HOW TO APPROACH A CHILD WITH A LIMP

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DISCLOSURES

- I have participated in Advisory board for Silvergate pharmaceuticals for Xatmep
- I do not plan to discuss this medication or any unapproved or off-label use of this medication
- I will briefly discuss off-label use of FDA approved medications

OBJECTIVES

- Review definition of limp and abnormal gait
- Evaluate a child presenting with a limp
- Discuss cases involving limp (presented to rheumatology)
- Develop differential diagnosis in a child with limp
- Identify when to order “rheumatologic labs”
- Recognize when to refer a patient to rheumatology

DEFINE LIMP

- Deviation from normal age-appropriate gait pattern → uneven, jerky walking
  - Cause = weakness, pain, deformity due to many different conditions
- Limp not related to trauma = 1.8 per 1000 children
- Average age = 4 years
- M>F
- Unilateral limp more common

-Naranje S, Kelly DM, Sawyer JR. *Am Family Physician* 2015
-Shah AP, Indra S, Kannikeshwaran N . *Pediatr Ann*. 2015

DEFINE GAIT

Normal: stance phase and swing phase developed around age 3 years

- Stance – foot in contact with ground (60%) – 5 phases
- Swing – foot in air (40%) – 3 phases

Disordered: antalgic and nonantalgic

- Antalgic = **pain** in affected extremity → shortening of the stance phase and increase in swing phage in affected leg (DDx: trauma or infection); patient wants weight off affected extremity.
- Nonantalgic – Trendelenburg gait – pelvis tilts toward unaffected side during swing phase (weakness in contralateral gluteus medius) (DDx: DDH, LCP, SCFE)
- Steppage gait – excessive flexion of hip and knee joints during swing phase due to inability to dorsiflex foot (CP, neurologic disorder)
- Vaulting or circumduction gait – hyperextension and locking of knees at end of stance phase often due to leg length discrepancy

Shah AP, Indra S, Kannikeshwaran N et al. *Pedatr Ann*. 2015

CAUSES OF LIMP

- Injuries/Trauma
- Leg length discrepancy
- LCP (AVN of femoral head); SCFE
- Transient synovitis
- Septic joint, osteomyelitis
- Inflammatory - arthritis
- Cancer (neuroblastoma, leukemia, solid tumors)
- Spinal problems: spondylolysis – injury to vertebrae from increased flexion or extension of spine; spondylolisthesis
- Muscle problems: muscular dystrophy

Theodorakidis A, Papineau A, Mares A et al. Limping. Sick Kids. www.aboutkidshealth.ca. accessed on 6/4/19

CLUES

History finding	Possible etiology
Acute onset	fracture
Abdominal pain	Acute abdomen, psoas abscess
Back pain	Diskitis, vertebral osteomyelitis
Fever, anorexia, weight loss	Malignancy, osteomyelitis, rheumatologic disorder, septic arthritis
Bleeding disorder	Hemarthrosis, hemophilia
Insect bite	Lyme disease
Intermittent pain at rest	Malignancy
Migratory polyarthralgia	ARF, gonococcal arthritis
Morning stiffness	JIA, stress fracture
Pain at night	Malignancy
Burning	Nerve involvement
Constant	Infection/malignancy
Decreased by activity	JIA
Focal	Fracture, infection, malignancy
In AM or after inactivity	JIA
Increased with activity	Overuse injury, stress fracture
symptoms preceding diarrhea	Reactive arthritis

Naranje S, Kelly DM, Sawyer JR. *Am Family Physician* 2015.

PHYSICAL EXAM CLUES

Exam finding	Possible etiology
Abdominal mass	Neuroblastoma, psoas abscess
Abdominal tenderness	Acute abdomen
Asymmetric gluteal and thighs skinfolds	DDH
Calf hypertrophy	Muscular dystrophy
Conjunctivitis, enthesitis, oliogarthritis, urethritis	ReA
ECM	Lyme disease
Hepatomeglay, splenomegaly, LAD	Malignancy, rheumatologic disorder
joint swelling	Hemophilia, JIA, ReA, septic arthritis
Malar rash	SLE, JDM
FABER: Flexion, abduction, ext. rotation	Sacroiliac joint pathology
Loss of internal rotation	Intra-articular hip (LCP, SCFE)
Refusal to bear weight, painful and limited ROM in all planes	Septic arthritis

Naranje S, Kelly DM, Sawyer JR. *Am Family Physician* 2015.

WHAT IS YOUR *SYSTEMATIC* APPROACH?

History

- Age, gender
  - Developmental or congenital
- Duration of symptoms – acute vs chronic
- Systemic signs: fever, rash
- Preceding trauma/injuries or illness
- Pain?
- Stiffness in AM worse than rest of day
- Refusal to bear weight vs. abnormal gait

SYSTEMATIC APPROACH

Physical exam

- general appearance, vitals (fevers vs. no fever)
- Gait evaluation
- Neuro evaluation
- Signs of injury (bruising)
- Bony pain, vs. general pain
- Joint swelling
- Other joints with pain
- Back exam

APPROACH

Labs/studies – dictated by differential diagnosis

- CBC/diff, blood culture, CRP, ESR
- Lyme test if in endemic area
- Synovial fluid, gram stain
- Xrays, ultrasound, MRI

Management

- Depends on diagnosis
- Trauma – surgery vs. casting
- Inflammatory - NSAIDs
- Infectious – antimicrobials
- Physical therapy

Shah AP, Indra S, Kannikeshwaran N et al. *Pedatr Ann*. 2015.


Learning is not a spectator sport.
Get in the game!

CASE 1

HPI

- 14 year old female presents to PCP for joint pain
- Limp for 2 months; initially thought due to increased soccer practice
- Now worse; pain & swelling in knees, ankles, elbows esp. in AM
- Increase in fatigue and new rash on face in addition to acne
- 5 pound weight loss over past 6 weeks (unintentional)

+ROS: fatigue, weight loss, joint pain and swelling, headaches, rash

Otherwise unremarkable

CASE 1 – PHYSICAL EXAM

- BP 140/95; Wt: 95 lbs; otherwise vitals w/nl
- General: NAD
- Derm: *acne on face, rash on cheeks, nasal bridge spares nasolabial folds*
- HEENT/Pulm/GI: w/nl
- MSK: *arthritis* in b/l knees, elbows, ankles
  - *putting weight on affected legs → waddling gait (unable to bend at hip and knee joints)*
  - Unable to fully extend right knee
- Remainder of systems unremarkable

PROBLEM LIST

- Limp
- Joint pain and swelling
- Fatigue
- Weight loss
- Acne
- Headaches
- Elevated blood pressure
- Arthritis on exam
- Malar rash on exam

WHAT ELSE DO YOU NEED TO KNOW….

- Previously healthy – denies prior URI or virus
- Stress at school but not unusual
- Sleeps ok at night – even more than normal lately
- Any new meds?
  - Ibuprofen for joint pain
  - *Medication for acne started by dermatologist; can't recall name*
  - *With probing, she recalls it is an antibiotic starting with and "m." She affirms it is minocycline once you state name*

LABS?

- CBC/diff
- CMP
- UA
- Spot urine protein/urine creatinine
- C3/C4
- ESR
- CRP
- ANA
- Anti-histone Ab
- Anti dsDNA
- SSA/SSB
- Anti RNP
- Anti smith Ab
- EBV antibodies
- Cocci panel

RESULTS OF LABS

- CBC/diff – **hgb 10, WBC low at 2***
- CMP – w/nl
- UA – no protein, no protein
- Spot urine protein/urine creatinine – 0.2
- C3/C4 – **C3 slightly low at 72,** C4 w/nl
- ESR – **elevated at 52**
- CRP – **elevated at 3** (<=0.9)

*peripheral smear w/o blasts and relatively unremarkable

- **ANA + 1:640**
- **Anti-histone Ab – positive**
- Anti dsDNA - negative
- SSA/SSB – negative
- Anti RNP- negative
- Anti smith Ab - negative
- EBV antibodies – h/o past infection
- Cocci panel - negative

PROBLEM LIST

- Limp
- Joint pain and swelling
- Fatigue
- Weight loss
- Headaches
- Elevated blood pressure
- Elevated ESR, CRP
- **Arthritis on exam**
- **Malar rash on exam**
- **+ANA**, +anti-histone Ab
- *Decreased C3*
- **Anemia, leukopenia**
- ***Acne treated with minocycline prior to onset***

DIAGNOSIS AND MANAGEMENT OF PATIENT 1

- suspected diagnosis=drug induced lupus secondary to minocycline
- You d/c minocycline and refer to dermatology for alternative treatments
- Refer to rheumatology for confirmation and treatment
- Seen by rheum → rash improving, acne worse; arthritis *not* better
    - starts hydroxychloroquine → resolution in 5 months of symptoms → hydroxychloroquine discontinued

DRUG INDUCED LUPUS ERYTHEMATOSUS

- Clinical manifestations similar to idiopathic SLE
  - More severe manifestations rare
- Pathogenesis
  - Acetylator status
  - Anti-histone autoantibodies
- Diagnostic criteria variable
- Treatment
  - Discontinuation of medication
  - NSAIDs, antimalarials, corticosteroids

Borchers A, Keen CL, Gersh E. *Annals of the New York Academy of Sciences*, 2007.

CAUSES OF DIL

High	Moderate	Low	Very low

- Antiarrhythmics – Procainamide, Quinidine
- Antihypertensives – hydralazine, methyldopa, captopril
- Anticonvulsants – carbamazepine, ethosuximide
- Antithyroid drugs - propylthiouracil
- Antibiotics – **Minocycline**, Isoniazid, Nitrofurantoin
- Antipsychotics – Chlorpromazine, Lithium

Other medications:

- D-Penicillamine
- Diltiazem
- Sulfasalizine
- Anti TNF-alpha; etanercept, adalimumab, infliximab, certolizumab pegol, golimumab
- Statins

Rubin RL. Drug-induced lupus. *Toxicol*. 2005.

CASE 2

4 year old female referred to rheum clinic

CC: joint pain and weakness x 2 months

HPI

- Seen at PCP 6 weeks prior to visit: x-rays nl (b/l femur, pelvis, tib/fib)
- 1 week later unable to ambulate → admitted to OSH
  - CBC/diff, CMP w/nl, CK nl, ESR 18 (0-10), CRP w/nl
  - MRI of left knee w/o contrast 4 weeks ago: periosteal edema along distal femur and proximal tib/fib – ddx: inflammatory or traumatic periostitis
  - Discharged on ibuprofen→ f/up with PCP → referral to rheumatology

HPI CONT…

About 4-5 weeks after last inpatient visit

- Pain was worse at night initially but now all day
- Acetaminophen helps briefly

ROS

- No rashes, no stomach pain; decrease in appetite
- Mom notes she appears pale and bruises easily
- Afebrile currently; flu 2 weeks ago w/ fever resolved

PHYSICAL EXAM

- Temp 36.7, P: 96
- Thin appearing, no rashes, appears pale
- Tender to palpation on lower extremities; cries when LE moved; reluctant to move LE
- Difficulty walking; appears weak; holds onto wall for support
- No joint effusions, no contractures

WHAT NEXT?

a) Start oral prednisone 2 mg/kg day x 7 days since she had periosteal reaction on MRI

b) Order ANA, RF, dsDNA and f/up in 1 month

c) Refer to orthopedics since no effusions on exam

d) CBC/diff, ESR, CRP, CMP

LABS

- CBC/diff: Hgb 10.3, wbc w/nl; platelets 61,000, bands 2%, lymphs 94%, ANC 400
- ESR – 58
- CRP – normal
- CK – normal
- LDH – normal
- Uric Acid – normal
- Blood smear – normochromic, normocytic anemia

WHAT IS THE NEXT STEP?

a) Start pulse Solumedrol 30 mg/kg IV

b) Call hematology/oncology

c) Check ANA, RF, ASO

d) Supportive care and reassurance

CALL HEME/ONC

- Labs repeated stat - cbc/diff with wbc 3 (4-12), hgb 9.5, plt 45,000, diff same
- smear repeated and showed 0.6% blasts

PRESENTATION OF LEUKEMIA CAN MIMIC JIA

- Initial presentation of leukemia may be MSK pain with normal cbc
  - Delay diagnosis of leukemia while focusing on arthritis
  - 2/3 of cases involve MSK system and arthritis may be only symptom
- Malignancy – nighttime pain, non-articular bone pain, no joint stiffness
  - Painful oligo presentation more typical
  - Lymphocytosis more common than neutrophilia
  - Normal or low platelet count
  - Pain severe disproportionally to findings

Murray MJ, Tang T, Ryder C, et al. *BMJ*. 2004.

CASE 3

CC: LIMP

HPI

- 3 y/o female presents to PCP
- Limping for past 5 weeks but otherwise ok
- Initially parents thought limp from falling off tricycle
- 5 weeks later still limping
- Waking up in AM with inability to straighten left leg
- Takes about 2 hours until she starts to play – used to be immediate
- ibuprofen x 1 dose—not sure if helped but scared to give any more

ROS

- No fevers, no chills, no weight loss
- + *Slight increase in fatigue*
- No rashes
- No cough, runny nose
- No vomiting, diarrhea, stomach pain; appetite baseline (picky)
- Meeting milestones
- MSK: left knee swelling; no redness, +warmth; +limp; no pain

On exam PCP notes warmth of left knee, limping …what next?

RHEUMATOLOGY REFERRAL

Physical exam 1 week later

- Vitals w/nl
- General: smiling, playful until examination
- MSK: **arthritis of left knee, right ankle, left shoulder**
- Remainder of exam normal

Labs: CBC/diff unremarkable

ESR 20 (<=10) , CRP w/nl

CRP w/nl, CMP unremarkable

ANA +, RF negative, HLAB27 negative

PROBLEM LIST

- Limping
- Joint swelling x 6 weeks
- Arthritis of left knee, right ankle, left shoulder
- ESR elevated
- ANA+

Diagnosis??

JUVENILE IDIOPATHIC ARTHRITIS

- JIA – diagnosis of exclusion
- Labs important in JIA
  - *NOT* for diagnosis
  - CBC/diff preliminary screening for infection, malignancy
  - ANA- predicts presence of uveitis
- ANA, RF, HLAB27 helpful in diagnosing *type* of JIA

CLUES LEADING TO A DIAGNOSIS OF JIA

- AM stiffness
- Swelling of joint; decrease in ROM worse in AM
- Joint *warm* but *not* red
- Patient afebrile and otherwise healthy

IMAGING STUDIES

- Baseline x-rays—evaluate for fracture, osteopenia, signs of infection
- Ultrasound – operator dependent and still limited in evaluation of arthritis
- MRI of joint *with and without contrast* – most sensitive way to determine inflammation/synovitis.

MANAGEMENT OF JIA

- Physical therapy
- Ophthalmology referral
- NSAIDs
- Intra-articular corticosteroid injections
- DMARDS – MTX, sulfasalazine, leflunomide
- Biologic medications (FDA approved for children): TNF antagonists, anti IL-1, anti IL-6, selective T-cell co-stimulation modulator

CASE 3: MORE THAN JOINT PAIN

CC: joint pain and abnormal labs

HPI: 12 y/o Hispanic female referred to rheum for elevated ANA, joint pain

- Notes it is "hard to walk" and "feet burn"
- Symptoms began 2 months prior: right elbow, pain, decrease ROM, no injury
- Initially pain and redness present so mom took her to OSH ED
  - X-ray showed effusion
  - Diagnosed with infection and started on antibiotics
- next few weeks → trouble walking and burning on feet
- ankle pain and leg pain (R>L) → difficulty walking and weakness
- Pain with movement and pain worse in AM

HPI CONT…

- Denies wrist or hand pain; +difficulty opening bottles and buttons
- Denies joint swelling, change of color in fingers/toes
- +numbness in feet → difficulty walking
- Missing school due to weakness and falling
- Fatigues easily – started 2 months prior to presentation
- Weight loss of 14 lbs. in 2 weeks
- No fevers. No rashes, no hair loss. No headaches. no vision changes
- Depression once symptoms started

CLINICAL SUMMARY

Outside Labs/imaging 1 month prior:

- CBC/diff unremarkable,
- **ANA+; dsDNA 14 (0-9), RNP 7 (0-9), anti smith Ab > 8 (0-0.9)**, anti Jo-1 normal, SSA/SSB negative, anti-centromere negative
- ESR 6, CRP w/nl. CMP with slightly low albumin 3.5 (3.8-5.6)

Brain MRI with and w/o contrast done in past month:

- No masses or fluid collections,
- no significant white matter signal abnormalities
- no evidence of demyelination; gray-white matter well differentiated
- Few scattered lymph nodes in visualized upper neck

REVIEW OF SYSTEMS

- General: **+ fatigue**; **+ weight loss: 12-14 pounds** ; no fever; **+ weakness**
- HEENT: no mouth sores; no red eyes, blurry vision or eye pain; No LAD
- Dermatology: no rash
- CV: no chest pain or palpitations
- Pulm/Immunology: no cough; no shortness of breath, no frequent infections
- GI/ENDO/GU negative
- Neuro: no headache; **+dizziness; + numbness of feet; + tingling of feet**
- Musculoskeletal: **joint pain in elbows, knees; joint stiffness; muscle pain/weakness;** no back pain, no joint swelling; **+AM stiffness**
- Psychiatric: **depression** related to symptoms; +difficulty falling asleep

PHYSICAL EXAM

Vitals: 45.3 kg (106% of IBW). Ht: 151 cm. Temp: 36.6 C (97.9 F)
HR: 80 BP: 112/69. SpO2 99% Pain Level 0/10

- General: alert; crying at times; *weak/lethargic, holding onto walker*
- HEENT/Pulm/CV/GI: w/nl
- Neuro: oriented x3; finger – nose limited given *unsteady hands*. Unable to ambulate secondary to weakness. *Patella reflexes absent*; *unable to sit up on own - unsteady*
- Skin: no rash; no cyanosis of hands and feet; *pale appearing*
- MSK: *unable to fully extend or flex arms at elbows*; no effusion; *unable to lift arms up over head* due to pain; slight *tremor* when trying to lift arms; *unbale to make a fist*
- No effusions in knees/ankles but *not able to extend legs*
- Gait/Station: *gait and stance abnormal;* unable to ambulate on own or hold self up at core; unsteady

PROBLEM LIST

- Weakness
- Weight loss
- Inability to ambulate
- Missing school
- Atrophy of muscles on exam limiting ROM
- Depression
- Rapid change from baseline
- Outside labs: ANA+, dsDNA+, +RNP, +anti Smith Ab
- Exam: no patella reflexes, unable to walk or hold herself up at core
- Tremors with movement
- Slightly low albumin

PROBLEM LIST CONT…

BUT…

-no malar rash, no oral ulcers, no seizures or unexplained change in mental status

-normal ESR and CRP and cbc/diff at outside

-normal brain MRI at OSH

-dsDNA modestly elevated

-no arthritis on exam – muscle atrophy and weakness

- And family lives 2 hours away

Now What?

ADMIT TO INPATIENT

Labs done on admission

- **ANA positive = 1:640**
- *dsDNA negative*
- **RNP +**
- SSA/SSB negative
- Anti Smith negative
- ANCA negative
- anti TPO Ab, anti thyroglobulin Ab positive
- CBC/diff with wbc 3.5 (4-10.5) otherwise negative
- **UPC 0.625**
- C3/C4 w/nl
- ESR 74, CRP mildly elevated

LUMBAR PUNCTURE

- CSF: Pink, clear
- WBCS 18 H 0-5 CELLS/uL; RBC 9000 (0-5 cells/uL)
- SEGMENTED NEUTROPHILS 3 0-6 %
- LYMPHOCYTES 90 H 40-80 %
- MONOCYTES 7 L 15-45 %
- DIFF TYPE MANUAL
- SEGMENTED NEUTROPHILS,CSF LYMPHOCYTES,CSF MONOCYTES,DIFF TYPE
- GLUCOSE, CSF 66 40-80 mg/dL
- TOTAL PROTEIN, CSF 498 H C

MRI: C+T+L SPINE WITH AND W/O CONTRAST

- Diffuse *spinal and cranial nerve root enhancement.*
- Primary consideration include the group of *chronic polyneuropathies* (e.g. subacute/chronic inflammatory demyelinating polyradiculoneuropathy).
- Guillain-Barre syndrome is also a consideration.
- Lumbar dorsal paraspinous muscle edema likely representing acute denervation given history. Muscle strain is another consideration

SO NOT RHEUMATIC?

Well… Let's examine the data

-+ANA, +RNP

-Leukopenia

-neuro findings – GBS symptoms – areflexia at presentation

-MRI with demyelination

-elevated ESR

-elevated UPC >0.5

-LP with lymphocytosis, elevated protein

-inability to ambulate

-weight loss

-arthralgia

RENAL BIOPSY

- MEMBRANOUS GLOMERULONEPHRITIS
- NO GLOMERULAR OBSOLESCENCE (0/25).
- consistent with ISN/RPS class V lupus nephritis.

PROBLEM LIST

- Joint pain
- Weight loss
- Inability to walk
- **+ANA**
- **+RNP**
- *+dsDNA; +anti-smith Ab at outside*
- MRI with demyelination and **polyneuropathy**
- **Proteinuria > 0.5**
- Elevated ESR, leukopenia
- CSF with elevated protein, lymphocytes
- Renal biopsy with **class V lupus nephritis**

DIAGNOSIS = systemic lupus

- Video of gait

SYSTEMIC LUPUS

ACR Criteria: must have at least *4/11* criteria (don't have to occur at same time; monitor over time)

1. malar rash
2. discoid rash; oval raised patches
3. photosensitivity
4. oral ulcers; usually painless
5. arthritis: 2+ peripheral joints; nonerosive
6. serositis: pleuritis, pericarditis
7. renal: proteinuria, nephritis
8. neuro: seizure or psychosis
9. heme: hemolytic anemia, WBC < 4, lymphs <1500, plt <100,000
10. labs: antiphopholipid Ab, anti-dsDNA, ENAs, false +RPR
11. Positive ANA

SLE EPIDEMIOLOGY

- F>M,
- Average age 9-15 years
- More common in African Americans, Native Americans, Hispanic, Asian

LABS/WORKUP

- CBC/D
- Coombs
- APA: anti-cardiolipin antibodies, anti β2 glycoprotein, lupus anticoagulant
- CMP
- UA
- Urine protein/Cr ratio
- ESR/CRP
- ANA
- C3/C4
- Anti-ds-DNA
- ENAs (anti-Sm*, anti-Ro, anti-La {*SSA/SSB*}, Anti-RNP)

COMPLICATIONS/MORBIDITIES

- Infection = # 1 cause of death
- Transverse myelitis
- Hypertension
- Seizures/psychosis
- MI
- Stroke/thromboembolic disease
- Malignancy
- Compression fractures

CASE 4: NOT EVERYTHING IS WHAT IT SEEMS
CC: WEAKNESS/NOT AMBULATING

HPI

- 11 year old male h/o of autism admitted for LE weakness and inability to ambulate; h/o transient synovitis
- 3 months prior admitted for same CC; severe progression since
- MRI of spine done at previous admission - small thoracic cord syrinx otherwise normal
- EMG normal
- Seen by NSG as outpatient and had LP - normal

ROS: 4 lb. weight loss but limited diet **(PB and mini bagels, milk);**

afebrile, rash on lower legs

EXAM/WORKUP

Initiated by referring provider:

- MRI of b/l hips showed sacroiliitis prompting admission
- Labs: CBC/diff - mild leukocytosis, ESR 23, CRP, CK, LDH w/nl

Physical exam (positive findings)

- **MSK**: UE: nl LE: pain on external rotation of hips b/l; pain on flexion & extension at knees – no effusions; +tenderness to palpation over SI joints b/l.
  - Sitting with knees flexed and folded behind right side & leans slightly to left.
  - Stands up with assistance; unable to bear weight on legs or hold body upright when trying to bear weight on legs.
- **Back:** lower back with prominence of vertebral bodies, slight erythema and mild tenderness to palpation.
- **SKIN**: macular-papular rash on extremities

WORKUP CONT:

- Xray pelvis (previous hospitalization)- demineralized bones, mild coxa valga.

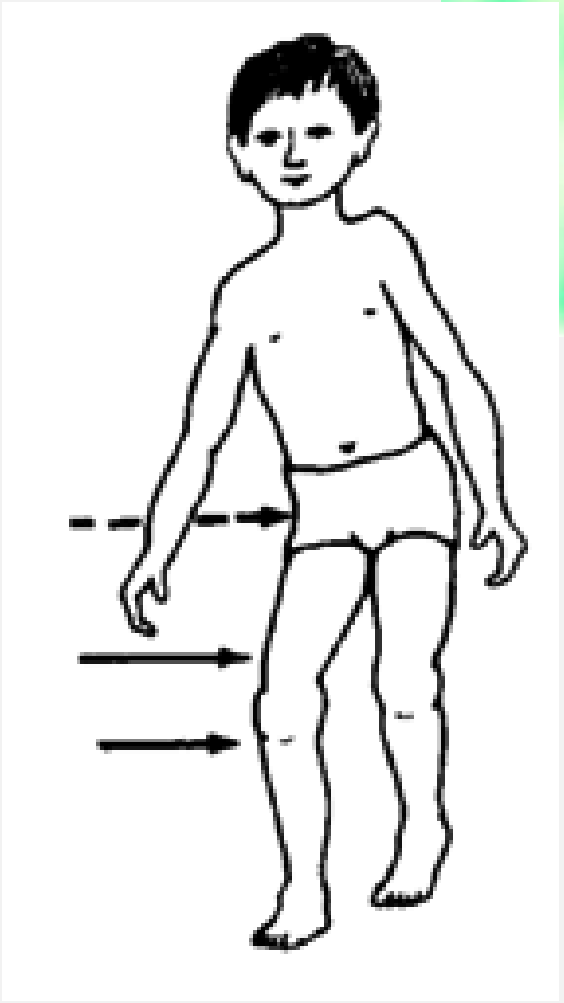
On admission (3 months later)

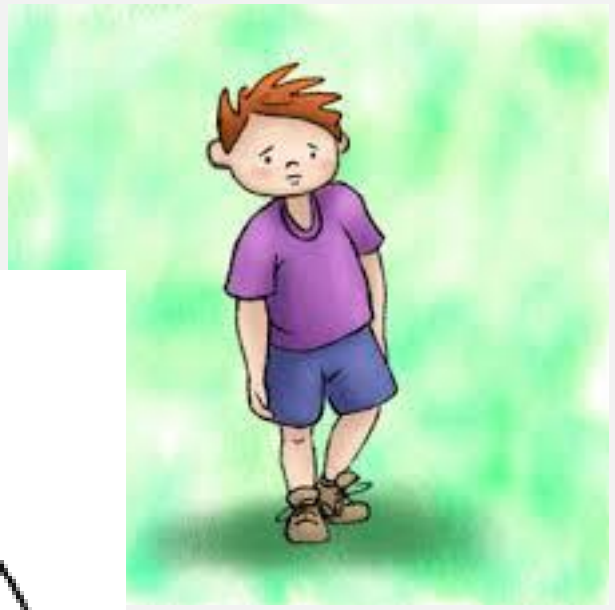
- Xray of pelvis: mild coxa valga. osteopenia progressed since prior examination.
- Spine xray: Very osteopenic bones with **multiple compressions of vertebrae**.
- MRI of spine with and w/o contrast 4/5/17: Multilevel endplate compression deformities throughout entire lumbar spine as well as T11 and T12, new since 01/20/2017. Findings likely related to progressive diffuse osteopenia seen on radiographs of the pelvis.
- 2. Stable trace dilatation of the central canal compared to the examination of 01/20/2017.

WORKUP CONT…

- ANA 1:320; HLAB27 negative, UA with mixed flora; vitamin D w/nl
- **Vitamin C < 5** (23-114), B12/folate normal
- Dexa scan: low bone mineral density
- Diagnosis: severe osteopenia, vitamin deficiency
- Treatment: bisphosphonates, G-tube placement, ascorbic acid + multivitamin

OTHER CAUSES OF LIMP





CRPS=COMPLEX REGIONAL PAIN SYNDROME

Chronic pain usually affecting a single limb – LE>UE

- Severe, debilitating pain out of proportion to findings
- Sensory, motor, autonomic, skin abnormalities
  - Allodynia/hyperalgesia
  - Swelling and color or temperature change
  - Muscle stiffness, osteopenia, dystrophic skin changes and atrophy; edema
- Budapest clinical diagnostic criteria for CRPS
- Bone abnormalities seen on imaging – osteoporosis from disuse; decreased radionuclide uptake in affected limb; normal study rules out underlying bone disease
- MRI – bone marrow edema on T1 weighted low signal and T2 weighted high signal
  - Early in disease – edema from CRPS vs edema from trauma (including subtle fractures) difficult to discern

Dutton K, Littlejohn G, *Journal of Pain Research* 2015.

CRMO = CHRONIC RECURRENT MULTIFOCAL OSTEOMYELITIS

- Inflammatory disorder affecting bones – sterile bone inflammation
  - Diagnosis of exclusion
  - Pain often worse at night
  - Limping when lesions in lower extremities
  - 1-20 sites involved at a time: metaphyseal region of long bones, clavicles, vertebral bodies, mandible, pelvis, small bones of hand and feet
- Labs: mild elevation in WBC, ESR or CRP but may be normal
- Blood cultures and bone cultures negative
- Bone biopsy often needed to rule out infection, malignancy
- Radiographs can reveal osteolytic lesions surrounded by sclerosis
- MRI most sensitive imaging modality
- NSAIDS as initial treatment unless mandible or spine involved requiring more aggressive therapy
- Association with psoriasis, palmar plantar pustulosis, IBD, ankylosing spondylitis, ANCA vasculitis

Ferguson PJ, Sandu M. *Curr Rheumatol Rep*. 2012.

OBJECTIVES

- Review definition of limp and abnormal gait
- Evaluate a child presenting with a limp
- Discuss cases involving limp (presented to rheumatology)
- Develop differential diagnosis in a child with limp
- Identify when to order “rheumatologic labs”
- Recognize when to refer a patient to rheumatology

KEY REFERENCES

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