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KEYNOTE: Artificial Intelligence in Diagnostic Imaging: Hype, Reality, and Future Directions (NI)

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DESCRIPTION: "Artificial Intelligence" (AI) has made tremendous advances recently and is poised to substantially change the practice of radiology. This revolution, even more than the transition from film based to digital radiology, has been accompanied by a unique combination of excitement, anxiety, and hype. The theme of this presentation is to explain what AI actually represents, to separate the hype from the reality, and to speculate specifically about how it will impact the practice of digital imaging.

OBJECTIVES
1. Discuss the impact of "AI" on the near and mid-term future of radiology.
2. Describe machine learning and its applications in diagnostic radiology.
3. List challenges/obstacles to the adoption of AI in diagnostic imaging.

OUTLINE
I. Artificial Intelligence (AI) in Diagnostic Imaging
  A. General History of AI
    1. Definition
    2. Types
      a) Narrow (Weak)
      b) General (Strong)
    3. Machine Learning
      a) Deep Learning
      b) Neural Networks
      c) Image Classification
    4. Non-Medical Applications
    5. Hype vs. Reality
  B. Diagnostic Imaging
    1. Applications
      a) CAD - Mammography
      b) Lung Nodule Detection
    2. Impacts
    3. Challenges/Obstacles
    4. Case Studies
    5. Near and Mid-Term Future Outlook

DIGITAL/RADIATION SAFETY-FLUORO: Imaging Obesity: A Technologist's Perspective

Kristin Beinschroth, BSRS, ARRT(R), CRT - Adjunct Faculty, Radiologic Technology, Chaffey College, Rancho Cucamonga Campus.

DESCRIPTION: With obesity statistics in America on the steady rise, diseases linked to obesity increase exponentially. As imaging technologists, we understand the limitations of radiographic and fluoroscopic equipment and evolve our techniques for the best diagnostic quality images while minimizing radiation dose to patients and exposure to staff utilizing principles of ALARA. This presentation will also cover exams most commonly ordered on obese patients, symptoms associated with these diseases and accommodating these patients in radiology while providing compassionate care.

OBJECTIVES

1. Identify diseases related to obesity.
2. Examine commonly ordered imaging studies on obese patients.
3. Recognize limitations of radiographic and fluoroscopic imaging equipment.
4. Describe applications of ALARA during radiographic and fluoroscopic exams.

OUTLINE

I. Imaging Obesity: A Technologist's Perspective
   a. Equipment limitations.
   b. Compassionate care.
   c. Obesity Statistics in America.
   d. Typical Radiological and Fluoroscopic Exams.
      1. Ways to Reduce Radiation Exposure
   e. Alternative methods of imaging.

RADIOLOGY: The Dos, Don'ts and The Whys in Orthopedic Imaging

Elias Silva, RT – Radiologic Technologist, Diagnostic Imaging, Southern California Permanente Medical Group, Panorama City

DESCRIPTION: In a fast-paced orthopedic imaging department, it is easy to move so quickly that we don't take time to pay attention to the details. We will review correct positioning criteria and the reasons why the details matter in assisting with patient diagnosis.

OBJECTIVES

1. Identify correct positioning of routine views.
2. Critique positioning that should be improved.
3. Explain why it is important to provide the best positioning possible to assist the doctor in diagnosis.

OUTLINE

I. Upper Extremities
   A. Shoulders
      1. Positioning Criteria Dos, Don'ts, Whys
         a. AP Internal

b. AP External
c. Y-view
d. Grashey with angle
e. Supraspinatous Outlet
f. Velpeau
g. Zanka

B. Elbows

1. Positioning Criteria Dos, Don'ts, Whys

a. AP
b. Lat
c. Internal Oblique
d. External Oblique
e. Greenspan
f. Acute Flexion Projection
g. Trauma Axial Lateral

II. Lower Extremities

A. Knees

1. Positioning Criteria Dos, Don'ts, Whys

a. AP
b. Lat
c. Obliques
d. Tunnel View
e. Superior Inferior Tangential
f.

MAMMOGRAPHY & ULTRASOUND: "D" Altered Breast

Payal Jain, MD - Radiologist/Breast Imager, Southern California Permanente Medical Group, West Los Angeles.

DESCRIPTION: The presentation will cover the three most common breast altering procedures, corresponding imaging techniques and different imaging positions post-surgery. Specifically, it will help attendees be familiar with the spectrum of appearances of the altered breasts and understand the differences after each procedure.

OBJECTIVES

1. Identify the different types and procedures leading to the altered breasts.
2. Describe the complexities of a surgical procedure involving the breasts.
3. Differentiate imaging modalities and positions that are compatible to breast altering procedures performed.

OUTLINE

I. Introduction
II. Overview:
A. Breast reconstruction post mastectomy
i. Implants
a. silicone gel
b. saline
ii. Autologous tissue
a. patient's tissue from her body(flaps)
iii. Combination of i and ii
iv. Nipple and areola reconstruction if not preserved during mastectomy

v. Surgery of other breast so that 2 will match in size and shape

B. Mammoplasty

i. Pre-op mammography

a. Detection of any lesion that requires further investigation or removal at time of reduction

ii. Common mammographic findings post breast reduction

a. changes of breast contour
b. elevation of the nipple
c. displacement of breast parenchyma
d. aesthetic distortion
e. skin thickening
f. retroareolar fibrotic band
g. disruption of areolar ducts
h. fat necrosis

C. Breast augmentation

i. Methods for breast augmentation

a. Autogenous tissue transplantation

1. Autologous myocutaneous flap
2. Transverse rectus abdominus myocutaneous flap

b. Injectable materials

1. Fat transfer breast augmentation injection, aka micro-lipoinjection or stem cell breast augmentation
2. Hormone enlargement injection therapy.

c. Implanted Prosthesis

1. Silicone gel
2. Saline

III. Imaging Work-up

i. Post Mastectomy

a. Mammogram
b. Ultrasound

ii. Post Mammoplasty

a. Mammogram
b. Ultrasound

iii. Post Breast Augmentation

a. Mammogram, incl implant displaced views
b. MRI

V. Outcomes

i. Results post surgical breast altering procedures

VI. Complications

i. Review of different types of complications relative to the type of breast surgery performed.

NUCLEAR MEDICINE: The Basics of Cardiac Rb PET/CT (.5R/.5I)

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DESCRIPTION: This presentation will give an in depth look into why using PET with Rubidium (Rb) could be the optimal myocardiac perfusion imaging (MPI) choice for patients with or suspected to have coronary artery disease (CAD). It will compare the different cardiac PET radiopharmaceuticals available as well as the radiopharmaceuticals used in SPECT imaging. Tracer extraction and flow quantification will be distinguished to identify the benefits of each. The importance of quality control of the Rb generator and PET/CT scanner will be explained. Typical indications and imaging protocols for cardiac PET MPI will be described along with how to recognize and troubleshoot potential imaging artifacts to ensure the highest image quality possible.

OBJECTIVES

1. Indicate the differences in cardiac PET radiopharmaceuticals.
2. Compare the differences between PET and SPECT radiopharmaceuticals.
3. Distinguish the relationship of the tracer extraction vs the flow quantification.
4. Summarize the importance of Rb generator QCs.
5. Name the alerts and expiration limits of the Rb generator.
6. List the parameters of PET/CT scanners.
7. Identify the indications for cardiac PET MPI.
8. Define the imaging protocols of cardiac PET MPI.
9. Recognize and troubleshoot of the imaging artifacts from cardiac PET MPI.

OUTLINE

I. Cardiac PET Radiopharmaceuticals
   a. Types and Their Differences
   b. PET vs. SPECT Radiopharmaceuticals
   c. Tracer Extraction vs the Flow Quantification.

II. QC of Rubidium Generator and PET/CT Scanner
   a. Importance of Rb Generator QC
   b. Alert and Expiration Limits of the Rb Generator
   c. Parameters of PET/CT Scanners

III. Imaging Protocols and Artifacts for Cardiac PET MPI
   a. Indications
   b. Imaging Protocols
   c. Imaging Artifacts
      i. Recognition
      ii. Troubleshooting

DIGITAL/RADIOLOGY: Radiology and Communication

Jana Arellano-Villaroel, MBA, R.T.(R)(T), Operations Manager/Clinic Manager, US Oncology, Riverside, Ca.; Contract Instructor, Flex Ed, Chino, Ca.

DESCRIPTION: This presentation will discuss the importance of communication in the medical imaging department and how it can impact the patient's experience and the accuracy of the radiologist's diagnostic report. Numerous points of communication in the day to day workflow of an imaging technologist will be explored. In addition, how using the Picture Archiving and Communication System (PACS) along with Electronic Medical Record (EMR) system can be utilized by the imaging technologist to improve diagnostic outcomes and patient satisfaction.

OBJECTIVES

1. Evaluate the importance of communication's impact on achieving quality diagnostic images and an accurate diagnosis.
2. Identify the interaction points of communication in the medical imaging workflow.
3. Utilize the PACS system and EMR system to bridge the communication gap.

OUTLINE:

I. Importance of Communication in Medical Imaging.
   a. Impact on the Patient's Experience.
      i. Improved Health Outcomes
      ii. Improved Satisfaction
   b. Impact on Radiologist's Diagnosis
      i. Reduction of Missed Diagnosis and Lawsuits

II. Interaction Points of Communication in the Medical Imaging Workflow.
   a. Patient and Technologist
      i. Technologist Role
         1. Code of Ethics
         2. Gather Pertinent Information
            a. Health History
            b. Patient's Symptoms
      ii. Items to Communicate
         1. Procedure Explanation
   b. Technologist to Technologist.
   c. Technologist to Radiologist
      i. Items to Communicate
         1. Health History
         2. Patient's Symptoms

III. Picture Archiving and Communication System (PACS) and Electronic Medical Record (EMR) System's Role in Communication.
   a. Changes in Workflows Due to Technology
      i. Increased Work Loads
      ii. Decreased Radiologist-Technologist Interaction
   b. Technologist Utilization of PACS and EMR Systems
   c. Benefits

RADIOLOGY: Radiology Image Analysis

Elliot S. Azizollahi, MD, Radiologist, Assistant Chief - Imaging Department, Southern California Permanente Medical Group, West Los Angeles.

DESCRIPTION: Radiology Image Analysis is a presentation focused mainly on radiographic anatomy and common disease entities. It is an introduction to the overview of the breadth of diagnostic imaging. Its purpose is not to train attendees to become skilled interpreters of diagnostic imaging but to understand basic insight on what to see and recognize in radiographic images in order to contribute to the care of the patient at large.

OBJECTIVES

1. Analyze technical quality of different images using simple parameters.
2. Identify basic views of different anatomical parts of the body.
3. Recognize radiographic patterns of disease and other abnormalities and describe them using appropriate terminology.
4. Recognize the vital role of imaging in establishing the correct diagnosis and treatment of the injured/ill patient.
5. Describe both typical and atypical patterns of radiographic presentation.

OUTLINE

I. Introduction
II. Overview
1. Radiographic Imaging Parameters
A. Thorax
i. Chest Images
a. Clinical information
b. Diagnosis
B. Lower Extremities
i. Pelvis
a. Clinical information
b. Diagnosis
ii. Knee
a. Clinical information
b. Diagnosis
iii. Ankle
a. Clinical information
b. Diagnosis
iv. Foot/Toes
a. Clinical information
b. Diagnosis
C. Upper Extremities
i. Shoulder
a. Clinical information
b. Diagnosis
ii. Elbow
a. Clinical information
b. Diagnosis
iii. Forearm
a. Clinical information
b. Diagnosis
iv. Wrist
a. Clinical information
b. Diagnosis

v. Hand
a. Clinical information
b. Diagnosis
D. Peritoneum
i. Multiple views of the Abdomen
a. Clinical information
b. Diagnosis
E. Spine
i. Cervical spine
a. Clinical information
b. Diagnosis
ii. Lumbar spine
a. Clinical information
b. Diagnosis
F. Brain
i. CT scan
a. Clinical information
b. Diagnosis
III. Summary

MAMMOGRAPHY: Optimal Techniques in Mammographic Imaging

Bahar Moussavian, MD - Radiologist, Southern California Permanente Medical Group, Los Angeles Medical Center (Body and Women's Imager).

DESCRIPTION: This presentation will provide information on optimal techniques of screening mammographic imaging per ACR guidelines along with consequences that suboptimal mammographic images can pose on the institutions and the patients.

OBJECTIVES

1. Demonstrate appropriate breast positioning per ACR guidelines.
2. Discuss the impact that improper positioning has on patients.
3. Identify the impact improper positioning has on the institution.

OUTLINE

I. Introduction:
A. Importance of optimal techniques in screening mammographic imaging
II. ACR Criteria's for proper positioning on screening mammography:
A. CC View
1. Breast centered on image
2. Nipple in profile
3. IMF is positioned as for the natural mobility of the breast will allow.
4. Breast tissue from the pectoralis muscle is included.
5. Proper compression
6. Wrinkles and artifacts remove from image.

7. Shoulders and chin not overlapping on the breast tissue.
8. No hair artifact
9. No motion artifact

B. MLO View
1. Angle the x-ray equipment to the patient
   a. Taller patients require a steeper angle of 50 degrees- 60 degrees.
   b. Short/Heavy patients are normally 30 degrees – 40 degrees.
   c. Average patients are 45 degrees-60 degrees.
2. Tissue imaged with chest wall forward.
3. Breast must be up and out.
4. Muscle needs to be at the nipple line or below.
5. IMF must be open and no overlapping tissue.
6. No wrinkles, no motion artifact
7. Contralateral breast must be pulled back, not to overlap with the opposite breast.
8. CC View to MLO tissue imaged must be within 1cm from each other.

III. Consequences of poor-quality images:
A. Cancer can be missed.
B. Unnecessary follow-up exams.
C. Increase patient's radiation dose.
D. Increase anxiety to the patient
E. Increase cost/material to the Medical Facility.

IV. Conclusion

ULTRASOUND: Sonography in Interventional Radiology

Andrew Song, MD - Interventional Radiologist, Diagnostic Imaging, Southern California Permanente Medical Group, Riverside

DESCRIPTION: With the advancements to sonographic equipment and processing power available, the uses for ultrasound has dramatically increased especially in the Interventional Radiology (IR) suite. This presentation will review the history and common uses of IR, list the common disease entities and pathophysiology in IR, and describe the practical role of sonography in a busy IR practice.

OBJECTIVES
1. Review the history and common uses of Interventional Radiology (IR).
2. List common disease entities and pathophysiology in Interventional Radiology.
3. Describe the practical role of sonography in a busy IR practice.

OUTLINE
1. Overview of Interventional Radiology (IR)
   a. History
   b. Diagnostic Uses
   c. Therapeutic Uses
2. Common Disease Entities and Pathophysiology
   a. Gastrointestinal
   b. Thorax
   c. Urogenital

d. Musculoskeletal
e. Vascular
f. Obstetrical and Gynecologic

3. Role of Sonography in IR
   a. Equipment
   b. Personnel
   c. Common Exams
      i. Diagnostic Uses 1. Biopsies
      ii. Therapeutic Uses
   d. Drainages
   e. Aspirations
   f. Benefits
   g. Complications

NUCLEAR MEDICINE: Management of Well-Differentiated Thyroid Cancer with Emphasis on 2015 ATA Guidelines (T)

O'Neil Lee, MD - Radiologist, Nuclear Medicine, Southern California Permanente Medical Group, Orange County.

DESCRIPTION: Nuclear Medicine has a unique role in managing patients with well-differentiated thyroid cancer. By understanding the biology of thyroid cancer, we can learn to optimize the diagnosis, treatment, and disease status monitoring.

OBJECTIVES

1. Discuss the biology of thyroid cancer.
2. Explain the role of I-131 therapy in managing thyroid cancer.
3. Describe how to optimize I-131 therapy.

OUTLINE

1. Thyroid nodules.
   a) Epidemiology.
   b) Diagnosing benign versus malignant thyroid nodules.

2. Well-differentiated Thyroid cancer.
   a) Epidemiology.
   b) Staging and surgery.
   c) Role of I-131 therapy after thyroidectomy.
   d) Monitoring disease status: thyroglobulin and thyroglobulin antibody.
   e) I-131 scan versus F-18 FDG PET scan.
   f) Role of TSH suppression after therapy.

3. I-131 therapy.
   g) Withdrawal versus thyrogen.
   h) Role of low iodine diet.
   i) Choosing I-131 dose.
   j) Pregnancy, breastfeeding, and radiation safety precautions.
   k) Managing complications/side effects of I-131 therapy.

4. Management of I-131 scan negative biochemical recurrence.
    a) Role of empiric I-131 therapy.
    b) Surgery and external beam radiation.
    c) Other treatment modalities.

DIGITAL/RADIATION SAFETY-FLUORO: Radiation Safety in IR Suite related to Surveys by Regulatory/Accrediting Agencies

Robert McDermott, MS, DABR, CRT, CNMT – Adjunct Professor, Radiologic Technology Program, Cypress College, California.

DESCRIPTION: Attendees will review radiation and fluoroscopy safety terms, guidelines, and organizations to include best practice for reducing dose for patients with obesity.

OBJECTIVES

1. Review radiation safety terms
2. Understand licensing regulations from past to present
3. Differentiate between radiologic regulating branches
4. Apply radiation safety to imaging obese patients

OUTLINE

I. Defining Terms
    A. ALARA
    B. Dose Equivalent
    C. Dosimeter
    D. Lead Equivalent
    E. Rad/Gray
II. History
    A. How protection standards have evolved
    B. How regulations have evolved
    C. How licensing has evolved
        1. ARRT 10 year renewal/requirements
        2. Current CA licensure requirements
        3. ACVP – CVT vs RT
III. Organizations
    A. RHB
    B. ARRT/ASRT
    C. NCRP
    D. FDA
    E. ACR
    F. CDPH
    G. ICRP
    H. UNSCEAR
IV. Radiation Safety
    A. Title 17
    B. Title 21
    C. Time/Distance/Shielding
    D. ALARA
    E. Position of ii to reduce dose
    F. Obese patients-reducing dose
V. Digital Fluoroscopy
    A. Verify Supervisor/Operator permit

B. Verify correct exam performed on correct patient
C. Obese patients-optimal images

RADIOLOGY: It's the Parts that Matter: Gender Diversity in Diagnostic Imaging

Virginia Sanders, RT - Staff technologist, Southern California Permanente Medical Group, San Diego.

DESCRIPTION: Our concept of gender has originally been binary (male/female) however the gender landscape is shifting, and healthcare workers should have some awareness of this change. There are many different genders that people now identify as. Within this Gender Diverse Community (GDC) are transgender individuals who pose a particular challenge for us in Diagnostic Imaging (DI) due to their gender identity and gender expression not being the same as their sex assigned at birth. We may not know where the reproductive organs are located on transgender patients and therefore, expose a patient to unnecessary ionizing radiation. New communication tools are suggested to work with the GDC in a respectful and professional manner. Additionally, we suggest a new intake form for DI that every patient must complete prior to an X-ray exam.

OBJECTIVES

1. Explain the Gender Spectrum.
2. Define gender identity, gender expression and other gender terms.
3. Identify factors that contribute to the disparity in healthcare between transgender individuals and the rest of the population.
4. Apply strategies to improve communication between rad techs and the gender diverse community, particularly transgender patients.

OUTLINE

1. The Gender Spectrum
    a. Explanation of the Gender Spectrum
    b. Define gender related terms such as gender identity, gender expression, etc.
    c. Omission of sexual orientation from the Gender Spectrum

2. Marginalization of the transgender community
    a. Statistics on physical, verbal and sexual abuse for adults and youth

3. Radiation Protection
    a. A summary

4. Why we are focusing on the transgender community
    a. This community does not express nor identify the same as their biological sex
    b. We can unintentionally expose patients' reproductive organs because we didn't ask where they are located

5. Communication tools for the gender diverse community
    a. Create a safe place

b. Don't make it weird
c. New form suggested: The SIGE form
d. Dialogue recommendations

6. Summary

DIGITAL/MAMMOGRAPHY: Mammography Quality Control: A Refresher

Matt Wait, MS, DABR, Medical Radiation Physicist, Medical Imaging Technology and Informatics, Southern California Permanente Medical Group, Woodland Hills.

DESCRIPTION: The presentation will provide mammography technologists and physicists with a review of digital mammography technology, radiation safety, quality control activities performed, and review responsibilities assigned by regulatory and accreditation bodies.

OBJECTIVES

1. Review digital mammography technology.
2. Identify basic radiation safety and personnel dosimetry principles.
3. Describe responsibilities assigned by MQSA, ACR, and the State of California.
4. Explain mammography technologist's QC responsibilities and procedures
5. Describe the physicist's QC responsibilities and procedures.
6. Examine misconceptions about mammography technology, radiation safety, and QC.

OUTLINE

I. Mammography Quality Control
   a. Overview of Digital Mammography Technology
   b. Radiation Safety Review
      i. Personal Dosimetry
   c. MQSA & ACR Responsibilities
   d. Technologist QC
      i. Responsibilities
      ii. Procedures
   e. Physicist QC
      i. Responsibilities
      ii. Procedures
   f. Questions

ULTRASOUND: Interesting Pelvic Ultrasound Cases

Ingrid Burger MD - Radiologist, Southern California Permanente Medical Group, West Los Angeles, (Section Chief, Ultrasound)

DESCRIPTION: Upon completion of the presentation, attendees will be introduced to the use and purpose of cine clips as surrogates during pelvic sonography for imaging etiologies leading to diagnoses. In addition, an introduction and discussion on color and spectral Doppler will be entertained alongside a conglomerate of interesting case studies in which diagnostic ultrasonography is performed for evaluating pelvic pain revealing gynecologic etiologies. At the conclusion of the presentation, attendees will demonstrate knowledge in identifying paramount clinical evidence during diagnostic ultrasonography to communicate with the radiologist to aid in generating accurate diagnosis during challenging studies.

OBJECTIVES

1. Describe during pelvic sonography when cine clips are helpful/necessary in making a diagnosis.
2. Explain when imaging pelvic structures, how color and spectral Doppler are helpful/necessary in making a diagnosis.
3. Identify the key pieces of information to communicate to the Radiologist to aid an accurate diagnosis in regard to pelvic sonographic imaging.

OUTLINE

I. 10 Interesting/Challenging Pelvic Ultrasound Case Studies
   a. Patient history
   b. Images
   c. Imaging Findings
   d. Technical Tips and Tricks
      1. Uses of Cine Clips
      2. Color and Spectral Doppler Uses
   e. Communication with Radiologist
      1. Key Pieces of Information to Include
   f. CT and MRI Exam Comparisons to Sonography
   g. Differential Diagnosis
   h. Final Diagnosis at Pathology
   i. Imaging Pearls
      1. Lessons Learned

II. Summary
   a. Scanning Tips and Tricks
   b. Lessons Learn

NUCLEAR MEDICINE: Theranostics in Nuclear Medicine Practice (T)

R. Jay Idea, MD. - Lead Nuclear Medicine Physician, Southern California Permanente Medical Group, Woodland Hills

DESCRIPTION: The theranostic approach in nuclear medicine is an established tool for molecular targeting that combines diagnostic imaging and therapy. Advantages of this approach include

visualization and detection of potential targets that predict if a patient will respond to therapy for estimating potential response, and eventual toxicity.

OBJECTIVES

1. Provide a brief history of theranostics in nuclear medicine.
2. Define theranostics as it applies to nuclear medicine.
3. Describe and discuss the currently utilized theranostic imaging and therapy agents.
4. Identify clinical cases that illustrate theranostic agents.

OUTLINE

1. Theranostics
    a. History
    b. Definition
    c. Theranostic as it applies to Nuclear Medicine
2. History of I-131 (the first Nuclear Med theranostic agent)
3. Current theranostic agents in Nuclear Medicine
    a. I-131
    b. MIBG
    c. Ga68 Dotatate
4. Clinical case examples

RADIOLOGY: The Importance of High-Quality Exams in Diagnostic Imaging

David Saperstein, DO - Radiologist, Southern California Permanente Medical Group, Fontana

DESCRIPTION: Our duty as radiologic technologists is to produce high quality radiographic images to allow the radiologists to create an accurate diagnostic report which ensures the patient receives the appropriate care from their treating physician. This presentation will provide an explanation of how the technical factors we choose, contribute to the diagnostic quality of our images along with the effect those factors have on radiation dose.

OBJECTIVES

1. Explain mAs vs KVP regarding dose and image quality.
2. Be familiar with radiation safety – time and distance.
3. Identify the importance of obtaining good-quality images.

OUTLINE

I. Introduction
    A. History
II. Exposure Factors
    A. Quantity - mAs
        1. Proportionality
            a. Number of X-rays and mA with Fixed Time
            b. Dose and mA with Fixed Exposure Time
            c. Reciprocity Law
    B. Quality – KVP
        1. Contrast

2. Beam Penetration
3. Compton Effect
a. Scatter Radiation
a) Image Noise

C. Operator Control vs. Fixed
D. Exposure Time
E. Distance
1. Inverse Square Law

III. Image Quality
A. Image receptors
B. Characteristic curve
C. Positioning
D. Beam angulation

IV. Image Examples

V. Conclusion/Summary
A. Responsibility
B. Gold Standard – Imaging your mother
1. Solution

DIGITAL/RADIOLOGY: CT Assisted Virtual Treatment Planning in Orthognathic Surgery

David Bell, DDS, MD - Maxillofacial Surgeon, Head and Neck Surgery, Southern California Permanente Medical Group, Orange County.

DESCRIPTION: Orthognathic surgery is performed on the face to correct developmental facial growth deformities resulting in a compromised bite, abnormal facial cosmetics and facial asymmetry, breathing disorders including obstructive sleep apnea, TMJ problems, speech problems, and problems related to social development and psychological well-being. The face is a complex three-dimensional structure and normalizing the structure of the face in the virtual realm with the aid of CT 3D reconstructed images to plan surgery has revolutionized the practice orthognathic surgery in the past 10 years.

OBJECTIVES
1. Explain orthognathic surgery.
2. Describe how facial CT scan data is utilized to plan and execute orthognathic surgery.
3. Assess how 3D printing of surgical guides has revolutionized orthognathic surgery.

OUTLINE
I. Orthognathic surgery
a. Introduction
b. Geometric challenges
i. Planning
ii. Executing

II. Virtual surgery
a. Preparation
i. Clinical

ii. CT scan protocol
iii. Web-based meeting with biomedical engineer to plan surgery
iv. Video presentation of planning session
v. 3-D printing of surgical guides

III. Surgical procedures
a. Before and after results

DIGITAL/MAMMOGRAPHY: 3D Mammography at a Glance
Mara Ridane, R.T. (R)(M), ARRT, Assistant Director of Diagnostic Imaging Services, Southern California Permanente Medical Group, Los Angeles Medical Center.

description: In this presentation the attendees will be able to differentiate between 3D and 2D mammography units. In addition, attendees will recognize the importance of 3D mammography and 3D Stereotactic Biopsy units in the fight against malignancies.

OBJECTIVES
1. Distinguish between 3D and 2D mammography.
2. Recognize the importance of 3D mammography "Tomosynthesis" in diagnosing normal and abnormal pathology, therefore minimizing the number of patients re-calls.
3. Discuss the importance of 3D Stereotactic Biopsy units in the fight against cancer.

OUTLINE

I. Introduction
A. Benefits of 3D Mammography vs 2D Mammography
1. Image Quality
2. Improved Cancer Detection
3. Call Back Reduction

II. How 3D Mammography Imaging Work
A. Digital Images
1. Image Acquisition
. Camera makes short sweeping motion
a. Approximately 60 slices for Radiologist to View
2. Recall Reduction
3. Detection Improvements
. Subtle Lesions and Fine Calcifications
a. Dense Breast Tissue
4. Low Dose High Resolution
5. Ultrasound Imaging of the Breast
6. MRI Imaging of the Breast

III. 3D Mammography Stereotactic Biopsy Unit
A. Benefits
1. Minimally Invasive
2. Short Procedure Time
3. Patient Positioning
4. Several Image Slices of Area of Interest for Radiologist to View
5. Biopsy Site Tissue Sampling
6. Clip Placement in the Biopsy Site

7. Quick Recovery

IV. Conclusion
A. 3D Mammography Advancements in Breast Cancer Detection

ULTRASOUND: Ultrasound of the Placenta

Cameron Manbeian, MD - Interventional Radiologist, Southern California Permanente Medical Group, South Bay.

DESCRIPTION: The placenta is not to be confused with a city in Southern California's Orange County suburbs but the vital organ responsible for supplying nutrients and oxygenated blood while removing waste products in a developing fetus. Abnormalities and/or pathologies of the placenta, if left undetected, can become life threatening to the fetus and the mother. Ultrasound of the placenta is a key tool in the prenatal screening to help ensure the baby and mother live a healthy gestational life together. Ultrasound, with its wide availability and lack of ionizing radiation is generally the first choice for placenta imaging. Delineation of normal anatomy vs normal anatomic variances vs pathologies on sonographic images will be presented and explained to help sonographers produce the highest quality images of the placenta possible and ensure that the radiologist makes the most accurate diagnostic interpretation.

OBJECTIVES

1. Identify normal sonographic presentation of placental anatomy.
2. Recognize normal anatomic variances of placenta seen on ultrasound images.
3. Describe common placental pathologies and their sonographic appearance.

OUTLINE

I. The Placenta
- a. Normal Placenta Anatomy
- b. Normal Anatomic Variances
    1. Marginal Sinus
    2. Succenturiate Placenta
        - a. Associated Risks
    3. Bi-lobed Placenta
    4. Circumvallate Placenta
        - a. Associated Risks
- c. Size
    - i. Thickness
    - ii. Indications of pathology
- d. Location
    - i. Accurate measurements
    - ii. Indications for Caesarian Deliveries

II. Common Pathologies of Placenta Seen with Ultrasound
- a. Morbidly Adherent Placenta (MAP)
    - i. Definition
    - ii. Imaging Techniques

1. Transvaginal
iii. Causes
iv. Risk Factors
v. Increased Incidence
1. Caesarian Delivery's Impact
vi. Classifications
1. Accreta
2. Increta
3. Perceta
vii. Sonographic Presentation
1. Loss of Retroplacental Clear Space
2. Placental Lacunae
3. Increased Vascularity

b. Placental Calficifications
i. Grades
c. Chorioamniotic Seperation
d. Placental Cysts
e. Placental Cord Insertion
i. Marginal
ii. Velamentous
1. Prevalence
2. Associated Risks
f. Vasa Previa
i. Prevalence
ii. Treatment
g. Placental Abruption
i. Definition
ii. Risk factors
iii. Detection Sensitivity Limitations of Ultrasound
h. Thrombotic Complications
i. Types
1. Placental Infarct
2. Echogenic Cystic Lesions

III. Summary

NUCLEAR MEDICINE: Nuclear Medicine Artifacts (I)

Brian Helbig, MS, DABR, Medical Radiation Physicist, Medical Imaging Technology and Informatics, Southern California Permanente Medical Group, South Bay.

DESCRIPTION: Artifacts can culminate in many shapes and forms within nuclear medicine. While some are due to inherent damage or issues with imaging devices, many can be addressed. As a result, the ability to differentiate artifacts in a clinical environment can be extremely useful. This talk will overview various artifacts within nuclear medicine spanning from planar to SPECT and PET imaging. It is the intention of this talk to prepare you to identify and avoid, or appropriately address, artifacts within your own clinical practice.

OBJECTIVES

1. Review of common artifacts in nuclear medicine
2. Describe the nature and causes of common artifacts.
3. Discuss various artifacts within nuclear medicine scanning from planar to SPECT and PET imaging.
4. Identify ways to avoid common artifacts within a clinical setting.

OUTLINE

I. Planar Imaging Artifacts
   a. Energy settings
   b. Spatial resolution
   c. Energy window setting in clinical studies
   d. Unstable energy window in clinical studies
   e. Defective linearity/energy maps

II. SPECT Imaging Artifacts
   a. Ring artifacts
      i. How to resolve them
   b. Center-of-rotation offset errors
   c. Attenuation correction
   d. Movement

III. PET Imaging Artifacts
   a. PET/CT fusion imaging
      i. Truncation and respiration artifacts
   b. Breathing artifacts

DIGITAL/RADIOLOGY: Temporal Bone Anatomy and Pathology on CT

Sameer Ahmed, MD - Associate Physician/Surgeon, Otology/Neurotology, Head and Neck Surgery, Southern California Permanente Medical Group, Downey.

DESCRIPTION: The bulk of this presentation will cover basic anatomy of the external, middle, and inner ear in addition to normal structures seen in the temporal bone on CT. The latter third of the presentation will discuss different pathologies of the temporal bone and their corresponding CT findings.

OBJECTIVES

1. Identify the external auditory canal, tympanic membrane, and middle ear structures.
2. Identify inner ear structures (cochlea, vestibule, and semicircular canals) and temporal bone structures (endolymphatic duct, subarcuate tract, and internal auditory canal).
3. Identify the facial nerve along its intra-temporal course.
4. Describe common temporal bone pathologies.

OUTLINE

I. Normal Anatomy seen on CT
   A. Middle Ear
   B. Inner Ear
   C. Temporal bone structures
   D. Facial Nerve's Intra-temporal course
II. Common Temporal Bone Pathologies
   A. CT Findings
   B. Treatments
   C. Case studies

RADIOLOGY: Fundamentals of Chest Radiograph Interpretation

Jong H. Yun, MD - Radiologist, Southern California Permanente Medical Group, San Diego.

DESCRIPTION: Although chest radiographs are relatively simple compared to other modalities, they contain a wealth of information about the condition of the patient. The anatomy of the chest as well as the nature of the pathology determine how abnormalities appear on chest radiographs. By reviewing multiple examples of common as well as rare but interesting abnormalities seen on chest radiographs, this presentation will explain the critical role that technologists and radiologists play in the evaluation and care of our patients.

OBJECTIVES

1. Identify anatomy of the chest.
2. Discuss the range of pathology involving the chest.
3. Evaluate how anatomy and pathology present themselves on chest radiographs.
4. Compare cases of common, rare and interesting abnormalities seen on chest radiographs.

OUTLINE

I. Chest radiographs
   a. Anatomy
   b. Pathology/abnormalities
      i. Common
      ii. Rare
   c. Case studies
   d. Technologists' role
      i. Positioning
      ii. Setting technical factors
   e. Radiologists' role

DIGITAL/MAMMOGRAPHY: Advances in Breast Imaging

Jessica Clements, MS, DABR, FAAPM is the Chief Physicist and Regional Radiation Safety Officer for Southern California Permanente Medical Group.

DESCRIPTION: Attendees of this course will receive an overview of how new technology in breast imaging is assessed for clinical use. There will be special focus on several technologies that have advanced breast imaging in the past 10 years.

OBJECTIVES

1. Describe how advances in breast imaging have been designed for higher accuracy in screening.
2. Explain how new technology in breast imaging addresses special patient populations.
3. Discuss processes for assessing new technology and implementing it clinically.

OUTLINE

I. Introduction
   a. Why breast imaging is important
   b. History of breast imaging modalities

II. Methods for technology assessment

III. Advances in breast imaging
   a. FFDM
      i. Contrast enhanced mammography
      ii. DBT
      iii. Image processing – CAD, C-view
   b. Ultrasound
      i. ABUS
      ii. Whole breast US
   c. Molecular breast imaging
      i. BSGI
      ii. PEM
   d. MRI
   e. Dedicated Breast CT (bCT)

ULTRASOUND: FETAL HEART ULTRASOUND

Cameron Manbeian, MD - Interventional Radiologist, Southern California Permanente Medical Group, South Bay.

DESCRIPTION: Congenital heart disease (CHD) is a leading cause of infant mortality and structural cardiac anomalies are among the most frequently missed by prenatal ultrasonography. Prenatal detection of CHD can vary by differences in the sonographer's experience, maternal obesity, transducer frequency, abdominal scars, gestational age, amniotic fluid volume and fetal position. This presentation will cover techniques that sonographers can utilize to provide optimal imaging of the fetal heart, and describe how anatomy, structural abnormalities, and pathology will present themselves on images.

OBJECTIVES

1. Identify techniques to provide optimal prenatal screenings of the fetal heart.

2. Evaluate how anatomy and pathology present themselves on fetal heart ultrasound.
3. Review abnormalities seen on fetal heart ultrasounds.

OUTLINE

Title: Fetal Heart Ultrasound

I. Screening Parameters
   a. Technical Factors
      i. Transducer Frequency
      ii. Images Magnification
         1. 1/3-1/2 the screen.
      iii. Gestational Age: 18-22 Weeks
      iv. Limitations:
         1. Maternal Obesity
         2. Prone Fetal Position
         3. Late Gestation.

II. International Society of Ultrasound in Obstetrics and Gynecology Guidelines
   a. Four-Chamber View
      i. Cardiac Situs
         1. Identify and Label Right and Left Sides of Heart
         2. Confirm Stomach and Heart Location.
         3. Situs Abnormalities
   b. Outlet Tract Views
      i. Benefits When Used in addition to Four Chamber View
         1. Increased Malformation Detection
            a. Conotruncal Abnormalities
               i. Tetralogy of Fallot
               ii. Transposition of the Great Arteries
               iii. Double Outlet Right Ventricle
               iv. Truncus Arteriosus
         2. Great Vessels Imaging
            a. Size
            b. Orientation to Their Origins
      ii. Left Ventricular Outlet Tract (LVOT) View
         1. Great Vessel Origination Location
         2. Ventricular Septum, Anterior Wall of Great Vessel, and Aorta Continuity
         3. Aortic Valves' Appearance
         4. Outlet Ventricular Septal Defects (VSD) and Conotruncal Abnormalities.
      iii. Right Ventricular Outlet Tract (RVOT) View
         1. Great Vessel
            a. Size
            b. Location
            c. Orientation
   c. Three Vessel (3V) View AND 3VT (Trachea)
      i. PA, Aorta and SVC.
         1. Size
         2. Location
         3. Orientation
      ii. VSD
         1. Anatomical Abnormalities Seen
   d. Heart Rate and Rhythm
      i. Normal rate ranges from 120-160 bpm.

ii. Fixed bradycardia
iii. Fixed tachycardia
iv. Occasional skipped beats are typically not significant.

NUCLEAR MEDICINE: The Evolution of Sulfur Colloid (R)

Raynold J. Ho, MBA, CNMT, ARRT(N), NMTCB - Program Director/Clinical Coordinator, Nuclear Medicine Program, Loma Linda University, California; Staff Nuclear Medicine Technologist, Southern California Permanente Medical Group, Fontana.

DESCRIPTION: This presentation will dissect all the facets associated with Tc^{99m} Sulfur Colloid, a gamma emitting radiopharmaceutical that is being used for various purposes in the Nuclear Medicine department. The origins of Sulfur Colloid and its original uses along with its additional uses and where it is commonly used will be explored.

OBJECTIVES

1. Describe the origins of Sulfur Colloid.
2. Discuss the original uses of Sulfur Colloid.
3. List the Sulfur Colloid's additional uses.
4. Identify where Sulfur Colloid is used today.

OUTLINE

I. Tc^{99m} - Sulfur Colloid
   A. Origins of Sulfur Colloid
   B. Original Uses
   C. Additional Uses
   D. Where we use it today