Psoriatic Arthritis: the Role of Radiologic Assessment in Diagnosis and Management

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Overview

- Patient AC
- Psoriatic arthritis (PsA)
  - Epidemiology
  - Pathogenesis
  - Clinical and radiographic features
  - Dx and DDx
- Role of imaging in PsA
  - Patient AC
  - Classic radiographic manifestations
  - Other modalities
- Summary
Patient AC

- 24 year-old gentleman referred to BWH Center for Skin and Related Musculoskeletal Diseases
- >10-year h/o severe cutaneous psoriasis and 8-year h/o arthritis
- Failed topical Rx, plaquenil, and MTX; lost insurance at age 18 persisted on Tylenol and Ibuprofen for pain
- Now complains of flaring psoriasis, inability to bear weight on his L foot x 3 mos, and inability to work due to involvement of L hand
- H/o anxiety and depression
Patient AC: Cutaneous Manifestations

Courtesy of A. Qureshi, BWH Dermatology
Patient AC: Cutaneous Manifestations

Courtesy of A. Qureshi, BWH Dermatology
Patient AC: Hands

Courtesy of A. Qureshi, BWH Dermatology
PsA: Epidemiology

- Psoriasis is estimated to affect at least 7 million people in the United States.
- Between 5% and 42% of this group will develop PsA.
- PsA significantly impacts health-related quality of life.
  - There is greater role limitations associated with PsA than RA due to emotional problems and more bodily pain.
- PsA is a lifelong condition and carries ~60% higher risk of mortality relative to the general population, correlated with radiologic damage at presentation.
- The course of PsA is unpredictable, with periods of relapse and remission.
PsA: Pathogenesis

- **Genetic factors**: susceptibility genes, HLA-B27 and others (-B17, -Cw6, -DR4, -DR7)
- **Environmental factors**: viral (HIV) and bacterial infections implicated as triggers
- **Immunologic factors**:
  - Deposition of immune complexes
  - Agents that inhibit T-cell function or proliferation improve PsA
  - Clonal and oligoclonal expansions of both CD8+ and CD4+ T cells in skin and synovium
  - Elevated levels of **TNF** in serum and synovial fluid → cytokines induce activation and proliferation of keratinocytes and synovial fibroblasts

(Mease and Goffe, 2005)
PsA: Clinical Features

- PsA belongs to the **seronegative spondyloarthropathies**, which share characteristics:
  - Asymmetric peripheral arthritis
  - Axial involvement (esp. sacroiliitis)
  - The usual absence of RF
  - Unique radiologic features
  - A greater degree of involvement of males
  - Distinctive HLA patterns
- In addition, **PsA** also demonstrates:
  - Enthesitis
  - Dactylitis (up to 30% of pts) $\rightarrow$ “sausage digits”
  - Joint deformities, subluxations
  - Psoriatic skin lesions

### Moll and Wright’s Classification of PsA
1. DIP joint predominant
2. Arthritis mutilans
3. Polyarticular symmetrical (RA-like)
4. Oligoarticular asymmetrical
5. Spondylitis and sacroiliitis
PsA: Radiographic Features

- Osteolysis (bony erosion)
  - Esp. paramarginal erosions
  - “Pencil-in-cup” deformity
- Loss of joint space
- Enthesitis
- Asymmetric sacroiliitis
- Ankylosis
- Joint subluxation
- Periostitis
- Spur formation, “whiskering”

**Radiographs are the study of choice for Dx of PsA due to cost-effective detection of bony changes (erosions and proliferation)**

Plain film of pelvis, AP view: asymmetric sacroiliitis

Plain film of R foot, lateral view

(Jacobson et al., 2008)

PACS, BIDMC
Let’s Review Synovial Joint Anatomy!

Diagram of normal and inflamed synovial joint: 

Plain film of IP joint in finger, AP view:

Marginal erosions (arrows) are seen where subchondral bone plate is exposed to intraarticular synovitis.

$f =$ joint fluid, $c =$ articular cartilage

(Jacobson et al, 2008)
Patient AC: Plain Film of Hands

Frontal views: joint space narrowing, subluxation, pencil-in-cup deformities, erosions

Centricity, BWH
Frontal views: pencil-in-cup deformities
## PsA: Diagnosis and Differential Diagnosis

(Adapted from Mease and Goffe, 2005)

<table>
<thead>
<tr>
<th>Signs and Sx</th>
<th>PsA</th>
<th>RA</th>
<th>OA</th>
<th>AS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral dz</td>
<td>Asymmetric</td>
<td>Symmetric</td>
<td>Varies</td>
<td>–</td>
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<tr>
<td>DIP involvement</td>
<td>+</td>
<td>–</td>
<td>+, Heberden nodes</td>
<td>–</td>
</tr>
<tr>
<td>Sacroiliitis</td>
<td>Asymmetric</td>
<td>–</td>
<td>–</td>
<td>Symmetric</td>
</tr>
<tr>
<td>Stiffness</td>
<td>Peripheral joints, some spine, morning</td>
<td>Morning</td>
<td>With activity</td>
<td>Significant spine</td>
</tr>
<tr>
<td>Enthesitis</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>PsA</td>
<td>RA</td>
<td>OA</td>
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<tr>
<td><strong>Radiographic changes</strong></td>
<td>Erosions, paramarginal, absence of osteopenia, pencil-in-cup, asymmetric syndesmophytes</td>
<td>Erosions, synovitis, periarticular osteopenia</td>
<td>Osteophytes, subchondral sclerosis and cysts</td>
<td>Squaring of vertebral bodies, symmetric syndesmophytes, spinal osteopenia</td>
</tr>
<tr>
<td><strong>Gender bias</strong></td>
<td>1:1, male to female</td>
<td>3:1, female to male</td>
<td>Hand and toe OA more frequent in females</td>
<td>3:1, male to female</td>
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<tr>
<td><strong>RF</strong></td>
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<td>+</td>
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<td><strong>HLA asso.</strong></td>
<td>B27, Cw6</td>
<td>DR4</td>
<td>--</td>
<td>B27</td>
</tr>
<tr>
<td><strong>Extraarticular manifestations</strong></td>
<td>Onychodystrophy, iritis, PSO</td>
<td>Nodules, vasculitis, renal dz</td>
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Classic Radiographic Features of PsA: Spine

Companion patient #1:
Plain film of thoracolumbar spine, AP view

Companion patient #2:
Plain film of cervical spine, lateral view

Compare with a non-pathological C-spine:

Asymmetric, syndesmophytes

Ankylosis
Classic Radiographic Features of PsA: Pelvis

Companion patient #3:

Companion patient #4:

Plain film of pelvis, AP view

Acymetric Syndesmophyte

“Whiskering”

Sacroiliitis

Plain film of pelvis, AP view

PACS, BIDMC
Patient AC: Treatment

- AC was started on etanercept (Enbrel) 50 mg SC twice per week
- Sx improved in just **2 months**: began to regain motion of some of his L fingers and toes, able to make a fist with L hand, and almost completely able to bear weight on his L foot
- His skin is completely clear except for 2 dime-sized spots on the back of the R leg
- F/u plain films reveal no radiographic progression of joint dz
- His CRP (60) and ESR (52.2) are now WNL

<table>
<thead>
<tr>
<th>Started etanercept</th>
<th>Working full-time, could walk around mall</th>
<th>Shoveled snow!</th>
<th>Could run up steps to house, got 2nd job as crossing guard</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>3</td>
<td>4</td>
<td>6</td>
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<tr>
<td>8</td>
<td>Months</td>
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PsA: Role of Plain Films in Clinical Trials

- **Modified Sharp Scoring Method**: assessment of baseline and post-treatment disease severity

(Mease and Goffe, 2005)

Etanercept: showed inhibition of radiographic disease progression compared to placebo at 1 year → FDA approval for PsA in 2002
PsA: Role of Ultrasound and Magnetic Resonance Imaging

- U/S is not as validated for PsA as it is for RA
  - Useful for enthesitis, joint effusions, synovial proliferation, and erosions
  - Doppler U/S can help detect hyperemia as an indirect sign of inflammation and differentiate acute synovial proliferation from effusion

- U/S and MRI are more sensitive to inflammatory and destructive changes than radiographs and clinical exam

- MRI can detect inflammation and bone destruction in joints earlier than projection radiography in PsA

- MRI has also revealed evidence of subclinical arthritis in a large proportion of pts with psoriasis alone → PsA could be much more common than previously suspected
PsA: Role of Ultrasound

Companion patient #5: Ultrasound with color Doppler of MCP joint, dorsal longitudinal view

(Kleinert, Feuchtenberger, Kneitz, Tony, 2007)
PsA: Role of Magnetic Resonance Imaging

A) Short tau inversion recovery (STIR) sagittal view

B) T1-weighted pre-contrast sagittal view

C) T1-weighted post-contrast sagittal view

(McQueen, Lassere, Ostergaard, 2006)

Companion patient #6: enthesitis, synovitis, bony erosions in ankle region
PsA has been defined as a unique, progressive, and often destructive form of seronegative inflammatory arthritis associated with psoriasis.

Radiologic imaging plays a key role in the diagnosis and management of PsA pts.

U/S and MRI may be increasingly utilized as sensitive tools for assessment of disease progression and in clinical trials.
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References


Thank you!