Swollen & Painful Joints:
Diagnosing Paul's Pain

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What are the first steps in the approach of a patient who presents with swollen and painful joints?

1. **Make sure it is an articular problem.**
   Articular problems tend to produce pain with joint movement in all planes, whereas periarticular problems may produce pain in only one plane of movement. Periarticular problems may be associated with focal tenderness outside of the joint and may produce swelling that extends outside the margins of the joint.

2. **Determine if it is monoarthritis or polyarthritis.**
   Conduct a history and physical examination and be sure to include an examination of the spine.

3. **Determine if the articular problem is inflammatory or non-inflammatory.**
   Inflammatory problems typically produce fluctuant and soft swelling, loss of range of motion, warmth, sometimes redness and a significant morning stiffness lasting more than 60 minutes.

Meet Paul

- Paul, 25, comes to you with a 10-day history of worsening pain and swelling in his left ankle and now his right knee.

For more on Paul, go to page 35.

Table 1

Risk factors for infectious arthritis

- Recent pneumonia, pyelonephritis, skin infection
- Immunosuppression
- Prosthetic joint
- High-risk sexual behaviour
- Intravenous drug use
- Underlying medical disease (diabetes, renal failure, chronic alcohol use, malignancy, *etc.*)
- Pre-existing chronic joint disease *(e.g.,* rheumatoid arthritis)

Table 2

Synovial fluid (SF) analysis

Prioritizing SF analysis

- Just a drop needed for culture (most important if infection is a concern)
- Cell count (usually need about 1 cc to get accurate count)
- Crystal analysis check with local lab

Cell counts:

	Inflammatory	Non-inflammatory (degenerative)
Appearance	Turbid	Clear
Viscosity	Low	High
WBC	>2000 X 106/L	<2000 X 106/L
	Crystals, infection typically > 50,000 with 80% neutrophils, but this is a guide only!	

Is infection always the most important diagnosis to consider?

While infection is not the most common cause of a monoarthritis, it is the most serious and one should always bear in mind the possibility of septic arthritis.When making the diagnosis, it is important to take into account the following things:

- Consider the patient's risks for infection (Table 1)
- Recognize that onset may be insidious in some high-risk patients (*i.e.,* elderly, immunocompromised)
- Infection can coexist with crystal-associated arthritis and the latter can be associated with dramatic inflammation that can mimic infection
- SF analysis is critical in helping to make the diagnosis (Table 2)
- Infection may still be a consideration in patients presenting with an acute oligo/polyarthritis (Table 4)

Table 3

Extra-articular features associated with different types of arthritis

Seropositive (rheumatoid arthritis, collagen vascular disease)	**Seronegative (psoriatic arthritis, enteropathic arthritis reactive arthritis ankylosing spondylitis)**	**Other**
Nodules	Enthesitis (inflammation of ligament/tendon insertions)	Tophi (gout)
Dry eyes/mouth (sicca)	Psoriasis	Erythema nodosum (sarcoid)
Oral and nasal ulcerations	Nail changes	Rash (viral exanthema, erythema migrans, *etc*.)
Malar erythema	Uveitis/conjunctivitis	New heart murmur
Raynaud's phenomenon	Oral ulcerations	
Pleuritis/pericarditis	Inflammatory bowel disease	
Vasculitic rash	Urethritis (sterile pyuria)	
Interstitial lung disease		

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Table 4

Differential diagnosis of arthritis

Monoarthritis, acute inflammatory	
Infections	Bacteria- *Staphylococcus aureus* (most common overall), hemolytic strep, gram negatives (especially elderly, underlying disease), *Haemophilus influenza* (kids)
	Neisseria
	Mycobacteria
	Lyme disease
	Viral
Crystals	Gout
	Pseudogout (calcium pyrophosphate)
	Hydroxyapatite (acute calcific periarthritis)
Traumatic	Hemarthrosis
Seronegative	Psoriatic arthritis
	Reactive arthritis (post-GI or GU infection)
Others	Hemarthrosis due to trauma, bleeding disorder, anticoagulation
	Palindromic rheumatism
	Sarcoidosis (acute)
	Bacterial endocarditis
Monoarthritis, chronic inflammatory	
Infections	Mycobacteria, fungi, lyme, bacterial
Seronegative	Psoriatic, reactive arthritis, inflammatory bowel disease
Tumors	Pigmented villonodular synovitis
Others	Foreign body synovitis, Juvenile chronic arthritis

Polyarthritis, inflammatory, acute (< six weeks)	
Infectious	**Non-infectious**
Viral (rubella, hepatitis, parvovirus, Epstein Barr Virus, HIV)	Rheumatoid arthritis
Bacterial (gonoccocal, meningococcal)	Reactive arthritis
Bacterial (non-gonoccocal oligoarthritis in 15%)	SLE, other collagen vascular disease
Bacterial endocarditis	Psoriatic arthritis, other seronegative disease
Lyme disease	Polyarticular gout
Acute rheumatic fever	Serum sickness
	Sarcoid arthritis
	Vasculitis

Chronic polyarthritis , lasting > 6 weeks
Rheumatoid arthritis
Reactive arthritis
SLE, other CVD
Psoriatic arthritis
Other seronegative disease
Polyarticular gout
Sarcoid arthritis
Vasculitis

If the infection is not a concern, how do I proceed?

The most likely cause of a non-inflammatory monoarthritis is osteoarthritis. If inflammatory, consider seronegative disease or crystal-associated arthritis.

Seronegative disease

Younger patients with spinal involvement (sacroiliitis may be occult and seen on X-ray only), recent gastrointestinal/ genitourinary infection (reactive arthritis), or have a history of psoriasis or inflammatory bowel disease. May have positive family history. Look for extra-articular manifestations (see Table 3).

Crystal associated arthritis

Older patients who have had a recent illness, surgery or renal dysfunction, or patients who suffer from alcohol abuse and the use of diuretics.

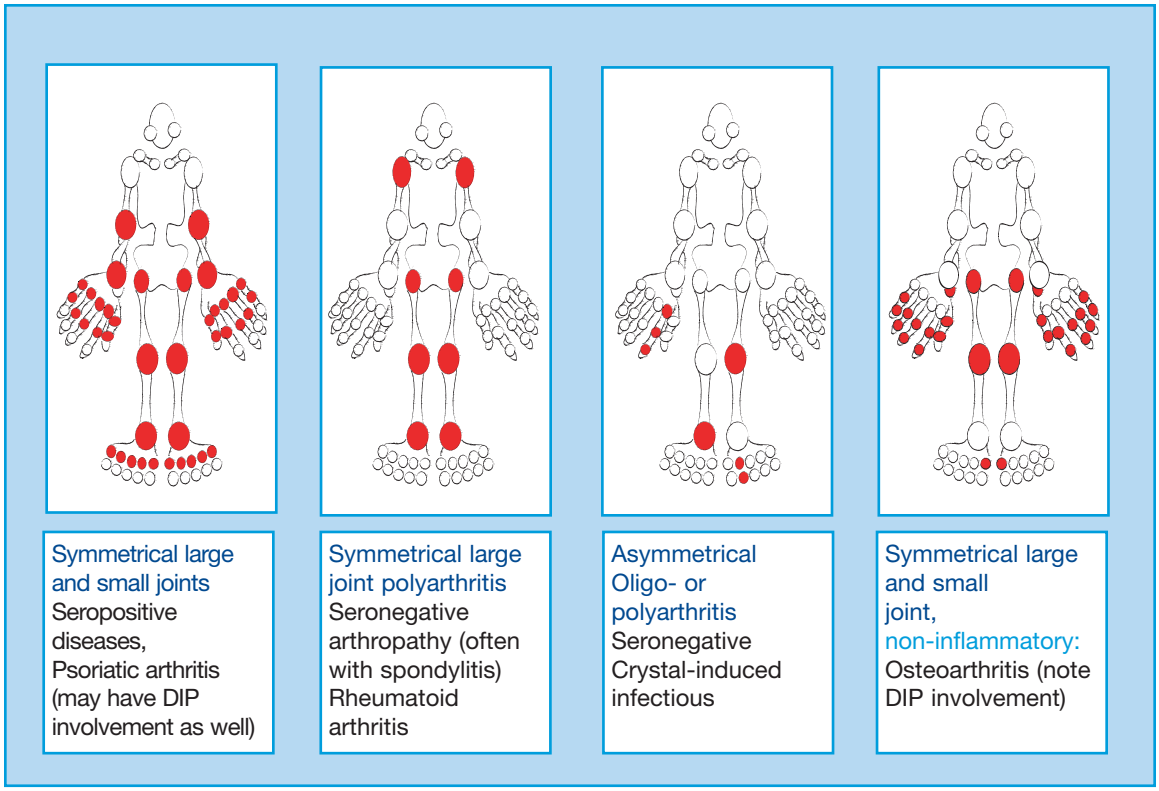

Figure 1. Characteristic patterns of joint involvement for oligo- and polyarthritis.

Polyarthritis and Oligoarthritis

Most non-inflammatory polyarthritis is due to osteoarthritis For inflammatory disease use pattern recognition (pattern of joint involvement and pattern of extra-articular features).

How can laboratory tests help me in making the diagnosis?

There are no specific or diagnostic tests. Serologic testing should only be done if a pretest probability of rheumatic disease is high (false positive rheumatiod factor and antinuclear antibody may confuse the picture).

Baseline complete blood cell count, creatinine and liver enzymes are needed to screen for significant systemic disease and as baseline for monitoring drug toxicity.

How can radiologic imaging help me?

Radiologic imaging is rarely useful in the acute setting. It is generally only helpful if there is a history of trauma.

In terms of subacute disease, radiologic imaging can help by allowing you to look at key sites for key features. The key sites are the:

- sacroiliac joints for changes in seronegative disease (may be clinically quiescent),
- hands and feet for erosions of rheumatoid arthritis (RA),
- feet for erosions of chronic gout and
- wrists and knees for calcium pyrophosphate crystal deposition.

Final note

After evaluation, some arthritides will remain idiopathic. Consider less common etiologies. Follow over time to firmly establish the diagnosis and refine therapy. Be wary of watching an inflammatory process progress and cause joint damage.

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More on Paul

- Further history revealed an episode of watery diarrhea following a trip to a resort in the Caribbean the month before presentation.
- Stool cultures were negative.
- Synovial fluid showed a white blood cell count of 45,000 X 106/L, with negative culture.
- No crystals were seen.
- Presumed diagnosis was reactive arthritis.
- Paul responded to a course of non-steroidal anti-inflammatory drugs (NSAIDs) and was tapered off, without recurrence of arthritis three months later.

1. Marzo-Ortega H, Cawkwell L, Green MJ: Early Oligoarthritis. Rheum Dis Clinic North Am 2005; 31(4):627-39.
2. Hitchon CA, Peschken CA, Shaikh S, et al: Early undifferentiated arthritis. Rheum Dis Clinic North Am 2005; 31(4):605-26.
3. Calabrese LH: Viral Arthritis. Infect Dis Clin North Am 2005; 19(4):963-80.
4. Ross J: Septic Arthritis. Infect Dis Clin North Am 2005: 19(4);799-817.
5. The Atlas of Standard Radiographs of Arthritis: Rheumatology 2005; 44 Suppl 4:iv42-iv72.

Take-home message

- Use clues from the history and physical examination to narrow down the differential diagnosis. Look for features of inflammatory process as well as characteristic extra-articular features.
- Laboratory data may be supportive, but generally can't be used to establish the diagnosis.
- Synovial fluid analysis is helpful in establishing the diagnosis and guiding therapy. It is essential to rule out pyogenic infection in monoarthritis.
- In the case of polyarthritis, it may be necessary to follow the patient over time to firmly establish the diagnosis and refine therapy.
- Caveat: any patient with inflammatory polyarthritis should be considered for accelerated rheumatologic consultation for possible rheumatoid arthritis. Early treatment improves the outcome.