations and guidelines pertaining to specific conditions and diseases (eg, the management of patients with gout and early arthritis).

Research questions
The expert group first discussed the different kinds of pathologies underlying the symptom of acute and recent onset swelling of the knee. The following aggregated list of underlying causes was agreed upon, and it was decided that this list would serve as a template for further literature research:

- degenerative diseases including osteoarthritis;
- inflammatory diseases (arthritis);
- traumatic conditions;
- infections;
- neoplasms and malformations;
- haematological conditions (haemophilia, use of anticoagulants).

The panel subsequently discussed and formulated a number of research questions to guide the literature research and serve as a basis for recommendations. Research questions reflected the priorities of the expert members with respect to the relative importance of the topic.

Subsequently, a systematic literature search was performed by the research fellow (CI) after translating the research questions into relevant key words (table 1). The results of the search were aggregated and fed back to the expert committee, and suggestions and comments by the experts complemented the results of the systematic literature search.

At a second meeting, the results of the systematic review were discussed and consensus statements on specific recommendations were developed.

RESULTS
In table 2 the number of identified articles in the literature referring to the outlined questions is summarised. In general, the database of identified articles was very weak and several research questions could not be answered exactly (eg, incidence and prevalence of acute swelling). Therefore the expert group had to develop the formulation of a consensus statement on specific recommendations mainly based on their experience. In total, 10 recommendations were prepared encompassing recognition, referral, history, physical examination, laboratory tests, synovial aspiration, imaging, diagnostic procedures, diagnosis and initial management.

Recognition
A patient presenting with acute swelling of the knee should undergo thorough clinical examination in order to confirm swelling.
A patient presenting with acute swelling of the knee should undergo thorough clinical examination in order to confirm swelling. Patients with a suspicion of septic arthritis or trauma with an onset of swelling within 12 h, should be referred immediately to a doctor experienced in musculoskeletal diseases. Bone tumours are rare but patients with a suspicion of bone tumour should be referred to an orthopaedic surgeon within 1 week. Patients with a suspicion of inflammatory arthritis should be referred to a rheumatologist within 6 weeks.

In addition to taking a conventional medical history (including previous and concomitant diseases and medication) specific information should be obtained about traumatic versus non-traumatic causes, the speed of onset, the characteristics of pain, first versus recurrent episodes, the presence of fever, the involvement of other joints and/or back and a recent history of infection. The examination of the knee should include the localisation and characteristics of the swelling (intra-articular versus extra-articular), the detection of effusion, testing stability, general or local tenderness, skin temperature and appearance, the range of motion, and a muscular and neurovascular assessment.

In patients presenting with an acute swollen knee of traumatic origin laboratory testing is not helpful in making a diagnosis. In patients presenting with an acute swollen knee of non-traumatic origin, normal acute phase reactants and normal white blood cell count may be helpful in decreasing the probability of inflammatory diseases including especially septic arthritis. Other laboratory tests should be performed on indication.

Diagnostic arthroscopy is only recommended in exceptional cases (eg, for a biopsy). In case of suspicion of a tumour joint fluid aspiration should not be performed.

Diagnostic procedures

In patients presenting with acute swelling of the knee, diagnostic arthroscopy is only recommended in exceptional cases (eg, for a biopsy). On the basis of the procedures described thus far it should be attempted to make an appropriate diagnosis, which should be the basis for further therapeutic decisions. Meanwhile, general measures can be useful to relieve symptoms.

Initial management

General measures to relieve pain and swelling in patients presenting with an acute swollen knee should be tailored to the individual patient and may include partial or non-weight bearing advice, splints, cold packs, the prescription of simple analgesics and non-steroidal anti-inflammatory drugs if not contraindicated. Antibiotics should not be started before appropriate diagnostic sampling has been performed. Intra-articular steroids should not be administered unless an appropriate diagnosis has been made and contraindications have been ruled out.

The incidence and prevalence of the symptom of acute or recent onset of swelling of the knee in the general population has not been subject of detailed research in appropriate studies. The lifetime prevalence of swelling of the knee has been reported as 27% in a study in the UK and 10% in an Italian study. A total of 10% of the 1404 men who responded to the UK survey reported swelling in the past month. Lifetime prevalence of knee symptoms has expectedly been reported to be higher (54% in the UK study and 17% in a Scandinavian study), but knee symptoms may often include pain without (acute) swelling. Another means to gain insight in the importance of the topic is to start with a well defined diagnosis (eg, osteoarthritis of the knee) and to determine the point prevalence in an unselected population. Such studies have been performed with regard to symptomatic osteoarthritis of the knee, and the point prevalence has been reported as 5.4% to 10.1%, depending on the study. The major limitation of using this type of information, of course, is that osteoarthritis of the knee may present with acute swelling of the knee according to the definition described above in only a minority of cases. So, although precise incidence figures are lacking, it may be assumed, based on life time prevalence figures and on figures pertaining to related symptoms (pain) and conditions (osteoarthritis), that acute or recent onset swelling of the

### Table 1

<table>
<thead>
<tr>
<th>Stage</th>
<th>Recommendation</th>
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<tbody>
<tr>
<td>Recognition</td>
<td>A patient presenting with acute swelling of the knee should undergo thorough clinical examination in order to confirm swelling.</td>
</tr>
<tr>
<td>Referral</td>
<td>Patients with a suspicion of septic arthritis or trauma with an onset of swelling within 12 h, should be referred immediately to a doctor experienced in musculoskeletal diseases.</td>
</tr>
<tr>
<td>History</td>
<td>Bone tumours are rare but patients with a suspicion of bone tumour should be referred to an orthopaedic surgeon within 1 week. Patients with a suspicion of inflammatory arthritis should be referred to a rheumatologist within 6 weeks.</td>
</tr>
<tr>
<td>Physical examination</td>
<td>Physical examination of a patient presenting with an acute or recent onset swelling of the knee should focus on the affected knee and should include the unaffected knee as well as an appropriate assessment of the other joints. A general physical examination should be performed on indication.</td>
</tr>
<tr>
<td>Laboratory tests</td>
<td>In patients presenting with an acute swollen knee of traumatic origin laboratory testing is not helpful in making a diagnosis.</td>
</tr>
<tr>
<td>Joint fluid aspiration</td>
<td>In the diagnostic process of a patient presenting with an acute swollen knee joint fluid aspiration should be performed in patients suspected of having septic, chronic or inflammatory arthritis. Joint fluid should be examined macroscopically and microscopically for leukocytes, crystals and bacteria (Gram staining and culture). In cases of significant traumatic effusion without radiographic evidence of a fracture, aspiration of haemarthroses can be performed as well.</td>
</tr>
<tr>
<td>Imaging</td>
<td>In case of suspicion of a tumour joint fluid aspiration should not be performed.</td>
</tr>
<tr>
<td>Diagnostic procedures</td>
<td>In patients presenting with acute swelling of the knee, diagnostic arthroscopy is only recommended in exceptional cases (eg, for a biopsy).</td>
</tr>
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### Table 2

<table>
<thead>
<tr>
<th>Research question</th>
<th>Sources and keywords</th>
<th>No of hits</th>
<th>Relevant articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is it possible to estimate the incidence and prevalence of acute swelling of the knee in the general population?</td>
<td>PubMed: &quot;knee AND (prevalence OR frequency)&quot; + related articles and references in relevant articles; Abstracts of EULAR and ACR congresses: (&quot;knee&quot; in title)</td>
<td>6066</td>
<td>20 (4 in congress abstracts)</td>
</tr>
<tr>
<td>Should the recognition of swelling of the knee be based on patient report only, or physical examination or on additional tests?</td>
<td>PubMed: &quot;history taking, medical AND knee&quot; + each test independently + related articles and references of relevant articles; Abstracts of EULAR and ACR congresses: (&quot;knee&quot; in title)</td>
<td>89</td>
<td>9 (1 in congress abstracts)</td>
</tr>
<tr>
<td>Under which circumstances is a delay in referral acceptable, and under which circumstances should a patient be referred immediately?</td>
<td>PubMed: &quot;knee AND (effusion OR swelling OR swelling)&quot; AND (aetiology OR cause OR etiology) + related articles and references of relevant articles; Abstracts of EULAR and ACR congresses: (&quot;knee&quot; in title)</td>
<td>1051</td>
<td>5 (2 in congress abstracts)</td>
</tr>
<tr>
<td>By whom and to whom should a patient with acute or recent onset swelling of the knee be referred for further evaluation?</td>
<td>PubMed: &quot;magnetic resonance imaging AND knee&quot; + related articles and references of relevant articles; Abstracts of EULAR and ACR congresses: (&quot;knee&quot; in title)</td>
<td>5060</td>
<td>14</td>
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</table>
knee is not a rare condition. For example, of the first 94 patients in a very early arthritis clinic in Tallinn, 39 patients presented with knee swelling (12 monoarticular, 18 oligoarticular and 9 polyarticular). 9

The wording of the first recommendation finds its basis in the fact that rheumatology experts and orthopaedic experts voiced the experience that a considerable proportion of patients consulting medical specialists with an acute or recent onset swelling of the knee in fact do not have swelling at all or swelling that fits the definition above (increase in volume). 10 Most probably, these “false positive referrals” occur more frequently in case of self-referral, but the topic has not been the subject of research in the past. It was broadly agreed that the specialist (either a rheumatologist or orthopaedic surgeon) should establish whether or not there is indeed swelling (increase in volume) present, although sparse literature suggests that intraserver variation in determining the presence or absence of fluid in the knee joint is moderate at best, 10–12 while interobserver reliability was poor in two studies 11, 12 and moderate in another. 13

### Referral

Patients with a suspicion of septic arthritis or trauma with an onset of swelling within 12 h, should be referred immediately to a doctor experienced in musculoskeletal diseases.

Bone tumours are rare but patients with a suspicion of bone tumour should be referred to an orthopaedic surgeon within 1 week. Patients with a suspicion of inflammatory arthritis should be referred to a rheumatologist within 6 weeks

Interestingly, rheumatology experts mentioned septic arthritis as the cause of acute knee swelling that must not be missed. Orthopaedic surgeons considered malignant bone tumour as a diagnosis that should not be missed. Both conditions are rare, and form only a tiny minority of all patient referrals because of acute or recent onset swelling of the knee.

There was broad consensus in the group that a suspicion of septic arthritis should be considered an emergency, because untreated septic arthritis can be life threatening, especially in patients who are immunocompromised (those who use immunosuppressive drugs or are in poor physical condition), and infection may rapidly destroy the joint. Risk factors for septic arthritis are well documented and include old age, comorbid diseases such as diabetes and rheumatoid arthritis (RA), recent joint surgery (or intra-articular intervention), hip or knee prosthesis and recent skin infection. 14

Patients with a trauma, who have a rapid onset of swelling (arbitrarily established as swelling within 12 h post trauma) should be immediately referred because of the suspicion of fracture, which needs immediate treatment.

Among orthopaedic surgeons, there was the unanimous opinion that a suspicion of bone tumour justifies a semiacute referral (<1 week) to an orthopaedic surgeon, preferably an expert in the field of bone tumours, in order to initiate an appropriate diagnostic investigation.

Recent advances in the field of early arthritis, including the rapidly growing experience from early arthritis clinics and their implementation in common clinical practice, now justifies the recommendation that patients with early arthritis should be seen within 6 weeks by a rheumatologist. 15

The wording “doctor experienced in musculoskeletal diseases” was chosen deliberately, in order to make clear that rheumatologists and orthopaedic surgeons can appropriately manage patients with these (sub)acute problems. Similarly, the term “rheumatologist” is meant to highlight that specialised knowledge in that medical field is of primary importance, although doctors from different European medical subspecialties (ie, within internal medicine and orthopaedic surgery) can reach that level of specialist competence.

### Medical history

In addition to taking a conventional medical history (including previous and concomitant diseases and medication), specific information should be obtained about traumatic versus non-traumatic causes, the speed of onset, the characteristics of pain, first versus recurrent episodes, the presence of fever, the involvement of other joints and/or the back and a recent history of infection.

This recommendation stresses the importance of careful history taking and was underscored by all orthopaedic and rheumatological experts. A careful distinction between trauma and non-traumatic causes of acute swelling of the knee is pivotal at an early stage, because treatment of traumatic causes is usually different from treatment of non-traumatic causes, and fits the specialty of orthopaedic surgery better than that of rheumatology. Questions about comorbidity as well as medication may point to increased risk of infection, malignancy and haemorrhage, whereas the speed of onset and pain characteristics may inform the clinician about degenerative and inflammatory diseases. Fever and a recent history of infection may point to joint infection, but fever can also be a symptom of reactive arthritis as well as (pseudo)gout, whereas the question about the involvement of other joints and the back elicits information about inflammatory rheumatological conditions.

This recommendation is a typical example of a recommendation that has been completely based on expert experience and consensus. None of the items mentioned in the text has been subjected to scientific validation, as far as we know, except for the presence of fever (which was paradoxically found to be inversely related to the presence of a septic arthritis). 14 The list of items should also not be regarded as complete, since context-specific questions may guide the doctor to a specific diagnosis (an appropriate example may be questioning about a recent tick bite in regions of high prevalence of Lyme disease). Similarly, a history of recent genitourinary or gastrointestinal infection may direct the focus to reactive arthritides even if such triggering infections may also be asymptomatic. 15

### Physical examination

Physical examination of a patient presenting with an acute or recent onset swelling of the knee should first focus on the affected knee and should include the unaffected knee, as well as an appropriate assessment of the other joints. A general physical examination should be performed on indication.

The examination of the knee should include the localisation and characteristics of the swelling (intra-articular versus extra-articular), the detection of effusion, testing stability, general or local tenderness, skin temperature and appearance, the range of motion, and a muscular and neurovascular assessment.

After history taking, physical examination was unanimously considered an obligatory part of the diagnostic management of a patient with acute or recent onset swelling of the knee. It was noted that physical examination should focus on the affected knee but should also take the unaffected knee and other joints into consideration, for two reasons: first, in order to compare findings, and second in order to obtain information about the involvement of other joints. The issue of general examination was discussed, and it was agreed that a general physical examination is only valuable if there is an indication that the recent onset knee swelling is part of a systemic illness that may
affect other organ systems. Examples are inflammatory rheumatological diseases, vasculitis and malignancy.

The second recommendation under this point addresses the content of the examination of the knee, which has been a topic of recent methodological research. Wood et al have investigated the interobserver and intraobserver variation in detecting several localisations of swelling in and around the knee. They found remarkably low \( k \) values for observing all kinds of swelling across investigators (from 0 to 0.65). Intraobserver agreement was somewhat better (\( k \) from 0 to 1.0) but still far from optimal for several locations. Specific tests for swelling, such as “bulge sign”, “balloon sign”, “patellar tap” and the palpation of a popliteal cyst, also yielded a disappointingly low level of interobserver agreement and a somewhat higher but still unacceptable level of intraobserver agreement. In the same study, intraobserver and interobserver agreement of skin palpation of a popliteal cyst, also yielded a disappointingly low agreement was somewhat better (\( k \) from 0 to 1.0).

Solomon et al reviewed a number of widely applied tests for the examination of the knee joint. These tests serve to detect joint instability (Lachman test, anterior drawer test, lateral pivot shift test) and torn meniscus (Apley compression test, McMurray test). Hegedus et al performed a systematic review of a number of these tests in which they established the sensitivity and specificity of each test with regard to the underlying condition these tests refer to. Of interest, there is one study suggesting that standardisation of knee examination in patients with moderate to severe osteoarthritis may lead to an acceptable level of reliability regarding most of the investigated tests. The general conclusion, however, was that sensitivity and specificity of these tests fall short in order to make them appropriate instruments in the diagnosis of acute and recent onset swelling of the knee.

The experts discussed the sparse information from literature and recognised that the performance of the investigated aspects of physical examination was rather poor. They also recognised, however, that in clinical practice it is the combination of signs and symptoms rather than one positive or negative test that points a clinician towards a diagnosis (pattern recognition). In light of the broad implementation of all these tests and manoeuvres in common clinical practice, they decided to recommend accordingly, while making the proviso that none of these tests and manoeuvres of physical examination of the knee should be used as a gold standard.

**Laboratory tests**

In patients presenting with an acute swollen knee of traumatic origin laboratory testing is not helpful in making a diagnosis. In patients presenting with an acute swollen knee of non-traumatic origin, normal acute phase reactants and normal white blood cell counts may be helpful in decreasing the probability of inflammatory diseases, including septic arthritis in particular. Other laboratory tests should be performed on indication.

The experts unanimously agreed that laboratory tests are of limited help in patients with an acute or recent onset of knee swelling. The exception stems from the literature research, which yielded a study summarising the contribution of white blood cell count and acute phase reactants to making a diagnosis of septic arthritis in multiple studies. White blood cell count and acute phase reactants may help in excluding septic arthritis if their levels are in the normal range. Apart from white blood cell count and acute phase reactants, the experts agreed that no other laboratory tests should be used generically, which means without specific indication. For monitoring purposes, the experts recommended a baseline value of C-reactive protein (CRP) if inflammatory arthritis was suspected or diagnosed (especially infection).

The situation becomes different if a specific condition is suspected. Common examples are the determination of serum uric acid concentration in cases of gout, and serum rheumatoid factor in case of RA. Measurement of serum uric acid has to be interpreted with caution in the diagnosis of gout. Asymptomatic hyperuricaemia (that is, in the absence of gout) is common, and during gout attacks the renal clearance of urate increases and serum uric acid may be normal.

**Joint fluid aspiration**

In the diagnostic process of a patient presenting with an acute swollen knee joint, fluid aspiration should be performed in patients suspected of having septic, crystal or inflammatory arthritis. Joint fluid should be examined macroscopically and microscopically for leukocytes, crystals and bacteria (Gram staining and culture). In cases of significant traumatic effusion without radiographic evidence of a fracture, aspiration of haemarthros can be performed as well.

In cases with suspicion of a tumour, joint fluid aspiration should not be performed.

There is one systematic review confirming the diagnostic accuracy of white blood cell counts and percentage of polymorphonuclear cells in joint fluid with regard to making a diagnosis of septic arthritis. Although Gram staining and culture are the gold standard for a diagnosis of septic arthritis, the clinician often cannot wait for results before commencing treatment, and knowledge about the white cell count as well as the percentage of polymorphonuclear cells may help in making a treatment decision. The general conclusion is that the probability of septic arthritis increases with increasing joint fluid white cell count and increasing percentage of polymorphonuclear cells. The degree of macroscopic cloudiness of the joint fluid is related on most occasions to its cell content and may guide the clinician towards joint infection. Joint infections produce cloudy to purulent-looking joint fluid, but exceptions are not infrequent. Joint fluid originating from non-inflamed joints is usually transparent. Joint fluids with a cell count >50 000 cells/\( \mu l \) are classified as septic, but infections may occur with lower cell counts and counts in the septic range may be due to crystal arthropathies and other causes. Cell counts >1500 cells/\( \mu l \) usually originate from inflamed joints.

A diagnosis of crystal arthropathy relies on the detection of crystals, and joint fluid aspiration is mandatory as a diagnostic procedure.

There was less consensus about the usefulness of joint fluid aspiration in cases of haemarthros. In general, the unexpected aspiration of blood from the joint may raise the suspicion of osteochondral fracture if radiographic evidence is absent, and diagnostic evaluation could be extended (eg, CT or MRI). Evacuation of haemarthros after a reported history of joint trauma was considered helpful only in cases with major effusion and no acutely scheduled surgical intervention (ie, conservatively treated ligament injury).

If a tumour is suspected, aspiration should be avoided because of the theoretical risk of spreading of malignant cells.

**Imaging**

In patients presenting with an acute swollen knee a plain x ray of the affected joint in two planes (preferably a weight-bearing
anterior–posterior (AP) view) should be performed. In specific situations additional x rays may be helpful.

Ultrasound (US) may be helpful in detecting joint effusion and synovial hypertrophy if clinical examination is doubtful. US, MRI and other imaging modalities may be helpful in detecting intra-articular and extra-articular structural abnormalities and should be performed on indication.

It was generally considered useful to perform an x ray of the affected knee if the patient presents with acute or recent onset swelling of the knee. The main reason is to find a fracture in case of trauma. A second reason is to detect erosive disease in case of RA, cartilage calcification in chondrocalcinosis, or thinning of the cartilage of the knee (joint space narrowing) as in osteoarthritis or RA. Though the diagnostic performance of a plain x ray has not been carefully investigated, experts considered this procedure obligatory in view of the potentially high diagnostic yield, the good tolerability and the low costs. There was some deliberation about the usefulness of performing a plain x ray of the unaffected knee; rheumatologists may do this, while orthopaedic surgeons usually do not. Consensus could not be reached, and it was decided to leave the unaffected knee out of the recommendations. Additional x rays were considered to be potentially useful if an inflammatory rheumatological condition (RA, psoriatic arthritis (PsA), ankylosing spondylitis (AS)) was suspected.

The second part of this recommendation refers to the usefulness of US and MRI in patients with acute or recent onset swelling of the knee. A number of studies have addressed the diagnostic performance of US and to a lesser extent MRI against clinical examination. Karim et al reported that the sensitivity and specificity were far better for US as compared to clinical examination when histological findings after arthroscopy were considered the gold standard for inflammation. Apart from that, acceptable figures for interobserver and intraobserver reliability were reported in this study, just as in a previous study examining the sources of variation with US examination of the knee.

Kane et al investigated the diagnostic performance of US in comparison with clinical evaluation and came to similar conclusions. US was also evaluated in comparison to MRI with respect to detecting joint effusion, Baker cysts and synovial membrane thickening. Overall, US performed as well with respect to detecting joint effusion, Baker cysts and synovial membrane thickening. US was also evaluated in comparison to MRI with respect to detecting joint effusion, Baker cysts and synovial membrane thickening.

Diagnosis

On the basis of the procedures described thus far there should be an attempt to make an appropriate diagnosis, which should be the basis for further therapeutic decisions. Meanwhile, general measures can be useful to relieve symptoms.

This recommendation is included to stress the importance of an appropriate diagnosis before therapy is started. The expert committee voiced the experience that all too often a therapy is started without exact knowledge about the cause of the knee swelling. In light of the causal heterogeneity with regard to acute or recent onset swelling of the knee and the differences in treatment decisions that should follow, the expert committee recommends all necessary efforts be made to make an appropriate diagnosis in consideration of the fact that such a diagnosis may be as unspecific as “undifferentiated arthritis” after careful exclusion of other causes. Since this diagnostic process may take time, the committee advocates general measures to relieve pain and other symptoms.

Initial management

General measures to relieve pain and swelling in patients presenting with an acute swollen knee should be tailored to the individual patient and may include partial or non-weight-bearing advice, splints, cold packs, the prescription of simple analgesics and non-steroidal anti-inflammatory drugs (NSAIDs) if not contraindicated. Antibiotics should not be started before appropriate diagnostic sampling has been performed. Intra-articular steroids should not be administered unless an appropriate diagnosis has been made and contraindications have been ruled out.

This recommendation spells out the kind of general measures that are mentioned in the ninth recommendation. It should be stressed that none of these measures described here have been appropriately tested in randomised controlled trials. As such, this general measures forms the aggregated experience of the orthopaedic and rheumatological experts on the panel. Two therapeutic measures (antibiotics and intra-articular steroid injection) are specifically referred to in the text of the 10th recommendation, since they constitute rather specific measures but are often applied when a diagnosis has not (yet) been made, in order to relieve symptoms (corticosteroid injections) or as a precaution (empirical antibiotics). The committee unanimously agreed that this should be avoided until an appropriate diagnosis was made or relevant diagnoses are ruled out.

DISCUSSION

Using the template of EULAR’s standardised operating procedures for the elaboration and implementation of evidence-based recommendations, we have established a set of recommendations endorsed by two professional organisations: EULAR and orthopaedic and rheumatological experts that diagnostic arthroscopy does not have a place in patients presenting with acute or recent onset swelling of the knee. Exceptional cases in which diagnostic arthroscopy could be considered are a suspicion of infection by Mycobacterium tuberculosis or by yeasts. In light of the invasiveness of the procedure and the risk of complications, the expert committee felt unanimously that arthroscopy solely for diagnostic purposes cannot be justified and should therefore be abandoned. Note that this recommendation does not extend to therapeutic arthroscopies, with the proviso that the therapeutic manoeuvres should be based on carefully obtained diagnostic information.

Recommendation

EORT. They represent the major medical specialties in the fields of musculoskeletal medicine, orthopaedic surgery and rheumatology.

The main aim was to find consensus with regard to a mutual field of interest, in order to better streamline professional opinions and performances across medical disciplines, and to avoid unnecessary variation in practice performance that is difficult to explain to patients, colleagues and decision makers.

The first topic of interest was chosen for reasons of convenience: “acute or recent onset swelling of the knee”.

This topic indeed provided common grounds, which is necessary for fruitful interdisciplinary discussion. Undoubtedly, the choice of the topic is of pivotal importance for the success of the process. If interdisciplinary opinions are very conflicting, the probability of establishing a consensual list of recommendations is likely to be low. Somewhat surprisingly, “acute or recent onset swelling of the knee” was not a topic in which opinions were extremely divergent, and it was not difficult at all to arrive at recommendations that were endorsed by rheumatologists and orthopaedic surgeons alike. Although this experience is encouraging with regard to future endeavours of consensus, it should be noted that the process of seeking expert consensus that we used may work well in the expert committee, but has no bearing outside the committee. EULAR therefore considers implementation of the recommendations as one of the most important steps of the entire procedure.

A methodological limitation of a “convenient topic” may be that the process of literature research becomes subordinate to the aim of achieving consensus. It was known in advance that the construct of “acute or recent onset swelling of the knee” was probably too specific to expect a great yield from literature research. A well recognised but complicating factor was that clinical research often has a particular disease as a starting point, rather than a symptom or a sign, and is usually carried out within the boundaries of a particular medical discipline. As a consequence, the yield of the literature research was very poor, stressing and confirming the paucity of “symptom-driven research”, especially if that symptom or sign covers different medical disciplines. A formal rating of the level of evidence supporting every recommendation was therefore disappointing (category 4 for all recommendations), and the consequent rating of the strength of the recommendation yielded level D.

The status of this set of recommendations therefore deviates from the status of other EULAR-endorsed sets of recommendations in rheumatology, in that the scientific strength of the recommendations does not surpass that of expert consensus. But consensus among specialists is a conditio sine qua non before fruitful research can be initiated, and this set of recommendations could also be seen as hypothesis generating, in addition to forming recommendations for clinical practice.

Every separate recommendation is a testable hypothesis that could be challenged in future clinical research performed by representatives of both professional organisations in order to increase the scientific evidence to such a level that a truly evidence-based set of rigorous recommendations becomes within the scope of a task force such as ours. It is therefore suggested that these recommendations deserve an update after approximately 5 years, so that new clinical evidence that has become available can be critically weighed and incorporated in the recommendations. In the meantime, both international societies will start to implement these recommendations by using them as a template for discussions with the stakeholders of the target population (general practitioners and other healthcare professionals), thus stressing the importance of uniformity of practice performance.

It is recommended to further endorse such task forces that may explore and weigh existing evidence at the interface of specialties and establish research agendas for the next decade, in order to improve the care for patients that present to orthopaedic surgeons as well as to rheumatologists. After this successful start, future collaborative task forces may also include representatives of patient groups, general practitioners and paramedics in health professionals, in order to further increase the coverage of the expert committee.

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