Pigmented Villonodular Synovitis
PVNS

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Our Patient

- 47 year old female
- Right hip pain since age 20
- No history of trauma
- Diagnosed with DJD of R hip in 20’s
- ED visits 1/year since then for pain
Differential Diagnosis: Nontraumatic, Monoarticular Joint Problem: Patients 20-45

- Osteoarthritis
- Inflammatory Arthritis
- Rheumatoid Arthritis
- Psoriatic Arthritis
- Septic arthritis
- Systemic lupus erythematosi
- Synovial chondromatosis
- Pigmented villonodular synovitis
- Benign/Malignant bone tumor

Frassica FJ, Bhimani MA, McCarthy EF, Wenz J. Pigmented Villonodular Synovitis of the Hip and Knee. Am Fam Physician 1999; 60(5): 1404-15.
Imaging Studies for Joint Assessment

- Plain radiograph
- Arthrocentesis/Arthrogram
- CT
- MRI
  - Suggest process
  - Extent
- Biopsy – tissue diagnosis
Our Patient: Plain Film

From BIDMC PACS
Subchondral Sclerosis

Joint space narrowing

From BIDMC PACS
Prior Dx: Degenerative Joint Disease

- Joint space narrowing
- Juxtarticular sclerosis
- Osteophytes
- Subchondral cysts
Prior Dx: Degenerative Joint Disease

- Joint space narrowing
- Juxtarticular sclerosis
- Osteophytes
- Subchondral cysts

Is this a primary or secondary process?
Subchondral Sclerosis

Joint space narrowing

Bony erosion of lesser trochanter
Our Patient: Plain Film

Bony erosion of lesser trochanter

From BIDMC PACS
Degenerative Joint Disease?

- Remained monoarticular for years
- Recurrent visits to ED
- Bony Erosions

→ Pursue alternative diagnosis
Non uniform distribution of contrast within joint capsule

Question: Is there an ongoing process involving the capsule?
Our Patient: Joint Aspiration

- Blood tinged
- Brown fluid
- Minimal inflammatory cells
DDx: blood tinged, brown fluid, minimal inflammatory cells

- Trauma
- Pigmented villonodular synovitis
- Bleeding disorders
- Sickle cell disease
- Ehler’s Danlos syndrome

• Ruddy: Kelley's Textbook of Rheumatology, 6th ed., W. B. Saunders Company, 2001.
Differential Diagnosis

Joint Aspirate
- Trauma
- Pigmented villonodular synovitis
- Bleeding disorders
- Sickle cell disease
- Ehler’s Danlos syndrome

Clinical Presentation
- Osteoarthritis
- Inflammatory Arthritis
- Rheumatoid Arthritis
- Psoriatic Arthritis
- SLE
- Septic arthritis
- Synovial chondromatosis
- Pigmented villonodular synovitis
- Bone tumor
Differential Diagnosis

Joint Aspirate
- Trauma
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Clinical Presentation
- Osteoarthritis
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- Bone tumor
Pigmented Villonodular Synovitis
the basics - PVNS

- “Pigmented” - contains hemosiderin
- “Villonodular” - appearance of gross specimen
- Proliferative disorder of synovium
- Single joint
Studies – Joint Assessment

- Plain radiograph
- Arthrocentesis/Arthrogram
- CT
- MRI
  - Suggest process
  - Extent
- Biopsy – tissue diagnosis
Our Patient: CT
Our Patient: CT

Femur
Our Patient: CT

Area of enhancement compared to surrounding soft tissue density
Our Patient: CT

Encompasses the entire joint space

Extends into the joint space
Our Patient: CT

From BIDMC PACS
Our Patient: CT
Our Patient: CT
Our Patient: CT

From BIDMC PACS
Our Patient: CT
Our Patient: CT

Distal Femur

Area of enhancement compared to surrounding soft tissue density
Our Patient, CT: Impression

- Ill defined infiltrating soft tissue enhancement surrounding femoral head and neck.
Our Patient: MRI

Areas of darkness on T1 weighted image
Our Patient: MRI

Proximal areas of darkness on T1 weighted image
Our Patient: MRI

Distal areas of darkness on T1 weighted image
MRI – Dark on T1

- Metal/ foreign body
- Cortical Bone
- Tendons
- Air
- Hemosiderin
- Fast flowing blood

Sanders TG, Parsons TW 3rd. Radiographic imaging of musculoskeletal neoplasia. Cancer Control 2001; 8(3): 221-31.
MRI – Dark on T1

- Metal/ foreign body
- Cortical Bone
- Tendons
- Air
- Hemosiderin
- Fast flowing blood

Plain film showed soft tissue density in the area of interest.

Sanders TG, Parsons TW 3rd. Radiographic imaging of musculoskeletal neoplasia. *Cancer Control* 2001; 8(3): 221-31.
MRI – Dark on T1

- Metal/ foreign body
- Cortical Bone
- Tendons
- Air
- Hemosiderin
- Fast flowing blood

Plain film showed soft tissue density in the area of interest

PVNS contains hemosiderin

Sanders TG, Parsons TW 3rd. Radiographic imaging of musculoskeletal neoplasia. Cancer Control 2001; 8(3): 221-31.
Our Patient: MRI with contrast

Region enhances with Gadolinium
Our Patient: MRI with contrast

Increased blood flow or increased vascular permeability

Region enhances with Gadolinium
Our Patient: Open Biopsy – Definitive Diagnosis

• Pigmented Villonodular Synovitis
Pigmented Villonodular Synovitis
PVNS

- Non malignant
- Proliferative disorder
- Unknown cause
  - Infection vs neoplasm
  - Clonality suggests neoplasm
- Entire synovium: joints, tendons, bursa
- Single joint
PVNS

- 1/500,000 per year
- Age 20-45
- Knee – 80%
- Uncommonly > 1 joint
- Tendon and bursa involvement

- Pain and swelling
  - Intermittent, often long standing
PVNS - Pathology

- Proliferation of synovium
- Brownish villi

*Image compliments of Carl Winalski, MD, Brigham and Women’s Hospital*
PVNS - Histology

- Fibrous stroma
- Hemosiderin deposition
- Histiocytic infiltrate
- Giant cells

*From fig 28-51. Cotran: Robbins Pathologic Basis of Disease, 6th ed., W. B. Saunders Company, 1999.*
PVNS - Subtypes

- **Diffuse**
  - Entire synovium

- **Local**
  - Discrete region

Images compliments of Carl Winalski, MD, Brigham and Women’s Hospital.
PVNS – Radiographic Features

• Soft tissue swelling – 80%
• Bony destruction
• Joint space narrowing
  – Later in disease
  – 70-75% of hip cases
• Subchondral cysts
  – 95% of hip cases
• No calcifications
PVNS – Radiographic Features

- Soft tissue swelling – 80%
- **Bony destruction**
- Joint space narrowing
  - Later in disease
  - 70-75% of hip cases
- Subchondral cysts
  - 95% of hip cases
- No calcifications

*Image compliments of Carl Winalski, MD, Brigham and Women’s Hospital.*
PVNS – MRI Features

• Low – intermediate signal intensity on PD, T1 and T2 weighted images
  – Hemosiderin deposition
• Hyperplastic synovium
  – Lobulated mass
• Bone erosions
• Bone density preserved

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Dark on MRI images: Patient 5

Images compliments of Carl Winalski, MD, Brigham and Women’s Hospital.
PVNS – MRI Features

- Blooming effect

Images compliments of Carl Winalski, MD, Brigham and Women’s Hospital.
PVNS – Ankle: Patient 7

Images compliments of Carl Winalski, MD, Brigham and Women’s Hospital.
PVNS – Treatment Options

- Synovectomy
  - Local recurrence (45%)

- Radiation therapy

- Arthroplasty
Patient 5 Synovectomy Post Treatment

A synovectomy was performed.

Anterior space free of disease but PVNS remains posteriorly. MRI should be obtained preop for surgical planning.
Our Patient

Discussion underway weighing advantages of hip replacement versus synovectomy
References

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• Sanders TG, Parsons TW 3rd. Radiographic imaging of musculoskeletal neoplasia. *Cancer Control* 2001; 8(3): 221-31.
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PVNS - Pathology

- Proliferation of synovium
- Brownish villi

*From fig 28-50. Cotran: Robbins Pathologic Basis of Disease, 6th ed., W. B. Saunders Company, 1999.*