Presented by:
Mary Lloyd Ireland
Professor
Dept. of Orthopaedic Surgery and Sports Medicine
University of Kentucky
Lexington KY
www.marylloydireland.com

629 PT1 Introduction What Plain Views and when to Order Advanced Imaging Lower Extremity

0:00 Introduction
0:28 Learning Objectives
1.Know the images and position of the patient to order for certain diagnoses
2.Understand when to order advanced images after plain X-Rays
I have nothing to disclose.
0:42 Menu: Intro

0:57 WORKUP Algorithm for Evaluation and Treatment of Suspected High-Risk Stress Fractures

2:31 High Risk Tensile Side

4:20 Low Risk Compression Side

5:02 Plain Radiographs LE
- •Standardized Views
- •Create and Agree within your group/department
- •Special Views
- •Marked Cone
- •Stress
- •Comparison

5:49 Imaging - MRI scan, CT scan, Ultrasound
- •Special Studies
- •MRI scan
- •With or without gadolinium
- •CT scan
- •Ultrasound

6:36 When Should an MRI Exam Be Obtained?(Courtesy Martin L. Schwartz, MD
Clinical Prof. of Radiology, UAB)
- •Recent Trauma
- •Difficult Physical Exam
- •Physical Exam that Does not Match Clinical Symptoms
- •Normal Radiographs with Significant Symptoms
- •Pre-Operative Planning
- •Recent MRI that was Technically Suboptimal

7:48 How Should The MRI Scan Be Performed(Courtesy Martin L. Schwartz, MD
Clinical Prof. of Radiology, UAB)

- •Best Possible Equipment
- •Dedicated Coils for the Body Part
- •Contrast When Necessary
- •Correct Sequences to Define Appropriate Anatomy
- •Shortest Exam to Achieve Results and Keep Patient Comfortable

8:14 Contrast Administration(Courtesy Martin L. Schwartz, MD
Clinical Prof. of Radiology, UAB)

- •Intraarticular Contrast Gives Superior Soft Tissue Contrast and Significantly Enhances Diagnostic Capability
- •Intravenous Contrast Useful for Post Operative Menisci and Tumors

9:08 IMAGING: MRI SCAN
Communicate with radiologist skilled in hips. Now better results if intra- articular gadolinium
Use of intra-articular injection is helpful

- •Lidocaine – if improves symptoms confirms intra-articular process
- •Gadolinium outlines labrum better

Low resolution studies (small magnet; open scanner)

- •Unreliable except for obvious disease (i.e., AVN)

High resolution MRI

- •1.5 Tesla magnet; surface coil
- •Reliability improving
- •Still up to 42% false negative
- •Indirect evidence most reliable (effusion; paralabral cyst; subchondral cyst)

MRI helpful for:

- •Labrum tear
- •Articular cartilage defects
- •Ligamentum teres tears
- •Impingement
- •Capsule/ileofemoral injury

10:24 1.5 Tesla(Courtesy Martin L. Schwartz, MD
Clinical Prof. of Radiology, UAB)

10:40 0.35 Tesla Open(Courtesy Martin L. Schwartz, MD
Clinical Prof. of Radiology, UAB)

10:57 1.0 Tesla Extremity(Courtesy Martin L. Schwartz, MD
Clinical Prof. of Radiology, UAB)

11:24 You Look for What You Know and Find What You Look For

12:17 The End

629 PT2 – Hip – What Plain Views and when to Order Advanced Imaging

0:00 Introduction

0:28 Learning Objectives:
.Know the images and position of the patient to order for certain diagnoses
.Understand when to order advanced images after plain X-Rays
I have nothing to disclose.
0:42 Menu: Hip

0:57 Thanks to Thomas Byrd M.D. for the hip images

1:15 Radiographs
•AP pelvis including both hips
•Properly centered to assess radiographic indices
•Allows comparison of contralateral hip for subtle variations
•Allows assessment of surrounding areas (ilium, ischium, pubis, sacrum & SI joints)

1:47 Radiographs 2
•Lateral view of affected hip
•Frog lateral (lateral of proximal femur; not a true lateral of joint)
•Consistent, reproducible study
•Cross table, False profile, Dunn, etc. for specific circumstances

2:29 IMAGING: Femoroacetabular impingement
•Helpful identifying morphological variants predisposing to Intra-articular pathology
Pincer type (acetabular retroversion)
•Cross-over sign
•Posterior wall sign
•Arthroscopic parameters more sensitive indicator
Cam-type (proximal femur)
•SCEF; “Pistol grip” deformity (premature physeal closure
•CT reconstruction excellent (!) for three-dimensional architecture

4:00 Radiographs: Identifying Morphological Variants
•Helpful identifying morphological variants predisposing to intraarticular pathology
•Femoroacetabular impingement
•Cam-type (proximal femur)
•CT reconstruction excellent(!) for three dimensional architecture

4:18 Low Resolution Studies
- (small magnet; open scanner)
- Unreliable except for obvious disease (i.e., AVN)

4:55 High Resolution MRI
- 1.5 Tesla magnet; surface coil
- Reliability improving
- Still up to 42% false negative
- Indirect evidence mostreliable (effusion; subchondral cyst)

5:22 MRA

5:46 Radiographs 3
- Helpful identifying morphological variants predisposing to intraarticular pathology
- Dysplasia (reduced CE angle)

6:07 Radiographs 4
- Helpful identifying morphological variants predisposing to intraarticular pathology
- Femoroacetabular impingement
- Cam-type (proximal femur)
- CT reconstruction excellent(!) for three dimensional architecture

6:25 Rim Impingement
- Radiographic indices
- Cross over sign
- Posterior wall sign

7:29 You Look for What You Know and You Find What You Look For

8:21 The End

629 PT3 – Knee – Imaging What Plain Views and When

0:00 Introduction

0:28 Learning Objectives
1. Know the images and position of the patient to order for certain diagnoses
2. Understand when to order advanced images after plain X-Rays

I have nothing to disclose.

0:42 Menu: Knee, OA Case, Bone Bruise

0:57 KNEE Radiographs
- Standing 45º PA, bilateral
- Patellar Views: Merchant or Sunrise Bilateral
- Lateral 45º Flexion
- Notch for Osteophytes
- Standardize Your Views for All Physicians

•Use Goniometer
•Know Your XRay Technicians

3:39 Physical Examination of Knee

7:11 Osteoarthritis Grading System
•Kellgren and Lawrence
•Fairbanks
•Joint space narrowing JSM –standing radiographs
•Ahlback classification
•Numerous studies comparing different classifications–there is disagreement on the definition and grading of osteoarthritis, as well as poor correlation with patient symptoms and progression of osteoarthritis.

8:23 45 Degree Flexed Weight-Bearing PA View(Cole BJ, Harner. Dervin GF, Feibel RJ

Dervin GF, Feibel RJ, Rody K, Grabowski J., 3-Foot standing AP versus 45 degrees PA radiograph for osteoarthritis of the knee. Clin J Sports Med. 2001 Jan;11(1):10-6.

8:41 IMAGING
•Plain radiographs
•Radiographs most important investigative tool
•Poorly indicative of problems amenable to arthroscopic intervention
– McCarthy & Busconi, Orthop 1995
•Insensitive indicator of early OA
– Santori & Villar, Orthop 1999

9:16 History & PE
•55 YO Female
•Difficulty walking due to left knee out of alignment
•Fell 10 years ago and was told she had meniscal tears
•PE: Height 5’ 5½”, weight 303: BMI 43
•Bilateral Knees:
•Diffuse crepitus and pain
•Mild effusion
•No calf tenderness

13:28 MRI Scan in the Arthritic Knee After 50 years
•Is the root of the Medial Meniscus Avulsed?
•What about my Baker’s Cyst?
•Think tree – MRI Scan
•In a Big Forest – Arthritis –The Plain Xrays show us the reason for stiffness & pain: Arthritis

15:29 IMAGING THE ARTHRITIC KNEE
•Use goniometer to assure comparable Xrays year to year and for outcome
studies
•Let the Orthopaedist Order the MRI Scan in the Arthritic Knee Patient.
•May want DESS or special articular cartilage sequences.
•In most cases MRI scans in patients over age 50 would not change treatment plan.
•I don’t need an MRI scan to know what to do arthroscopically! I was scoping knees prior to MRI scans!

16:15 17 YO WF Right Knee Lateral knee pain
–Complete radial tear of the interval horn/body junction), with a high-grade radial tear of the posterior horn/root junction

17:16 Bone Bruise
–Does That Predict Development of OA?

18:38 Bone Bruise Patterns
•Acute patellar dislocation
•Medial patella anterolateral femoral condyle
•No OA from bone bruise, but from articular cartilage injury and mal-trackin

20:19 What is the significance of Bone Bruises? Unknown. . .
•Long term Bone Bruise ≠ OA
•In ACL injuries noncontact compartments:
•Lateral / acute
•Medial / chronic OA
•Classification systems for bone bruises need further development

20:59 You Look for What You Know and You Find What You Look For

21:52 The End

629 PT4 – Foot – Imaging What Plain Views and When

0:00 Introduction

0:28 Learning Objectives
1.Know the images and position of the patient to order for certain diagnoses
2.Understand when to order advanced images after plain X-Rays
I have nothing to disclose.
0:42 Menu: Foot, Navicular, Calcaneus, Achilles, Conclusions

0:57 Secondary Center Ossifications

•Apophysis – present 22%
Appears > 8 years
Fusion: 12 years – females
15 years – males
•Os peroneum
In tendon at cuboid level
•Os versalianum – present 15%
Insertion peroneus brevis
Usually bilateral – present in 0.1%

2:45 Foot Bone Anatomy Image

3:55 19 YO basketball player Os vesalianum bilateral feet

4:43 Os peroneum

5:02 PAINFUL OS PERONEUM(Courtesy UK Radiology)

5:51 18 YO Freshman Div. I basketball athlete
•C/O mid-foot pain, L > R
•Started when she was running, playing in shoes mandated by her school
•History of “normal” periods

6:24 Navicular
•Initial x-rays

7:28 Navicular view
30º ER
Torg described typical orientation of navicular stress fracture

8:45 Basketball Player with Proximal Foot Pain(Courtesy Martin L. Schwartz, MD
Clinical Prof. of Radiology, UAB)

9:04 Tarsal Navicular Stress Fracture(Courtesy Martin L. Schwartz, MD
Clinical Prof. of Radiology, UAB)

9:34 NAVICULAR STRESS REACTION(Courtesy UK Radiology)

9:40 Stress Fractures
CALCANEAL APOPHYSITIS
(Sever’s Disease)
•Repetitive microtrauma
•Normal Radiographs
•Sclerosis due to normal multicenter ossification

10:56 Calcaneal Stress Fractures

11:13 Marathon Runner Complains of Heel Pain Around Achilles Tendon 2 Weeks Post Race(Courtesy Martin L. Schwartz, MD Clinical Prof. of Radiology, UAB)

11:24 Occult Calcaneal Fracture(Courtesy Martin L. Schwartz, MD Clinical Prof. of Radiology, UAB)

11:48 20 YO Football Athlete
- •Diabetic
- •Heel pain
- •DX: plantar fasciitis
- •Xray: performed after the season

13:03 Open excision, ectopic bone

13:25 ACHILLES TEAR(Courtesy UK Radiology)

14:02 57 YO WM
- •College Professor
- •Heel Pain for 1 Year
- •PMH + for Hypertension Only
- •Left Ankle
- •Symptomatic Calcific Tendinitis

14:20 Physical Exam
- •Pain Over Lateral Insertion,

Radiographs
- •Calcific Deposits in Achilles
- •Calcaneus Normal

14:29 Calcific Achilles Tendinitis, Opposite Foot for Comparison

15:21 Radiographs from Emergency Room
While waiting for an appointment to see a foot and ankle specialist, a motorcycle fell on his left ankle.
He complained of weakness of the calf and inability to go up on his toes.

16:30 Test and Results
- •Lateral Radiograph Compared to Pre-Injury Film
- •Proximal Displacement of Calcific Nodule, Mild Haglund’s

Deformity

16:47 Final Working Diagnosis
- •Avulsion of Calcific Achilles Tendon from Calcaneus

Operative Findings
- •Complete Avulsion Achilles Tendon
- •Calcific Degeneration of Tendon

16:53 Surgery Images

19:09 Operative Treatment
- Direct repair with metal anchors to calcaneus
- Augmentation with plantaris tendon weaved in pulvertaft fashion

1 Week Post Surgery

19:28 You Look for What You Know and You Find What You Look For

20:20 The End