An Overview of Juvenile Idiopathic Arthritis (And its mimickers)

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Learning objectives

1. Recognize the clinical findings associated with the various types of juvenile idiopathic arthritis

2. Recognize the laboratory and imaging findings associated with juvenile idiopathic arthritis

3. Recognize the long-term complications associated with juvenile idiopathic arthritis

4. Formulate a differential diagnosis for juvenile idiopathic arthritis

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Outline

- Background – what is arthritis
- Acute versus chronic arthritis
- Clinical features of JIA
- Exam findings of chronic arthritis and JIA
- Subtypes of JIA
- Clinical cases
- Complications of JIA
- Therapy for JIA

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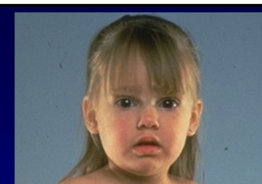
Case 1



[illegible overlapping text] ... 30-45 minutes ... nt limp for the last 5-6 weeks

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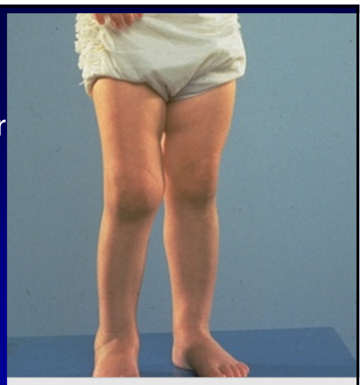
Case 1

No significant PMH or family history

Vitals normal for age

On examination

- Right knee swollen / Reduced flexion of right knee
- Flexion contracture
- Leg length discrepancy (R> L)
- Right ankle swollen



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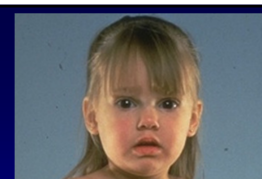
Case 1



Labs demonstrate

- Normal CBC w/ diff, ESR, and CRP
- ANA positive (1:320)
- Lyme screen non-reactive

Xray shows no abnormality

Does her normal lab studies, imaging, and absence of pain rule out juvenile arthritis?

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Arthritis

Defined as joint effusion alone or presence of two or more of the following:

- Limited range of motion
- Tenderness of pain on motion
- Tenderness to palpation
- Increased warmth of joint

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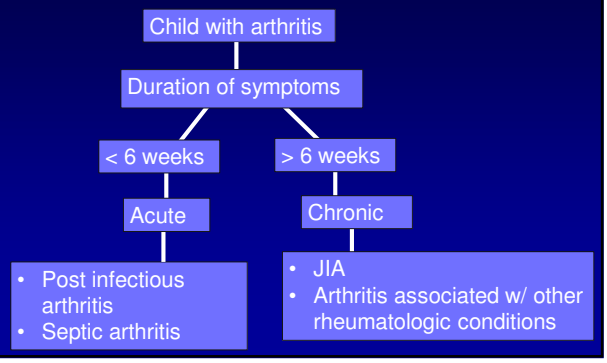
Acute vs Chronic arthritis



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	Acute	Chronic
Onset	Rapid	Insidious
Pain	Mod-severe	Absent to mild
Swelling	+++	++
Erythema	Can occur	Usually absent
Tenderness	Mod-severe	Absent to mild
Nighttime awakenings	Common	Uncommon

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Arthritis in kids

More common than you might think

- Juvenile Idiopathic Arthritis (JIA)
  - 1 in every 1,000 children
  - Girls > Boys
  - Ages 1 month to 16 years

JIA is as common as juvenile diabetes

JIA is the most common cause of disability in children

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Arthritis in kids

- Not all that different from adults!

- Similarities
  - Differentiation of acute versus chronic processes
  - Diagnosis largely based on history and physical exam
  - Same therapeutic agents
- Differences
  - Developmental implications
  - Proxy reports
  - Questionable cooperation
  - Weight-based dosing
  - Need for liquid meds
  - Pharmacokinetics

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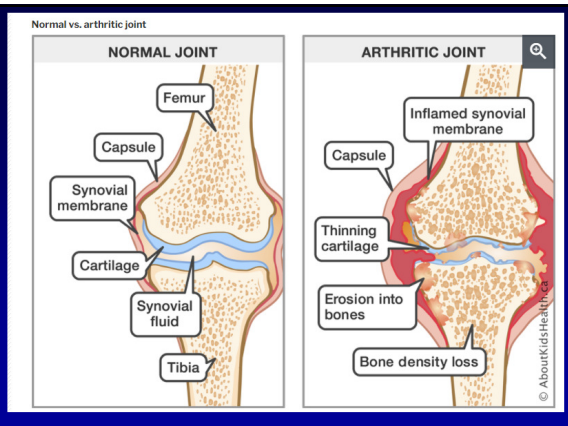

https://www.aboutkidshealth.ca/article?contentid=1049&language=english

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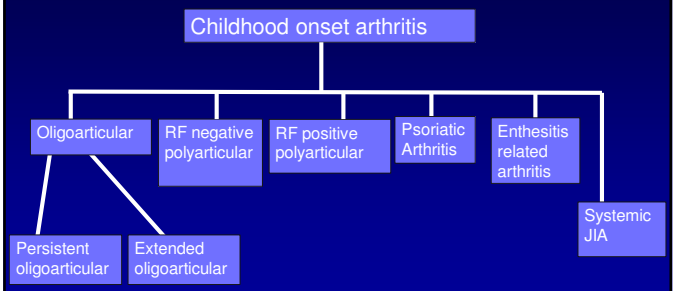
Current arthritis classification



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Diagnosing arthritis in children

- Pattern recognition
  - Characteristic history
  - Arthritis on physical exam
  - Chronic changes consistent with arthritis
- Exclusion of other entities

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Characteristic history

- Stiffness, especially in the morning or after periods of inactivity
- Swelling
- +/- Pain
- Loss of function

Nighttime awakenings are uncommon

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Characteristic history

- Common stories
  - Trouble getting up from "circle time" at school
  - A painless limp
  - Trouble "keeping up" with peers
  - Increased "clumsiness"
  - Using fists to push up off of the ground instead of palms

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Characteristic history

KEY POINT: Some children with JIA never complain of pain!

- Think of JIA when stiffness is present in the morning and improves throughout the day

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Good questions to ask when a child has joint pain

- When is the pain (or stiffness) worst?
  Pain from JIA is usually worst in the AM.
- What makes the pain go away?
  Activity decreases symptoms of JIA.
- Have you ever seen your child limp?
  Kids with JIA limp, kids with "growing pains" don't.
- Does pain awaken your child at night?
  Nighttime awakening is usually not JIA.

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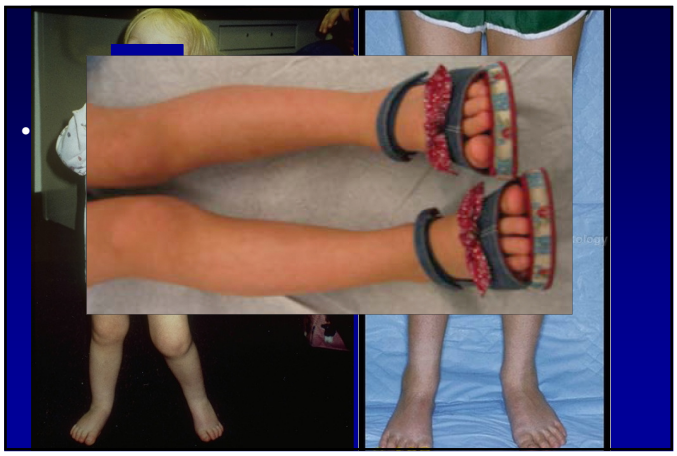

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Exclusion of other diseases

- Infections
  - Septic arthritis, osteomyelitis
- Malignancies
  - Leukemia, osteoarticular disease
- Orthopedic conditions
- Trauma
- Other rheumatologic diseases

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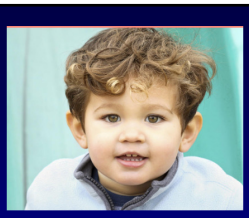
Case 2



Bryce is a 3-year-old male who presents to clinic with limp and leg pain

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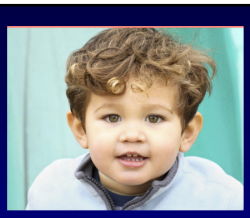
Case 2



- Has a limp and complains of right knee/thigh pain throughout the day (will refuse to bear weight at times)
- Is waking up 2-3 times per night with severe leg pain
- No systemic symptoms

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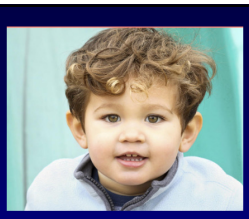
Case 2



- He was seen at a local urgent care recently and given a 7-day course of prednisone
- Felt better for a few days but his symptoms returned after he completed prednisone

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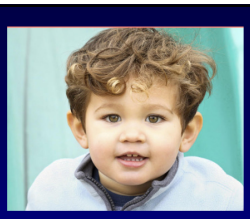
Case 2



Vitals: normal for age

Exam shows

- Well-appearing toddler
- Right knee has an effusion, severe articular and periarticular tenderness
- Cries with weight bearing
- Normal exam otherwise

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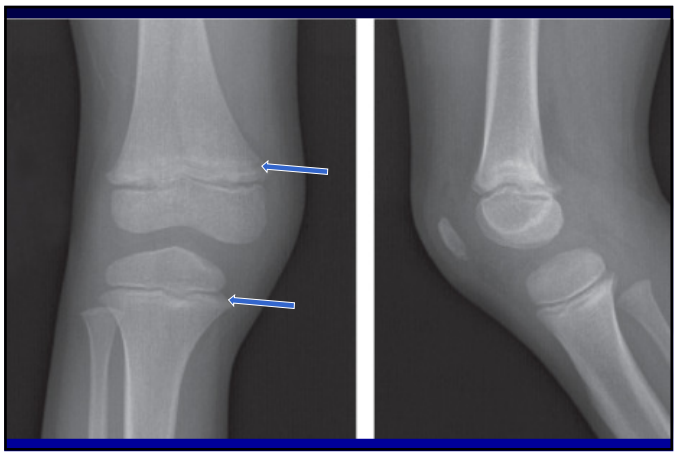

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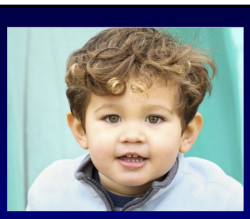
Case 2

Does this child have JIA?



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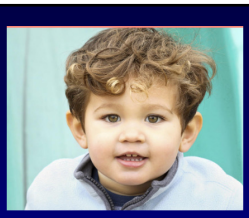
What were the clues for leukemia?



- Severe joint pain
- Nighttime awakenings
- Extraarticular joint pain
- Thrombocytopenia
- Radiographic findings

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KEY POINTS

The following are not typical of JIA

- Nocturnal pain
- Severe pain
- Neutropenia and/or thrombocytopenia

DO NOT GIVE STEROIDS TO ANY CHILD WITH JOINT PAIN!!!

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Acute leukemia vs JIA

•Leukemia patients had bone pains increasing in severity at night independent from joint pain.
•JIA patients found to have morning stiffness, swelling and mild pain.
•Elevated uric acid and LDH are more common in ALL
•Absence of morning stiffness can be a clue to ALL
•Thrombocytopenia more common for ALL and thrombocytosis for JIA
•Absence of blasts on smear cannot exclude ALL as it may not be seen in smears up to 83% of cases

Demir, Ferhat et al. "A case of acute lymphoblastic leukemia mimicking juvenile idiopathic arthritis." *Northern clinics of Istanbul* vol. 6,2 184-188. 23 May. 2019, doi:10.14744/nci.2018.48658

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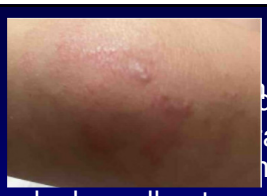
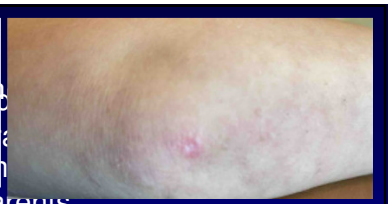
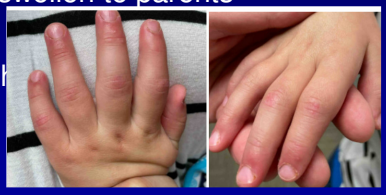




look swollen to parents

Also



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Can a laboratory test diagnose JIA?

- NO!!!
- But...
  - Labs are useful in excluding alternative diagnoses.
  - Labs can help define risk for associated conditions.
  - Labs may be required before starting certain medications.
  - Labs must be monitored while on certain medications

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Characteristic lab findings

- Hemoglobin - Normal or decreased
- WBC - Normal or increased
- Platelet count - Normal or increased
- ESR - Normal or increased
- ANA - + in 40%
- RF / CCP - + in <5%

KEY POINT: Labs are usually normal in kids with JIA.

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Other useful labs

- In specific contexts…
  - Specific antibody tests (serologies)
    - Strep studies, viral titers (parvovirus, EBV, CMV)
  - Specific tests for other rheumatic diseases
    - muscle enzymes (dermatomyositis)
    - autoantibodies (SLE and MCTD),
    - organ injury, inflammatory parameters (vasculitis)
  - Joint fluid studies
    - indicated only when septic arthritis is suspected.

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Can studies be useful in JIA?

- X-rays
  - Can sometimes see joint inflammation or its effects
  - Can be used to exclude other diseases

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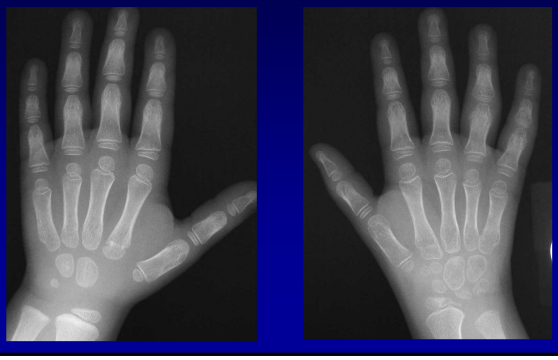
Which side is normal?



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KEY POINTS

- **Kids get arthritis too! (1/1000 children)**
- **No lab test or imaging study is diagnostic of JIA**
- **Absence of pain and normal labs and/or imaging doesn't rule out JIA**

DON'T GIVE STEROIDS FOR KIDS WITH JOINT PAIN

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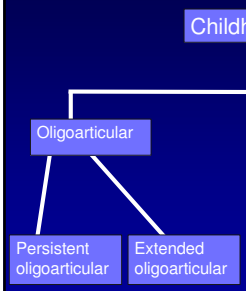
Current arthritis classification



40-50% of cases of JIA

Involvement of ≤4 joints at onset

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Oligoarticular JIA (AKA Pauciarticular JIA)

- Girls
- Peak
- Most
- Increa

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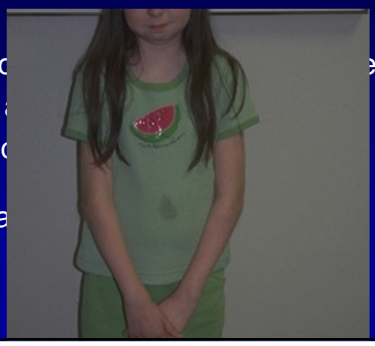

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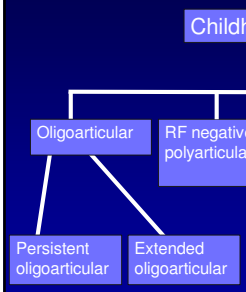
Current arthritis classification



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RF negative polyJIA

- Biphasic trend with peak at ages 1-3 years and another in late childhood
- Knees, wrists, ankles are most affected
- 20% have hip involvement at presentation
- May see systemic manifestations such as growth disturbance, fatigue, and weight loss

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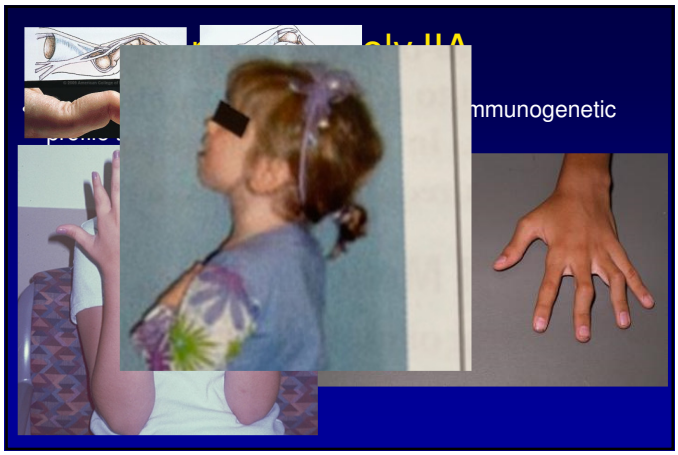

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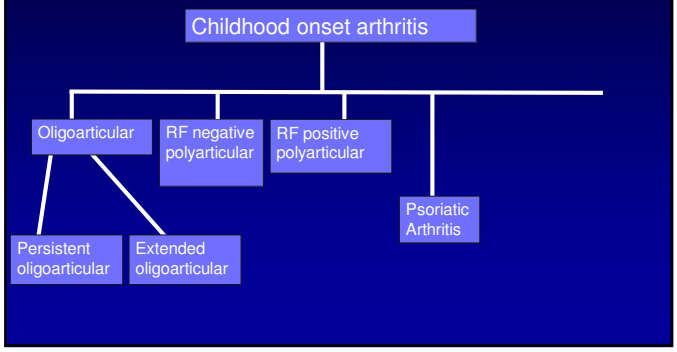
Current arthritis classification



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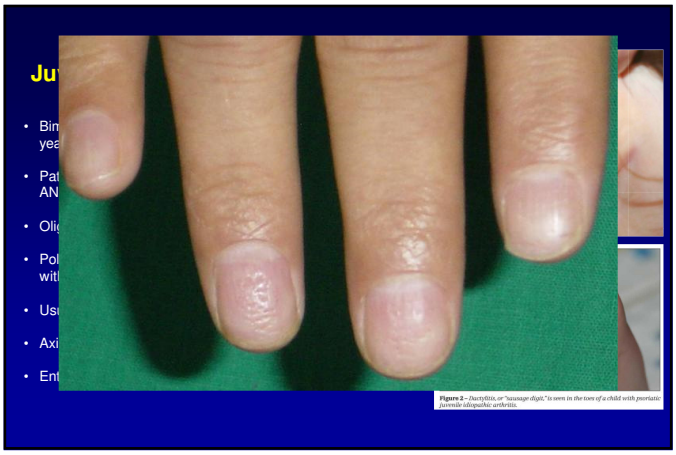

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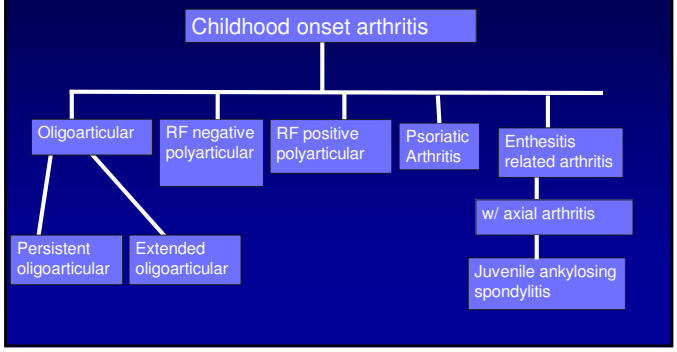

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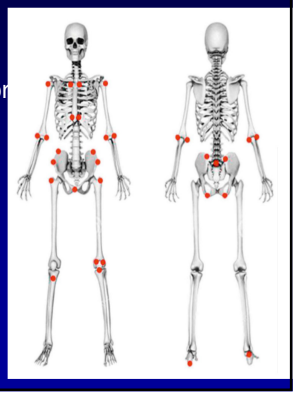
Enthesitis Related Arthritis

Peripheral Joint Arthritis and/or
- Sites of attachment of ligament, tendon, fascia, or capsule to bone

Enthesits on exam
- Marked localized tenderness or swelling at the entheseal insertion into the bone



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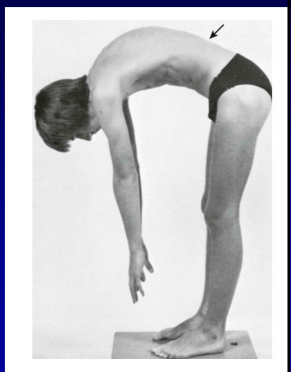
Enthesitis Related Arthritis

Axial arthritis (spine or SI joint)

The rigid spine of longstanding ankylosing spondylitis is rare in children



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Case 4

I received a call from a pediatrician who is very worried about a 12-year-old male with fever for 3 weeks and intermittent rash

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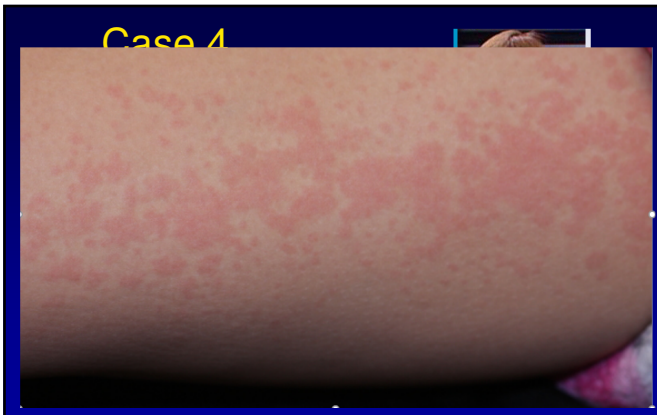
Case 4



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Case 4

Recently admitted

- Bilateral knee effusions
- Extensive ID and Rheum eval negative

Labs demonstrated

-Leukocytosis (25,000 with neutrophilia)

-ESR 80 mm/hr, CRP 14 mg/dL

-Ferritin 1800

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Case 4

Diagnosed with an acute arthritis and sent home with naproxen

Fever and rash continue and now has diffuse joint pain and swelling

Fever pattern has changed and is now unremitting

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Case 4

Examination notable for severe polyarthritis and faint maculopapular rash on trunk and arms

Ill appearing but non-toxic

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Case 4

Lab	Today	One week ago
WBC	2000	25,000
Hgb	12	12.5
Platelet count	80,000	560,000
Ferritin	16,000	1800
ESR	2 mm/hr	80 mm/hr
AST/ALT	> 5 x ULN	Within normal limits
CRP	26 mg/dL	14 mg/dL

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Case 4

Who's worried about this patient?

What are his diagnoses?

Systemic JIA with macrophage activation syndrome (aka secondary hemophagocytic Lymphohistiocytosis)

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Systemic onset JIA

- Systemic inflammation in association with arthritis
- Equal number of boys and girls
- No peak age of onset
- Arthritis may be severe and polyarticular or mild

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Systemic onset JIA

- Diagnostic criteria
  - Characteristic fever curve
  - Arthritis
  - Any one of the following:
    - Characteristic rash
    - Hepatosplenomegaly
    - Lymphadenopathy
    - Serositis

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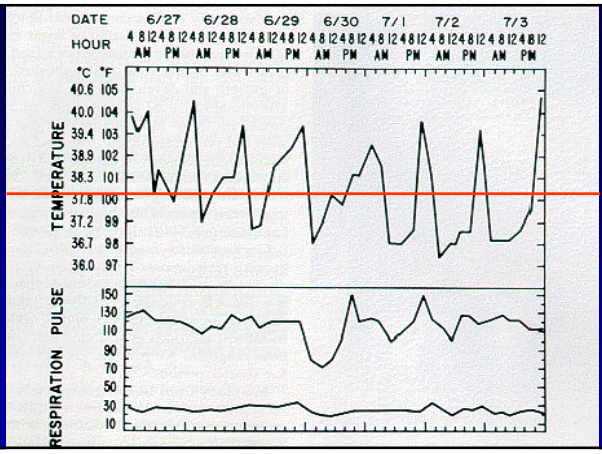

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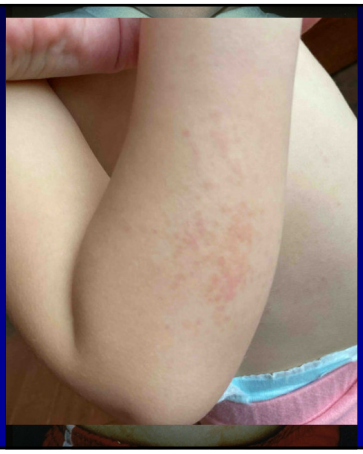

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Macrophage Activation Syndrome (MAS)

AKA: Secondary Hemophagocytic Lymphohistiocytosis (HLH)

- Devastating complication of SJIA (10-15% of patients)
- Prominent activation of T cells and macrophages → overwhelming systemic inflammatory response
  - Usually occurs during periods of active disease
  - Can be triggered by infections (esp. HSV, VZV, CMV, EBV)

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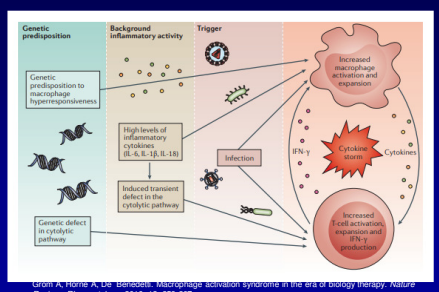
Macrophage Activation Syndrome (MAS)



Grom A, Horne A, De Benedetti. Macrophage activation syndrome in the era of biologic therapy. *Nature Reviews Rheumatology*. 2016; 12: 259-267

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Table 14–2 -- The main clinical and laboratory features of macrophage activation syndrome

Clinical	Laboratory
Unremitting fever	Fall in ESR
Bruising, purpura, and mucosal bleeding	Fall in WBC and platelet counts
Enlarged lymph nodes, liver, spleen	Elevated ferritin
Liver dysfunction (jaundice, liver failure)	Elevated liver enzymes and LDH
CNS involvement (disorientation, seizures)	Elevated triglycerides
Multiple organ failure	Fall in fibrinogen and elevated D-dimers. Prolonged PT and PTT
	Bone marrow hemophagocytosis

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Which of the following statements about systemic JIA are true?

A. Macrophage activation syndrome (MAS) is a complication that occurs in approximately 10-15% of children
B. Systemic JIA is an autoinflammatory disorder
C. Macrophage activation syndrome typically occurs during periods of active disease
D. Presents with a quotidian fever pattern
E. All of the above

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Which of the following statements about systemic JIA are true?

A. Macrophage activation syndrome (MAS) is a complication that occurs in approximately 10-15% of children
B. Systemic JIA is an autoinflammatory disorder
C. Macrophage activation syndrome typically occurs during periods of active disease
D. Presents with a quotidian fever pattern
E. All of the above

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Which of the following are true regarding RF positive polyarticular JIA?

A. They present at a younger age of onset than RF negative polyarticular JIA
B. Symmetric involvement of the small joints of hands, wrists, and small joints of feet is characteristic
C. Their risk of joint damage is lower than children with RF negative polyarticular JIA
D. None of the above

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A 5-year-old male presents to clinic with dactylitis, asymmetric polyarthritis (affecting both small and large joints), and nail pitting. What JIA subtype is most likely?

A. Enthesitis related arthritis
B. Juvenile psoriatic arthritis
C. Polyarticular JIA
D. Systemic JIA
E. None of the above

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D. Systemic JIA
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Complications of JIA

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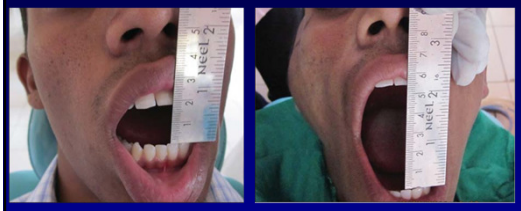
TMJ arthritis and JIA



Maximal Incisal Opening

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TMJ arthritis and JIA

Deviation upon opening

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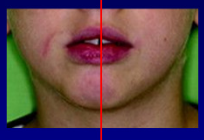
TMJ arthritis and JIA

Symmetry



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Goals of therapy for JIA

- Control symptoms
- Arrest inflammatory process
- Preserve function
- Prevent deformity

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Treatment of juvenile arthritis is a team effort!

- Primary Care Physician
- Pediatric Rheumatologist
- Nurse
- Social Worker
- Physical Therapist
- Occupational Therapist
- Ophthalmologist
- Orthotist

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How do we treat JIA?

- Medications
- Physical & Occupational Therapy

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Medications for JIA

- The therapeutic pyramid
  - NSAIDs
    - naproxen, indomethacin, sulindac

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Medications for JIA

- The therapeutic pyramid
  - NSAIDs
    - naproxen, indomethacin, sulindac
  - Intra-articular long-acting steroids
  - Disease modifying agents
    - methotrexate, sulfasalazine, leflunamide
  - Biologic agents
    - etanercept, infliximab, adalimumab, abatacept, anakinra

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Medications for JIA

- Bridging medications
  - Low dose oral steroids (0.5mg/kg/day)
  - Avoid Narcotics

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PT & OT for JIA

- Goals:
  - Relieve discomfort
  - Maintain joint function
    - Range of motion exercise program
    - Splints
    - Gait/posture training
  - Restore conditioning

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Outcomes in JIA

- Remission rates 70-85% within 2-5 years
  - oligoarticular >90%
  - polyarticular ~50%
  - systemic <50%
- *After remission, all that's left are residual chronic deformities and visual disturbance*

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What work up should I do?

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THANK YOU SO MUCH!

ANY QUESTIONS

Please reach out anytime

My cell is 218-988-2669

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