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## Review

# Managing monoarthritis in children



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## ABSTRACT

Monoarthritis, defined as inflammation of a single joint, requires a thorough physical examination in children, as pain may be lacking in 10% to 30% of cases and joint stiffness may be the only symptom. Joint aspiration is a crucial diagnostic tool that remains markedly underused. Joint aspiration may be unnecessary, however, when the family history or other investigations provide the diagnosis. Radiographs of the involved joint may supply information on the severity of the lesions. In doubtful cases and in patients with arthralgia, B-mode and Doppler ultrasound or magnetic resonance imaging (MRI) may confirm the presence of synovitis. Although suspected septic arthritis is an emergency and occurs frequently, particularly before 2 years of age, acute monoarthritis is often a post-infectious manifestation and therefore associated with a good outcome. Lyme disease should be sought, particularly when a lower limb joint is involved, as tick bites often go unnoticed. Chronic monoarthritis is very often a manifestation of juvenile idiopathic arthritis (JIA), which exists as several variants. Oligoarthritis is a specifically pediatric joint disease, whereas the other patterns of JIA have corresponding forms in adults, despite a number of specific features due to their onset during childhood. Tests for antinuclear antibodies should be performed routinely in children with monoarthritis persisting longer than 3 weeks. A decline in general health or a fever should suggest arthritis revealing a malignancy, which is a hematological disease in most cases. Finally, suggestive symptoms are often present in patients with less common causes such as auto-inflammatory diseases and connective tissue diseases.

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## 1. Introduction

The prevalence of childhood arthritis is estimated at 71/100,000 [1], with 75% of cases manifesting as monoarthritis (an inflammatory effusion in a single joint). Several distinctive features of pediatric monoarthritis must be borne in mind to ensure optimal management. The initial diagnostic workup must rapidly separate the causes that mandate prompt action (bacterial infection of the joint or manifestation of a malignancy) from those requiring targeted additional investigations. Joint aspiration is crucial in the vast majority of cases but may deserve discussion depending on the

child's age and diagnostic orientation. Evaluation in a specialized department is mandatory to establish the diagnosis.

## 2. Diagnosing monoarthritis in children

Monoarthritis is defined as inflammation of a joint and therefore by the cytological characteristics of the joint fluid. The inflammatory nature of the condition may also be defined clinically by the combination of local erythema, increased warmth, swelling, and an inflammatory time pattern of pain; or biologically by blood test results indicating systemic inflammation. However, a number of features are specific of the pediatric population.

There may be only few complaints from the child, and the problem may therefore be detected when another person notices a limp or decreased use of the affected limb. The diagnosis is particularly difficult in younger children, most notably before 2 years of age.

The time pattern of the pain is often challenging to determine. Pain at night should alert to the possibility of malignant disease, which is, however, a rare cause of monoarthritis.

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**Fig. 1.** a–d: examination of the joints in a child with suspected monoarthritis. a: limited extension and swelling of the right knee in a 5-year-old girl with antinuclear antibody-positive monoarthritis; b: monoarthritis of the right knee in a 13-year-old boy with enthesitis-related arthritis (juvenile spondyloarthritis); c: limited extension of both elbows in a 13-year-old girl with polyarticular juvenile idiopathic arthritis; d: limited extension of the fingers in a patient with chronic dry polyarthritis.

A thorough physical examination of all the joints, entheses, and spine must be performed, with the child in his/her underwear.

Examination of the joints should look not only for arthritis, but also for arthralgia and motion-range limitation, with a routine comparison of the two sides (Fig. 1). Joint involvement is missed in 10% to 30% of cases [2].

Osteoarticular B-mode or Doppler ultrasonography by experienced physicians or magnetic resonance imaging (MRI) can assist in the diagnosis when the presence of arthritis is in doubt.

Height and weight charts must be plotted to assess the potential systemic impact of the disease. Effects on school attendance and performance, sports participation, and sleep should be sought.

### 3. Joint aspiration: indispensable in monoarthritis?

Joint aspiration is the cornerstone of the diagnostic strategy, as the results show whether the effusion reflects inflammation, a mechanical disorder, or hemarthrosis. Although joint aspiration is the first-line investigation and is easy to perform in children older than 5 years with involvement of a large or medium-sized joint, it is not consistently performed in everyday practice. In some patients, the physical findings and other investigations establish the etiological diagnosis (i.e. presence of antinuclear antibodies in a young girl), thereby obviating the need for joint aspiration.

The joint-fluid tests include a cytological analysis to differentiate a mechanical condition from an inflammatory disease. The fluid should be tested for bacteria. Some of the more vulnerable organisms require special enriched media such as chocolate agar or blood culture flasks (*Neisseria gonorrhoea* and *Kingella kingae*). A search for monosodium urate crystals may be useful in patients with risk factors (overweight, disorders of metabolism, high intake of soft drinks) [3].

**Table 1**

History of diseases in the patient and family to be sought when evaluating a child with monoarthritis.

Family	Patient
<i>Spondyloarthritis</i>	<i>Skin</i>
Psoriasis	Psoriasis
Uveitis	Urticaria
Chronic IBD	Erythema nodosum, migrans
<i>Rheumatoid arthritis</i>	Purpura
	Raynaud, aphthosis
<i>Connective tissue disease</i>	<i>Infections</i>
Lupus	Recent ENT infection
Gougerot-Sjögren syndrome	Cyclic recurrent fever
<i>Auto-inflammatory diseases</i>	Conjunctivitis, diarrhea
Recurrent fever	Immune deficiency
Ethnicity	Recent vaccination
	Area of endemicity for tuberculosis or rheumatic fever
<i>Blood diseases</i>	<i>Bites and puncture wounds, animals</i>
Hemophilia	Tick bite
Hemoglobinopathies	Cat scratch
	Sea urchin spine or plant thorn
	Contact with sheep or goats

IBD: inflammatory bowel disease.

### 4. Other signs to look for

An in-depth medical history to collect information on the patient and family should be taken (Tables 1 and 2) and a thorough physical examination performed to look for clues to the diagnosis (e.g., psoriasis, lymphadenopathy, abdominal mass, or fever). The ethnic origin of the child may suggest specific diseases (such as auto-inflammatory conditions or Behçet's disease). A chronic course may indicate incipient juvenile idiopathic arthritis (JIA).

### 5. Diagnostic strategy

When definitive proof of the inflammatory nature of the effusion is not obtained, the diagnosis relies on the combination of an inflammatory time pattern, local evidence of inflammation, and laboratory tests indicating systemic inflammation.

The main differential diagnoses are mechanical effusions, which occur chiefly at the hips and knees. Radiographs followed by MRI establish the diagnosis. A diagnosis of posttraumatic joint effusion should be viewed with circumspection, as overdiagnosis of this condition is common, particularly after a trivial trauma, and subsequent events may indicate that the cause was incipient JIA.

In patients with inflammatory monoarthritis and suspected septic arthritis, several investigations must be obtained on an emergency basis, including joint aspiration, blood cultures, and a

**Table 2**

Investigations to evaluate pediatric monoarthritis, according to the setting.

Acute monoarthritis
Joint fluid aspiration (cytology and microbiology) – urgent if fever
<i>Laboratory tests</i>
Blood cell counts, ESR, CRP
Hemostasis
Blood cultures if fever
<i>Depending on the setting</i>
Serological tests: Lyme, parvovirus B19, Salmonella, Shigella, Yersinia, Campylobacter, antistreptolysins
Echocardiography
Serum uric acid
<i>Imaging studies</i>
Radiograph of the involved joint (± comparative if abnormality)
Mode B and Doppler ultrasonography if arthralgia and no arthritis

ESR: erythrocyte sedimentation rate; CRP: C-reactive protein.

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