

**Society of Thoracic Radiology
Scientific Posters
March 25-29, 2007
Red Rock Casino, Resort & Spa**

- 101 Hemoptysis: Evaluation Using Volumetric High-resolution CT
Mizuki Nishino, MD
M. Nishino, T. Kubo, DH Roberts, PM Boiselle, V. Raptopoulos, H. Hatabu
- 102 Coronary Calcium Scoring with 64-slice CT: Can the Variability of the Scores and the Influence of the Reconstruction Interval be Overcome?
Markus Weininger, MD
M. Weininger, C. Ritter, M. Beer, D. Hahn, M. Beissert
- 103 Quantitative Perfusion Measurements of the Healthy Human Lung by Using Contrast-enhanced MRI
Markus Weininger, MD
M. Weininger, M. Oechsner, M. Beissert, H. Koestler, D. Hahn, M. Beer
- 104 Congenital Coronary Fistula: A Rare Cause of Heart Failure
Navid Zenooz, MD
NA Zenooz, RC Gilkeson, R. Habibi, MR Robbin, P. Finn
- 105 Complement Coronary CT Angiography after Cath Lab
Jean Chalaoui, MD
J. Robillard, V. Freire, C. Chartrand-Lefebvre, J. Prenovault, J. Chalaoui
- 106 Contrast Volume Reduction with Superior Vena Cava Catheter-Directed Coronary CT-Angiography: Comparison with Peripheral IV Contrast Enhancement in a Swine Model
Kostaki G. Bis, MD
AN Shetty, KG Bis, AR Vyas, A. Kumar, A. Anderson, M. Balasubramaniam
- 107 WITHDRAWN
- 108 Pleural Interventional Procedures for Thoracic Radiologists
Eun-Young Kang, MD
EY Kang, OH Woo, HS Yong, YW Oh, CM Park, IH Cha
- 109 Are There Gender Differences in Absolute or Corrected Pulmonary Arterial Size?
Ahuva Grubstein, MD
A. Grubstein, JE Fishman
- 110 CT Venography in Suspected Venous Thromboembolism; Findings, Pitfalls, and Controversies
John P. Fantauzzi, MD
DS Katz, JP Fantauzzi, AY Choi, PA Loud, RA Shah, ZD Grossman
- 111 Coronary Ostium - Straight Tube or Funnel Shaped? A Computerized Tomographic Coronary Angiography Study
Galit Aviram, MD
G. Aviram, H. Shmilovich, A. Finkelstein, G. Rosen, S. Banai, M. Graif, G. Keren
- 112 Mystery Tumor of Bronchioloalveolar Carcinoma: Spectrum of Chest CT Findings with Pathologic Correlation
HJ Seon, MD
HJ Seon, YH Kim, KJ Kim, JG Park, HK Kang
- 113 MDCT Evaluation of Congenital Airway Abnormalities Presenting in Children and Adults
Kei Yamada, MD
K. Yamada, EY Lee, A. Ernst, DM Boyer, D. Feller-Kopman, PM Boiselle

Scientific Posters

POSTERS

- 114 Pictorial Review of Radiological Manifestations in Common Variable Immunodeficiency (CVID) Disorder
B. Rengabashyam, MD
B. Rengabashyam, B. Bhartia, S. Savic, P. Wood
- 115 Evaluation of Cardiac Chamber Enhancement During 64-slice Coronary CT Angiography Using a Triphasic Contrast Injection Protocol and Automated Bolus Tracking
William Boonn, MD
WW Boonn, S. Jha, H. Litt, S. Charagundla
- 116 Cryptogenic Organizing Pneumonia (COP) in Post Hematopoietic Stem Cell Transplantation (HSCT): CT Features and Association with Graft Versus Host Disease (GVHD)
Sudhakar Pipavath, MD
S. Pipavath, J. Chung, JD Godwin, JW Chien
- 117 Incidence and Clinical Significance of Extracardiac Findings on Cardiac CT
Nishard Abdeen, MD
N. Abdeen, A. Ayyappan, J. Seely, F. Matzinger, B. Chow, C. Dennie
- 118 MDCT Evaluation of Tracheobronchial Stenoses
Jay Catena, MD
JR Catena, D. Litmanovich, A. Ernst, V. Dialani, PW Spirn, PM Boiselle
- 119 NTM (Non-Tuberculous Mycobacterium) Diseases at CT: New Five Forms and Its Schematic Illustrations
Semin Chong, MD
S. Chong, TS Kim, KS Lee, WJ Koh, J. Han
- 120 Which Breathing Protocol is Optimal in Independent Computer-registered Fusion of PET and CT Data Sets?
Aleksandar Grgic, MD
A. Grgic, D. Hellwig, U. Nestle, S. Kremp, CM, Kirsch
- 121 Imaging of Lung Transplantation
Yuen-Li Ng, MD
YL Ng, N. Paul, A. Walsham, TB Chung, D. Patsios, S. Keshavjee, G. Weisbrod
- 122 Characterization of Solitary Pulmonary Nodules: Comparison of Dynamic Contrast-enhanced CT Perfusion (DCECT) and FDG-PET
Yuen-Li Ng, MD
YL Ng, I. Sitartchouk, H. Bayanati, A. Pereira, A. Walsham, T. Waddell, H. Roberts
- 123 CT Virtual Bronchoscopy: Advancements on the Evaluation of Segmental Airway Stenosis
I.B. Oliva, MD
IB Oliva, MA Barish, R. Gill
- 124 A Practical Approach to Cardiac Findings on the Standard MDCT of the Thorax for Non-Cardiac Radiologists
A. Goela, MD
A. Goela, SR Digumarthy, A. Sharma, S. Abbara, JO Shepard
- 125 Mosaic Attenuation on Thin-section CT of the Lung: An Algorithmic Diagnostic Approach
Anoop Ayyappan, MD
A. Ayyappan, C. Souza, C. Dennie, V. Astrope, F. Matzinger, R. Peterson, J. Seely
- 126 Coronary Computed Tomography Angiography (CTA) for Rapid Disposition of Low Cardiac Risk Emergency Department (ED) Patients with Acute Chest Pain Syndromes
Woojin Kim, MD
W. Kim, JE Hollander, WG Baxt, M. Chase, HI Litt

- 127 Feasibility of Low-Dose Multi-detector Computed Tomography in Follow Up of Patients with Severe Emphysema after Airway Bypass - A Novel Bronchoscopic Procedure for Severe Emphysema
Aleksandar Grgic, MD
A. Grgic, H. Wilkens, B. Kramann, A. Groschel, GW Sybrecht
- 128 Combined Endoscopic and Endobronchial Ultrasound Find Needle Aspiration for Mediastinal Staging of Lung Carcinoma
Edem F. Chen, MD
BL McComb, JMS Pascual, EF Chen, M. Raimondo, TA Woodward, MM Johnson, M. Al-Haddad, J. Hardee, J. Odell, MB Wallace
- 129 The Thoracic Inlet: Normal Anatomy and Selected Pathology
Jerry Lee, MD
JC Lee, T. Siddall, A. Malhotra, J. Wandtke
- 130 Impact of Emergency Department Chest CT on Clinical Management of Immunocompetent Patients with Chest Radiographic Findings of Pneumonia
P. Banker, BA, MHS
P. Banker, V. Jain, Linda Haramati
- 131 Clinical Value of 64 Slice Cardiac MDCT in the Preoperative Planning of Complex Adult Heart Surgery
William M. Strub, MD
WM Strub, CA Meyer, R. Strunk, W. Merrill
- 132 CT Evaluation of Extrapleural Lymph Nodes in Malignant Mesothelioma
Valerie Astrope, MD
V. Astrope, J. Seely, F. Matzinger, C. Dennie, C. Souza, R. Peterson
- 133 CT of Congenital Heart Disease
Saurabh Jha, MD
S. Jha, C. Sridhar, H. Litt
- 134 Influence of CT Imaging Parameters on Automatic Measurement of Airway Wall Thickness with FWHM Method Using a Physical Phantom
Eun Jin Chae, MD
EJ Chae, K. Kim, JD Seo, SH Kang
- 135 Radiologic Findings of Pulmonary Aspergillosis in Solid Organ Transplant
Eun Jin Chae, MD
EJ Chae, Y. Park, JB Seo, YK Lee, KH Do, HS Lee, JW Song
- 136 Pseudoemboli
Emma C. Ferguson, MD
EC Ferguson, A. Berkowitz, AA Oldham
- 137 Dual Time Point PET-CT in the Differentiation of Non-small Cell Lung Cancer
Soo-Youn Ham, MD, PhD
SY Ham, YW Oh, EJ Choi, SES Kim, EY Kang, KY Lee, YH Kim
- 138 Pulmonary Blastoma: Radiological and Pathological Correlation of a Rare Disease
Amit Newatia, MD
S. Shkurovich, A. Newatia, S. Soohoo, R. Shah, A. Khan
- 139 Correlation with PET-CT and Follow Up CT for Primary and Metastatic Lung Cancers Treated With Cryoablation
Soo-Youn Ham, MD, PhD
SY Ham, SB Cho, HW Oh, YH Kim, SE Kim, SH Lee, CT Kim

Scientific Posters

POSTERS

- 140 Low-Dose Computed Tomography in Prior Asbestos-exposed Workers: Assessment of Pleural Plaques and Screening for Lung Cancer and Malignant Mesothelioma
Hamid Bayanati, MD
H. Bayanati, H. Roberts, Z. Dong, A. Pereira, I. Sitartchouk, A. Kale, N. Paul, M. Johnston
- 141 PET/CT of Lung Cancer: An Educational Exhibit
Janice Sung, MD
JS Sung, WB Gefter, A. Alavi, DA Torigian
- 142 Cryptogenic Organizing Pneumonia
Emma C. Ferguson, MD
EC Ferguson, A. Berkowitz, SA Oldham
- 143 Mosaic Perfusion on HRCT: Disease Characterization and Etiologies
Amit Newatia, MD
A. Newatia, S. Shkurovich, S. Soohoo, R. Shah, A. Khan
- 144 The Effect of Saline Flush for Enhancement of Aorta and Coronary Artery Using Cardiac Multidetector-row Computed Tomography (MDCT) Angiography
Sang Jin Kim, MD
SJ Kim, DJ Kim, TH Kim
- 145 A Clue to Lung Cancer in Lobar Consolidation: Bronchial Wall Thickening and Diffuse Enhancement
Ho Seok Yoo, MD
HS Yoo, W. Kwon, SH Kim, MS Kim
- 146 Expanding the Differential Diagnosis of Cystic Lung Disease at HRCT
Matthew D. Gilman, MD
MD Gilman, FX McCormack, CA Meyer
- 147 Paravertebral Lesions of the Thorax
Eugene Berkowitz, MD
EA Berkowitz, EC Ferguson, SA Oldham
- 148 Imaging Findings in Vascular Mediastinal Masses
Katherine Parker, MD
K. Parker, JP Ko, G. McGuinness, A. Rubinowitz
- 149 Coronary CTA in the Setting of Cocaine Related Chest Pain
Jeffrey Peeke, MD
J. Peeke, T. Fkukinger, J. Jeudy, C. White
- 150 Evaluation of Coronary Artery Stent Occlusion Using 64-detector CT Angiography
N. Goyal, MD
N. Goyal, Y. Goldman, A. Kakkanatt, LM Boxt
- 151 A Review of Atypical Intrathoracic Manifestations of Sarcoidosis
A.C. Walsham, MD
AC Walsham, Y-L Ng, N. Paul, G. Weisbrod, T-B Chung, S. Herman, H. Roberts, M. Balter, D. Patsios
- 152 Evaluation of Aortic Regurgitation in Congenital Heart Disease: Value of Magnetic Resonance Imaging in Comparison to Echocardiography
Sebastian Ley, MD
S. Ley, R. Arnold, J. Ley-Zaporozhan, J-P Schenk, H. Ulmer, H-U Kauczor
- 153 Typical and Atypical Multi-Detector Computed Tomographic Findings in Acute Traumatic Aortic Injuries - A Pictorial Review
Scott Steenburg, MD
S. Steenburg

- 154 Various Findings of Breast Lesions on Routine Chest CT
J.G. Yi, MD
 JG Yi, JH Park, SJ Kim
- 155 Acute Aortic Syndrome: Pictorial Assay
Andre M. Pereira, MD
 AM Pereira, NS Paul, DJ Doyle, V. Pen, Y. Ng, Y. Provost
- 156 Audit of Missed Lung Cancers on Chest Radiographs
Manoj Srivastava, MD
 M. Srivastava, MG Cowing, N. Watson
- 157 Effect of Different Tidal Volumes and PEEP on Lung Compartments Using Respiratory Gates 4D-CT
Julia Ley-Zaporozhan, MD
 J. Ley-Zaporozhan, S. Ley, RR Unterhinninghofen, O. Weinheimer, Y. Saito, G. Szabo, H-U Kauczor
- 158 Cystic Lung Disease
Ahmed El-Sherief, MD
 A. El-Sherief, J. Wandtke
- 159 Multidetector CT (MDCT) for the Evaluation of Congenital Heart Disease in Adults
Diana Palacio, MD
 D. Palacio, D. Hughes, S. Jadhav, S. Parada, J. Cuellar
- 160 Differential Diagnosis of Delayed Contrast Enhancement of Myocardium in Cardiac MRI
Satinder Singh, MD
 S. Singh, N. Hosakote, C. Corros-Vincente, S. Llyod, H. Gupta, H. Nath
- 161 Imaging of Pulmonary Hypertension in 21st Century
Satinder Singh, MD
 S. Singh, J. Nath, S. Llyod, H. Gupta
- 162 PET/CT and Endoscopic Ultrasound (EUS) in Management of Esophageal Carcinoma: A Pictorial Review
Tadesse Eshetu, MD
 T. Eshetu, SN Shah, TL Mohammed
- 163 CT and Pathologic Correlation in Patients with NSIP
Shalin Amin, MD
 S. Amin, C. Farver, Tan-Lucien H. Mohammed
- 164 Utility of CT in Evaluating Patients with Suspected Arrhythmogenic Right Ventricular Dysplasia (AVRD)
Aqeel Chowdhry, MD
 AA Chowdhry, T-L H. Mohammed
- 165 Low-Dose Computed Tomography as a Screening Tool Post Prior Asbestos Exposure for Early Lung Cancer and Mesothelioma
Demetris Patsios, MD
 D. Patsios, H. Bayanati, G. Dong, N. Paul, M. Jonstoon, H. Roberts
- 166 Aponyms in Thoracic Radiology
Jeffrey P. Kanne, MD
 J. Kanne and JD Godwin

Hemoptysis: Evaluation using Volumetric High-Resolution CT

NISHINO M, Kubo T, Roberts DH, Boiselle PM, Raptopoulos V, Hatabu H

Purpose: To review volumetric HRCT findings in patients with hemoptysis, and to investigate how often and in which anatomic level volumetric HRCT demonstrates the etiology of hemoptysis.

Materials and Methods: 50 patients with hemoptysis evaluated by volumetric HRCT between April 03 and January 06 were retrospectively studied. The contiguous axial HRCT images were reviewed regarding abnormalities in 7 categories: 1) central airway, 2) segmental and subsegmental bronchi, 3) small airway, 4) parenchyma, 5) mediastinum, 6) vasculature, and 7) end-expiratory findings. When present, the abnormalities were graded in terms of whether or not they explained the cause of hemoptysis using a five-point scale: 1=definitely no, 2=probably no, 3=equivocal, 4=probably yes, 5=definitely yes. The highest score in each patient was used to represent an overall score.

Results: Among 50 patients, 30 patients (60%) had findings on HRCT that definitely/probably explained the cause of hemoptysis (scores; 5, n=20; 4, n=10; 3, n=5; 2, n=6; 1, n=9). The findings in segmental/subsegmental bronchi (19/50, 38%) and parenchyma (19/50, 38%) most frequently explained the cause of hemoptysis. The most frequent findings in segmental/subsegmental bronchi were bronchiectasis (n=18). The parenchymal findings were multiple centrilobular nodules (n=6), cavitory lesion (n=4), mass (n=3), ground glass opacity (n=3), consolidation (n=2), and post radiation changes (n=1). Although end-expiratory findings were noted in 38/50 (76%) patients, these were thought to explain the cause of hemoptysis only in 6 patients.

Conclusion: In patients with hemoptysis, volumetric HRCT frequently demonstrated findings that can explain the cause of hemoptysis, most commonly in segmental/subsegmental bronchi and in parenchyma.

Coronary Calcium Scoring with 64-slice CT: Can the Variability of the Scores and the Influence of the Reconstruction Interval be Overcome?

MARKUS WEININGER, Christian Ritter, Meinrad Beer, Dietbert Hahn, Matthias Beissert

Purpose: To evaluate the variability of coronary calcium scores depending on the image reconstruction interval using a 64-slice CT scanner with 330msec gantry rotation.

Methods: 21 patients (12 male, 9 female, mean age 56 ± 11) with a mean heart rate of 68 ± 7 bpm underwent coronary calcium scoring using a 64-slice CT scanner. Oral β -blockers were administered to 12 patients with heart rates >70 bpm. Image reconstruction (slice thickness 3mm, increment 1.5mm) was performed in 10% increments from 0-100% of the RR-interval. Two blinded experienced observers calculated Agatston (AS), calcium mass (MS) and volume scores (VS) for every reconstructed image series.

Results: Excellent inter-observer agreement was achieved ($\kappa=0.98$). Mean values and mean coefficients of variation among all patients were as follows: AS, 224 ± 396 , 77%; MS, 40 ± 68 , 70%; VS, 200 ± 362 , 81%. Image reconstruction interval dependent analysis displayed mean coefficients of variation of 81% (AS), 79% (VS) and 74% (MS), respectively. No statistical significant difference in variations depending on the image reconstruction interval could be found for AS, VS and MS ($p > 0.05$).

Conclusions: By using a 64-slice scanner with fast gantry rotation values for VS, AS and MS display a wide range of variability depending on the image reconstruction interval. Our findings are in concordance with prior studies using 4- and 16-slice CT scanners and reporting similar results. We could not identify a specific image reconstruction interval displaying a significant lesser variability. This indicates that for accurate and reproducible quantification of coronary calcium scores still more than one reconstruction interval needs to be evaluated.

Quantitative Perfusion Measurements of the Healthy Human Lung by Using Contrast-enhanced MRI

MARKUS WEININGER, Markus Oechsner, Matthias Beissert, Herbert Koestler, Dietbert Hahn, Meinrad Beer

Purpose: To evaluate contrast-enhanced pulmonary perfusion, comparing a pre-bolus approach to single bolus measurements using different contrast agent quantities.

Methods: 11 healthy volunteers (8 male, 3 female, 25 ± 2 years) were examined using a 1.5T MR scanner. Perfusion images were acquired in expiratory breath-holds with saturation-recovery TrueFISP. We compared first-pass boluses (0.5/1.0/2.0/3.0ml) to pre-bolus approaches (2ml/3ml). A ROI was positioned in the left pulmonary artery to evaluate the arterial-input-function (AIF). AIF for 2ml/3ml boluses were constructed from 1ml AIF. Signal-time courses of the lung parenchyma were taken from ROIs over the right and left lung. Perfusion values were calculated deconvoluting lung's signal-time courses with the AIF and an residual exponential function. Perfusion maps were generated fitting the lung pixel by pixel. Lung volume (2D-HASTE) and heart-time-volume (TrueFISP) were measured to derive global lung perfusion (GLP) as correlation.

Results: Mean perfusion values were as follows: 0.5ml: 190 ± 73 ml/min/100ml; 1ml: 221 ± 68 ml/min/100ml; 2ml: 263 ± 87 ml/min/100ml; 3ml: 365 ± 148 ml/min/100ml; pre-bolus 1ml/2ml: 192 ± 70 ml/min/100ml; pre-bolus 1ml/3ml: 165 ± 52 ml/min/100ml. Mean value for GLP was 187 ± 34 ml/min/100ml. Single bolus measurements with contrast quantities ≥2ml resulted in increased pulmonary perfusion, due to saturation effects of the AIF. Calculated perfusion maps resulted in improved fit quality and smoother maps using the pre-bolus approach.

Conclusions: Lung perfusion using single boluses (0.5ml, 1.0ml) and pre-boluses (2ml, 3ml) seems to display higher correlation to GLP. The pre-bolus technique seems to be preferable to single boluses as it achieved smoother and less noisy perfusion maps due to higher SNR.

Congenital Coronary Fistula: a Rare Cause of Heart Failure

ZENOOZ N, Moatamed N, Rafie Sh, Gilkeson R

Purpose: The intent of this exhibit is to demonstrate different kinds of congenital coronary fistulas. With more frequent application of 64-slice CT scanners in chest/cardiac imaging, the number of incidental findings has been increasing.

Methods: MR and CT imaging features of different types of congenital coronary fistulas are depicted.

Results: Congenital coronary artery fistulas are incidentally identified in adult and pediatric populations. Most patients are asymptomatic; however, knowledge of these fistulas is important as they have been associated with various clinical features, including chest pain or heart failure in young patients.

Conclusion: Congenital coronary artery fistulas, a subgroup of anomalies of the coronary arteries, are rare cardiac defects. Correct diagnosis and early surgical correction is indicated because of the high incidence of late symptoms and complications.

Complement Coronary CT Angiography after Cath Lab

J Robillard, V Freire, C Chartrand-Lefebvre, J Prenovault, J CHALAQOUI

PURPOSE/AIM OF THE EXHIBIT

Catheter angiography is the gold standard of coronary artery imaging.

Nevertheless, difficult cases can be encountered in the cath lab. Non invasive cardiac CT can be a complementary procedure in some cases. We illustrate indications of coronary CT angiography as a complement after catheter coronary angiography.

CONTENT ORGANIZATION

1) Native arteries: a) suboptimal canulation of an ostium; b) suboptimal opacification of a segment; c) confirmation of a spasm; d) congenital anomalies 2) Stent follow-up 3) Grafts: a) graft difficult to locate in CL; b) visualization of the length of an occluded segment; c) recent versus chronic thrombosis; 4) Aorta: a) extent of a coronary dissection in a sinus of Valsalva; b) confirmation of a primary aortic dissection identified in CL 5) Non coronary cardiac structures

CONCLUSION/SUMMARY

Coronary CT angiography can be an add-on procedure in some cases of difficult or incomplete catheter angiograms. When performed in selected cases, CT can obviate a repeat and unnecessary invasive diagnostic procedure.

Contrast Volume Reduction With Superior Vena Cava Catheter-Directed Coronary CT-Angiography: Comparison with Peripheral IV Contrast Enhancement In A Swine Model

Shetty AN, BIS KG, Vyas AR, Kumar A, Anderson A, Balasubramaniam M

Purpose:

While conventional multi-detector computed tomographic angiography (MDCTA) uses a traditional peripheral IV approach for contrast injection, we describe our experience with a superior vena cava (SVC) catheter approach for coronary artery MDCTA as a means of decreasing iodinated contrast volume.

Methods:

Four farm swine were imaged on a 64-slice (32 detector) CT-scanner, following institutional approval, using SVC injections of 25 ml and 50 ml Visipaque (Iodixanol) at 10 ml/sec immediately followed by 50 ml saline flush at 10 ml/sec. A peripheral intravenous (IV) injection of 100 ml Visipaque at 5 ml/sec followed by 50 ml saline flush at 5 ml/sec was also performed in the same animals and coronary attenuation was measured for all studies.

Results:

The pooled mean coronary artery attenuation values from SVC (25 ml), SVC(50 ml) and IV (100 ml) studies were 195.05 ± 36.42 , 331.79 ± 64.9 , 353 ± 73.75 for RCA ; 173.5 ± 16.29 , 303.58 ± 73.01 , 339.58 ± 79.87 for LAD and 182.1 ± 43.26 , 300 ± 69.57 , 344.29 ± 50.95 for LCX, respectively. Measurements were statistically significant ($p < 0.05$) for SVC (50 ml) and peripheral IV (100 ml) when compared with a cutoff value of ≈ 8805 ; 250 HU.

Conclusion:

Central SVC contrast injection can decrease the contrast volume by 50% while maintaining similar coronary attenuation as a peripheral IV injection. This approach has a potential in reducing the contrast volume on coronary MDCTA studies and, therefore, risk of contrast induced nephropathy. Further studies with higher injection rates and faster scan acquisition are needed for defining a lower volume threshold.

In Vitro Evaluation of Commercially Used Stents using 16-slice Versus 64-slice Multi-detector Computed Tomography (MDCT) Coronary Angiography

Sang Jin Kim, Woo-Suk Chung, Tae Hoon Kim

ABSTRACT: Purpose: To assess the visualization of different coronary stents using 16- and 64-slice multi-detector computed tomography (MDCT) coronary angiography.

Materials and Methods: Ten different coronary artery stents commercially used in Korea were placed in a vascular phantom and examined with a 16- and 64-slice MDCT; for image reconstruction, a standard medium-soft (B30f) kernel and a stent-optimized (B46f) kernel were used for the visualization of coronary artery stents. We analyzed the artificial luminal narrowing (ALN), intraluminal attenuation and artifacts by the stent according to the stent material, stent diameter, and CT machines. We used a t-test, ANOVA with SNK method, and linear regression for statistical analysis.

Results: Although ALNs were different according to 16- and 64-slice MDCT with B30f and B46f kernels, a 64-slice MDCT with B46f kernel showed statistically the lowest ALNs as compared to other protocols. The attenuation values with B46f kernel were significantly lower when using B46f kernel than when using B30f kernel regardless of 16- or 64-slice MDCT. Mean artifact scores by the stents were not different according to two machines and two kernels, but they were significantly lower in the cobalt-chromium alloy stents than in the stainless steel 316L stents.

There was a moderate correlation between artifact scores by the stents and the strut thickness of the stents, but no correlation between artifact scores and stent diameter.

Conclusion: Using the 64-slice MDCT with a B46f kernel might be useful for the coronary artery stent visualization. In addition, cobalt-chromium alloy stents with thin strut thickness can supply the superior visualization of stent lumen as compared to the stainless steel 316L stents with thick strut thickness.

Pleural Interventional Procedures for Thoracic Radiologists

KANG EY, Woo OH, Yong HS, Oh YW, Park CM, Cha IH

Purpose: This exhibit is to review and illustrate the interventional procedures in patients with pleural diseases for thoracic radiologists.

Principal information: In clinical practice, pleural diseases are very common and thoracic radiologists play a crucial role in the imaging and management of pleural diseases. Radiologic modalities can be used to guide pleural interventional procedures. Thoracic radiologists perform frequently interventional procedures such as thoracentesis, drain catheter placement and pleural biopsies using CT and ultrasound.

Diagnostic and therapeutic thoracentesis is required for pleural effusions and ultrasound assesses the presence of pleural disease and evaluates pleural effusion with septa and loculations. Ultrasound-guided thoracentesis improves the success and decreases complications.

Complicated pleural effusion includes unilocular or multilocular parapneumonic effusions, empyema, malignant effusions, and hemothoraces.

Drainage of complicated pleural effusions is necessary to control pleural infection, allow re-expansion of the lung, and prevent the long-term sequela of pleural fibrosis and lung entrapment. Image-guided drainage catheter insertion is very convenient for patients with complicated pleural effusion. Image-guided pleural biopsy shows a high diagnostic yield for focal or diffuse pleural lesions.

Conclusion: Radiologic imaging investigates easily the pleural disease, and ultrasound and CT are most useful modalities for intervention in pleural disease. Thoracic radiologists perform accurately interventional procedures using image-guidance, and image-guided pleural interventional procedures are very convenient and comfortable for patients than non-image guided or invasive surgical procedures.

Are There Gender Differences in Absolute or Corrected Pulmonary Arterial Size?

GRUBSTEIN A, Fishman JE

PURPOSE

Females often demonstrate more prominent pulmonary arteries than males on chest radiographs, as well as a higher prevalence of primary pulmonary arterial hypertension. Our purpose was to compare pulmonary artery size among females and males, corrected for body size.

METHOD AND MATERIALS

We retrospectively analyzed 400 contrast enhanced chest CT obtained between October 2005 and March 2006. We excluded studies that demonstrated main pulmonary artery above 30 mm or any pulmonary vascular abnormality, emphysema, or previous thoracic surgical procedures. Absolute measurements of the main, right, and left pulmonary arteries and ascending aorta, as well as ratios of these measures to thoracic width, were grouped according to age. The two sample t-test and Mann-Whitney test were used to assess for significance ($p < .05$).

RESULTS

The size of the main pulmonary artery was not significantly different in males vs. females (23.9 ± 3.0 mm vs. 23.5 ± 2.8 mm, $p > .2$). However, the ratio of the main pulmonary artery size to thoracic width was significantly larger in females than males (male: $0.096 \pm .013$, female: $0.105 \pm .013$, $p < .001$). Among those age 20-50, the ratios of both right ($p = .002$) and left ($p = .032$) pulmonary arteries to thoracic width were larger in females, despite the fact that absolute left pulmonary artery size was significantly larger in males (17.9 ± 2.5 mm vs. 16.9 ± 2.4 mm, $p = .013$). While males of all ages had a larger aorta than did females ($p < .01$), the ratio of aortic size to thoracic width did not reach statistical significance.

CONCLUSION

Females age 20-50 have larger main, right, and left pulmonary arteries relative to thoracic width than do males.

CT Venography in Suspected Venous Thromboembolism: Findings, Pitfalls, and Controversies

Katz DS, FANTAUZZI JP, Choi AY, Loud PA, Shah RA, Grossman ZD

Purpose: To review our experience with CT venography over the past decade.

Principal Information: CT venography (CTV) has utility, for a variety of reasons, for the diagnosis or exclusion of deep venous thrombosis, as well as for the determination of the extent of clot burden and its location and chronicity, in the lower extremities, abdomen, and pelvis. The latest literature on CTV will be reviewed in detail, as will controversies including the appropriate and optimal technique and strategies to minimize radiation dose. Findings on CTV will be shown from case material from our institutions over the past decade. Pitfalls, variants, uncommon and unusual findings, and alternative diagnoses will be shown and discussed. The literature on the yield of CTV + CTPA compared with CTPA alone will be reviewed, including the recent PLOPED II data.

Conclusion: Radiologists performing CT venography in conjunction with CT pulmonary angiography should be familiar with routine as well as the uncommon and unusual findings on CTV, as well as the potential pitfalls and controversies regarding the technique.

Coronary Ostium – Straight Tube or Funnel Shaped? A Computerized Tomographic Coronary Angiography Study

AVIRAM G, Shmilovich H, Finkelstein A, Rosen G, Banai S, Graif M, Keren G

Introduction: The 3D configuration of the aortic-coronary junction is decisive in stenting ostial coronary lesions. We hypothesized that it varies between straight to funnel shaped tubes and studied arterial orifices using cardiac-gated computerized tomographic coronary angiography (CTCA).

Methods: Axial and sagittal 2D and volumetric 3D reconstructions of the aorto-coronary junction were performed in 25 patients who underwent CTCA.

The following measurements of the left main (LM) and right coronary (RCA) arteries ostia were obtained: the coronary orifice broad base diameter, the diameter of the coronary vessel most proximal segment, the distance between these two lines, and the angles of the aortic-coronary junction.

The aortic-coronary junction was defined as “funnel shaped” when the orifice diameter was $\geq 50\%$ larger than the diameter of the vessel’s most proximal segment, and asymmetric” when the difference between the two measured angles at the aortic-coronary junction was ≥ 20 degrees.

Results: All patients exhibited a funnel shaped aortic-coronary junction in at least one plane. The RCA take off had symmetric angling in both the axial and sagittal planes in only one patient, while the LM did not have a symmetric origin in either plane in any patient. The mean coronary orificial funnel depth and the mean ostial cross sectional diameters (base of the funnel) and vessel diameters in the axial and sagittal planes for the LM and RCA were measured.

Conclusion: The frequency of funnel-shaped and asymmetry of the aortic-coronary junction configuration needs to be considered in designing stents for aortic ostial coronary lesions in order to achieve optimal results and reduce ostial stent thrombosis and restenosis.

Mystery Tumor of Bronchioloalveolar Carcinoma: Spectrum of Chest CT Findings with Pathologic Correlation

SEON HJ, Kim YH, Kim JK, Park JG, Kang HK

Purpose: Bronchioloalveolar carcinoma (BAC) remains one of the most enigmatic and controversial lung cancer, and is classified as a subset of lung adenocarcinoma. However, it has a distinct clinical presentation, tumor biology, response to therapy, and a broad spectrum of radiographic appearances.

Methods: We retrospectively reviewed the chest CT findings of 13 consecutive patients (seven men and six women, from 38 years to 76 years; average, 63 years) with pathologically proved BAC, from December 2002 to July 2006.

Results: The chest CT findings were illustrated with the special respect of locations, patterns (solitary or multiple nodular lesion; lobar or diffuse consolidation), cavitation, associated abnormality of pleura, and lymphadenopathy. In the cases of solitary pulmonary nodule, additional searches would be shown for specific findings including size, margin, contour, pleural tail, hemiopacity, and air-bronchogram. Follow up imaging findings on chest CT scans would be illustrated in the selected cases.

Conclusion: The purposes of this exhibit were to illustrate protean chest CT findings of BAC and to correlate them with histopathological features.

MDCT Evaluation of Congenital Airway Abnormalities Presenting in Children and Adults

YAMADA K, Lee EY, Ernst A, Boyer DM, Feller-Kopman D, Boiselle PM

Introduction: Congenital airway anomalies occur across a diverse clinical spectrum and may present as incidental or clinically symptomatic findings in children and adults. Accurate recognition and characterization of central airway anomalies are important for appropriate diagnosis and management.

Methods: Chest radiography is limited in its ability to detect and characterize congenital airway anomalies. In contrast, MDCT imaging provides a precise anatomic display of the airways and their relationship to adjacent vascular and nonvascular thoracic structures. By providing a continuous anatomical display of the airways and vascular structures, multiplanar reformation and 3-d reconstruction images provide important complementary information to axial images by clarifying complex relationships and better characterizing the longitudinal extent of abnormalities. MDCT aids early diagnosis of congenital anomalies, assists surgical planning, and helps to identify other associated thoracic anomalies.

Conclusions: The purpose of this exhibit is to provide a pictorial review of the MDCT appearance of various congenital airway anomalies in children and adults with an emphasis upon the role of multiplanar reformation and 3D reconstruction techniques. A variety of primary airway abnormalities will be illustrated, including congenital tracheal stenosis, congenital tracheobronchomegaly, tracheal diverticulum, tracheal bronchus, other abnormal bronchial branching patterns, bronchial atresia, lung agenesis and hypoplasia. Additionally, the spectrum of vascular lesions that may compromise the central airways will also be depicted, including right aortic arch with aberrant left subclavian artery, double aortic arch, pulmonary sling, and innominate artery syndrome.

Pictorial Review of Radiological Manifestations in Common Variable Immunodeficiency (CVID) Disorder

RENGABASHYAM B, Bhartia BSK, Savic S, Wood P

Purpose: To highlight the pulmonary and extra-pulmonary imaging features of CVID.

Principal information: A pictorial review of the pulmonary and extra-pulmonary complications manifesting in patients attending the Immunodeficiency clinic in a large teaching hospital. CVID is the second commonest class of immunodeficiency syndromes with an incidence of 1:10000. This heterogeneous syndrome is characterised by impaired production of all major antibody classes with normal circulating B cells.

The principal organ affected is lung with a variety of respiratory complications including asthma, and recurrent chest infections with or without bronchiectasis. Associated non-infective complications include lymphocytic interstitial pneumonitis, which occurs as part of a generalised lymphoproliferative process, and granulomatous lung disease.

There is an elevated risk of thymoma, lymphoreticular tumors and gastrointestinal malignancy. Up to 20% of patients will develop autoimmune diseases. In patients with complex pulmonary lesions, HRCT is the gold standard for the identification of bronchiectasis and parenchymal abnormalities.

Conclusion:

The majority of patients with CVID survive for at least 30 years with the exception of those with thymoma who have a relatively poor prognosis. CVID is a disease with an unpredictable clinical course and patients need regular clinical and radiological assessment. Imaging is a key tool in the diagnosis and management of this complex condition.

Evaluation of Cardiac Chamber Enhancement During 64-slice Coronary CT Angiography Using a Triphasic Contrast Injection Protocol and Automated Bolus Tracking

WILLIAM W. BOONN, Saurabh Jha, Harold I Litt, and Sridhar R Charagundla

INTRODUCTION: 64-slice coronary CTA is possible using short-lived boluses of contrast with high flow rate and automated bolus tracking, however, enhancement of all cardiac chambers is needed for complete assessment of morphology and function, particularly in patients with congenital heart disease. The purpose of this study was to evaluate enhancement of all 4 cardiac chambers as compared to the interventricular septum (IS) using a triphasic injection protocol, and the influence of automated delay time on scan performance.

METHODS: 24 subjects underwent coronary CTA on a 64-slice MDCT scanner using a triphasic injection of contrast and automated bolus tracking.

Enhancement was measured within ROI in the left and right ventricles (LV and RV), in the IS, and in the left and right atria (LA and RA). The delay between start of contrast injection and ventricular image acquisition was recorded.

RESULTS: All studies were of diagnostic quality for coronary CTA. No studies had significant streak artifact in the RV. Mean chamber enhancement measured as follows (mean \pm SD in HU): RA 185 \pm 47, RV 190 \pm 52, LA 311 \pm 83, and LV 296 \pm 72. Mean IS attenuation measured 116 \pm 17 HU. All 24 cases showed greater than 50 HU difference between the LV lumen and IS, whereas 16/24 cases showed greater than 50 HU difference between the RV lumen and IS. There was a significant negative correlation between RV enhancement and delay time ($R=-0.64$, $P<0.001$).

CONCLUSION: The triphasic injection protocol resulted in optimal LV enhancement in all cases and adequate RV enhancement in 2/3 of cases.

Suboptimal RV enhancement occurred with increased scan delay. When cardiac CT is used to evaluate the morphology and function of both ventricles, injection protocols must be modified to achieve consistent RV enhancement.

Cryptogenic Organizing Pneumonia (COP) in Post Hematopoietic Stem Cell Transplantation (HSCT): CT Features and Association with Graft Versus Host Disease (GVHD).

PIPAVATH S, Chung J, Godwin JD, Chien JW.

Introduction: Diagnosing COP and distinguishing it from pulmonary infections are important in those who undergo HSCT, as COP requires steroids for therapy, whereas steroids are contraindicated if infection is present.

Purpose: To evaluate radiographic appearances of COP in post HSCT population, and its relation to GVHD.

Methods: We retrospectively studied 8 patients who underwent HSCT and were later diagnosed with COP. Plain radiograph and CT features were analyzed.

An attempt was made to correlate COP with acute or chronic GVHD.

Results: COP was diagnosed 5 to 34 months from the time of transplant. On CT, ground glass opacity (GGO) was seen in 8 (100%), consolidation in 4 (50%), linear abnormalities in 4 (50%), traction on airways in 4 (50%), scarring in 3 (37%) and septal thickening in 1 patient. No patient had honeycombing. Peribronchovascular distribution of abnormality was the most common pattern in 6 (75%). Upper / mid lung dominance was seen in 4 (50%) and lower lung in 3 (37%). Histopathology confirmation was available in 4 (50%). Acute GVHD was diagnosed in 4 (50%) and chronic GVHD in all (100%).

A majority (6/8) demonstrated response to therapy and 2 remained stable on subsequent CT studies.

Conclusion: Peribronchovascular distribution of GGO in the setting of post HSCT, irrespective of lower or upper lung predominance, should prompt consideration of diagnosis of COP rather than infection. In this subset, COP can have significant linear / scar like abnormalities, which may be reversible. COP is more likely to occur if there is prior history of acute or chronic GVHD.

Incidence and Clinical Significance of Extracardiac Findings on Cardiac CT

ABDEEN N, Ayyappan AP, Seely JM, Matzinger FR, Chow BJ, Dennie CJ.

Purpose:

Cardiac MDCT is increasingly used to image the coronary arteries. Since noncardiac anatomy is imaged, significant extracardiac findings may be seen. The purpose of this study was to establish the incidence of major and minor noncardiac incidental findings in patients undergoing cardiac MDCT.

Methods:

A total of 405 patients referred for cardiac CTA were examined with contrast-enhanced 64-slice MDCT. The retrospectively gated images were performed with a small field of view for the cardiac portion of the examination and then reconstructed to a full field of view to assess the extracardiac structures. Extracardiac findings were classified according to significance (major if investigation or management was altered, minor if not) and anatomical region.

Results:

There were major findings in 16.5 % of patients and minor findings in 33.5 %. The major findings were distributed as follows: lung (9.1%), great vessel (3.2%), mediastinum (1.2%) and upper abdomen (2.9%). Major findings lead to the following diagnoses: lung cancer, hepatoma, thymoma, pulmonary embolism, aortic aneurysm, aortic dissection, mycobacterial infection, pneumonia and interstitial lung disease. Minor findings were distributed among lung (21.9%), great vessels (1.7%), mediastinum (1.9%) abdomen (6.9%) and chest wall (1.2%). The most frequent minor diagnoses were granulomatous disease and emphysema in the lung, hiatus hernia and lymph nodes in the mediastinum, hepatic cysts and steatosis in the abdomen.

Conclusion:

Extracardiac incidental findings in cardiac CTA can have significant implications for further investigation or therapy. CT technique and image reconstruction should allow for all anatomy to be carefully assessed for other important noncardiac pathology.

MDCT Evaluation of Tracheobronchial Stenoses

CATENA JR, Litmanovich D, Ernst A, Dialani V, Spirn PW, Boiselle PM

Multidetector-row CT (MDCT) has recently emerged as a powerful, noninvasive imaging method for detecting and characterizing airway stenoses. Multiplanar and 3-d reconstruction images provide important complementary information by enhancing detection of stenoses and improving estimation of their craniocaudal length compared to traditional axial images.

In this exhibit, a variety of common and uncommon causes of tracheal stenosis are illustrated and reviewed, including stenoses related to intubation, trauma, infection (rhinoscleritis, papillomatosis, tuberculosis), neoplasms, lung transplantation, and a variety of immunologic and inflammatory conditions (polychondritis, amyloidosis, Wegener's granulomatosis, sarcoidosis, ulcerative colitis, and tracheopathia osteochondroplastica). An emphasis will be placed upon a diagnostic approach to interpreting MDCT scans that combines disease distribution, the appearance of the tracheal wall, the presence of ancillary thoracic abnormalities, and clinical/demographic information.

Using this approach, the broad differential diagnosis of tracheal stenosis can usually be narrowed to 2 or 3 likely entities, and a specific diagnosis can be made by MDCT in some cases.

Objectives:

- 1) To illustrate and review common and uncommon causes of tracheobronchial stenoses using MDCT with bronchoscopic correlation.
- 2) To provide radiologists with a framework with which to approach the interpretation of tracheal stenosis on MDCT exams.
- 3) To describe the role of multiplanar and 3-d reconstruction methods for enhanced detection and characterization of stenoses.

NTM (Non-Tuberculous Mycobacterium) Diseases at CT: New Five Forms and Its Schematic Illustrations

CHONG S, Kim TS, Lee KS, Koh WJ, Han J

PURPOSE/AIM

1. To categorize NTM diseases into five forms at CT 2. To describe, illustrate and discuss their CT and pathologic features.

CONTENT ORGANIZATION

1. What is NTM disease?
2. How to diagnosis of NTM disease?
3. Two forms of CT findings in NTM disease.
 - Upper lobe cavitory form
 - Nodular BE form
4. Why now five forms of CT findings in NTM disease?
 - Consolidative form: important to differentiate from pneumonia, Wegener's granulomatosis, BALT lymphoma
 - DPB(diffuse panbronchiolitis)like form
 - ARDS related NTM disease: rare

SUMMARY

In this pictorial assay, we categorized and describe five forms of NTM diseases at CT, illustrated and discussed their CT and pathologic features. The five forms of NTM diseases included upper lobe cavitory form, nodular BE form, consolidative form, DPB-like form, and rarely ARDS related NTM disease. This new classification of NTM disease at CT will be of help in the differential diagnosis and the accurate diagnosis of NTM disease.

Which Breathing Protocol is Optimal in Independent Computer-registered Fusion of PET and CT Data Sets?

ALEKSANDAR GRGIC, Dirk Hellwig, Ursula Nestle, Steffi Kremp, Carl Martin Kirsch

Aim:

To determine the optimum breathing protocol for the fusion of separate 18F-FDG-PET and CT studies of the thorax.

Material:

Six patients (5m, mean 64,5 years, 53-71 years) were examined on separate PET- and CT- scanners on the same day. CTs were performed using different breathing protocols (expiration, inspiration, mid breathhold) in every patient. The data sets were coregistrated with a non-rigid algorithm (normalized mutual information) on a commercially available workstation (Hermes Medical Solutions). Three fusion groups were formed: Group 1:

CT-Inspiration with PET, Group 2: CT-Expiration with PET, and Group 3:

CT-Mid breathhold with PET. The quality of the fusion was assessed in each group based on the following anatomical landmarks: thyroid, lung apices, aortic arch, heart, spine, carina, liver dome/diaphragm and tumor. To rate the differences between the groups a scale from 1 (no alignment) to 5 (exact alignment) was used. To compare these results a Wilcoxon signed rank test was used.

Results:

Comparing the groups group 3 yielded a better fusion of the data (mean 4,3) as group 1 (3,7) or group 2 (3,1). Group 3 showed in five of eight anatomical landmarks a significantly better alignment, as these were: liver dome (p=0,03), heart (p=0,04), tumor (p=0,03), lung apices (p=0,03), and spine (p=0,02), respectively. Furthermore, group 3 provided better results in comparison to the group 2 with respect to carina (p=0,04) and the tumor (p=0,02), respectively.

Conclusion:

In this preliminary investigation the fusion between the separate PET- and CT-studies obtained at mid breathhold showed the least deviation. Thus, this protocol is applied in our daily routine.

Imaging of Lung Transplantation

NG YL, Paul N, Walsham A, Chung TB, Patsios D, Keshavjee S, Weisbrod G.

Purpose: This educational exhibit aims to review the radiologic findings associated with current surgical techniques and the common complications of lung transplantation based on our experience in a busy Tertiary Referral Center.

Principal information: Lung transplantation is an established treatment for end-stage pulmonary disease. Advancements in surgical technique and medical therapy influence the spectrum of expected radiological findings.

This exhibit will present the progressive change in surgical technique and illustrate the complications associated with these approaches, including early and late airway complications. It will also illustrate the radiological appearance of early complications such as re-implantation response, acute rejection, infection; and late complications such as post-transplant lymphoproliferative disorder, bronchiolitis obliterans syndrome and recurrence of disease.

Conclusion: Radiology plays a pivotal role in the diagnosis and treatment of complications of lung transplantation. Recognition of the radiologic appearance of different surgical techniques and the complications related to lung transplantation is essential in the effort to minimise patient morbidity and mortality.

Characterization of Solitary Pulmonary Nodules: Comparison of Dynamic Contrast-enhanced CT Perfusion (DCECT) and FDG-PET

NG YL, Sitartchouk I, Bayanati H, Pereira A, Walsham A, Waddell T, Roberts H

Introduction: DCECT has been used to assess the nature of a solitary pulmonary nodule (SPN) by virtue of its angiogenic activity, while FDG-PET reflects the metabolic activity. The purpose of this study is to compare these two techniques in SPN.

Method: Ten patients with SPN underwent DCECT and FDG-PET between 0 and 28 days apart. DCECT was performed as a cine study during the administration of 50 ml contrast agent (flow rate 3-5 ml/sec), for approximately 25 seconds, with approximately 1sec temporal resolution. Data analysis was performed with the CT Perfusion 3 software (Advantage Windows, General Electric Medical Systems, Milwaukee, WI), yielding maps and ROI estimates of fractional blood volume (BV, [ml/100g]), blood flow (BF, [ml/100g/min]), mean transit time (MTT, [s]) and microvascular permeability (PS [ml/100g/min]). Perfusion parameters were compared to the standard uptake value (SUV) of FDG-PET.

Results: The 10 nodules were 21 ± 6 mm in diameter. Histology revealed 6 adenocarcinomas, 2 squamous cell carcinoma, 1 necrotizing granulomatous inflammation, and 1 histology is outstanding. SUV was greater than 2.5 in 7 nodules (range 1.0-13.3, median 3.5); 2 BAC and the unknown nodule were metabolically non-active. BV was 10.2 ± 4.4 , BF 122.1 ± 79.2 , MTT 9.9 ± 6.5 and PS 29.7 ± 17.6 . Comparing with FDG-PET, there was no significant correlation between SUV and BV ($r = -0.34$), BF ($r = -0.55$), MTT ($r = 0.16$) or PS ($r = -0.23$).

Conclusion: Our preliminary results indicate that there is no relationship between the angiogenic and metabolic activity of a SPN. Both studies might reveal additive rather than redundant information for characterization of SPN. More comparative studies with nodules of different histology are required to confirm these findings.

CT Virtual Bronchoscopy: Advancements on the Evaluation of Segmental Airway Stenosis.

OLIVA IB, Barish MA, Gill Randhawa

Objective: The purpose of this study was to assess the accuracy of 3D CT imaging and CT virtual bronchoscopy in depicting and grading segmental bronchial stenosis using flexible bronchoscopy findings as the gold standard.

Materials and Methods: Multi-row Detector Computerized Tomography (MDCT) virtual bronchoscopy and flexible bronchoscopy were used to diagnosis and grade segmental airway stenosis in 30 patients. The data were acquired retrospectively from CT scans that were obtained using a 64 channel MDCT.

Flexible bronchoscopy was performed and findings were graded by a pulmonologist/ surgeon and served as the reference standard for 302 segmental airway regions. The extent of airway narrowing were categorized as grade 0 (no narrowing), grade 1 (<50%), or grade 2 (>50%).

Results: Virtual bronchoscopy, axial CT scans, and multiplanar reformatted images were extremely accurate (98%) in depicting segmental bronchial stenosis with high sensitivity (94%) and specificity (98%). Regarding correlation in grading stenosis, findings from virtual bronchoscopy correlated closely with those from flexible bronchoscopy for segmental airway stenosis ($r = 0.76$).

Conclusion: Virtual bronchoscopy after MDCT scanning is a noninvasive method that allows accurate diagnosis and grading of segmental bronchial stenosis because it enables high-resolution endoluminal imaging with high sensitivity and specificity and allows for the examination of the segments beyond the stenosis. Also with the combination of axial CT and MPR images this technique gives the capability to evaluate the surrounding structures and aids in stent planning.

A Practical Approach to Cardiac Findings on the Standard MDCT of the Thorax for Non-Cardiac Radiologists

GOELA A, Digumarthy SR, Sharma A, Abbara S, Shepard JO

Purpose — While a comprehensive analysis of the heart is not possible on routine MDCT of the thorax, there are several basic elements which can often be assessed. The intent of this exhibit is to provide a basic approach to radiologists unfamiliar with the potentially detectable, interpretable and clinically relevant cardiac findings on standard, non-gated MDCT of the thorax.

Methods — A simple categorical checklist helps to highlight cardiac findings on noncontrast and contrast-enhanced, non-gated, MDCT of the thorax. Specific examples are illustrated with correlative dedicated cardiac CT, MR, US or angiography.

Results — Basic structures warranting assessment include coronary arteries, pulmonary veins, myocardium, interatrial and interventricular septa, cardiac chambers, cardiac valves and pericardium. Examples of pathologies in these subcategories are presented including coronary artery anomalies, ischemic and non-ischemic cardiomyopathies, septal defects as well as neoplastic and non-neoplastic cardiac masses among several others. Correlative imaging is provided.

Conclusions — Using this simple categorical checklist of cardiac structures to assess during routine MDCT of the thorax, the non-cardiac radiologist will be able to provide clinically relevant information to referring physicians and potentially improve patient care.

Mosaic Attenuation on Thin-section CT of the Lung: an Algorithmic Diagnostic Approach

ANOOP AUUAPPAN, Carolina Souza, Carole Dennie, Valerie Astrope, Frederick Matzinger, Rebecca Peterson, Jean Seely

Mosaic attenuation refers to an inhomogeneous appearance of the lung parenchyma with alternating areas of different attenuation seen on thin-section CT scans. This finding is nonspecific and may be caused by diffuse parenchymal lung disease, small airways disease or pulmonary vascular disease. Specific disorders that demonstrate mosaic attenuation include bronchiolitis obliterans, asthma, extrinsic allergic alveolitis, sarcoidosis and chronic thromboembolic pulmonary arterial hypertension.

The differential diagnosis of the various causes of mosaic lung attenuation requires correlation to clinical history as well as recognition of ancillary imaging findings. This pictorial exhibit suggests an algorithmic approach to the presence of mosaic attenuation on high resolution CT scans, considering clinical history, pulmonary function tests and ancillary HRCT findings in order to facilitate the differential diagnosis.

Coronary Computed Tomography Angiography (CTA) for Rapid Disposition of Low Cardiac Risk Emergency Department (ED) Patients With Acute Chest Pain Syndromes

KIM W., Hollander JE, Baxt WG, Chase M, Litt HI

Purpose: To assess the utility of coronary CTA for rapid evaluation and disposition of low cardiac risk patients presenting to the ED with acute chest pain.

Methods: 147 low cardiac risk patients with chest pain and Thrombolysis In Myocardial Infarction (TIMI) scores of 2 or less, without acute ischemia on electrocardiogram (ECG), had coronary CTA performed in the ED from January, 2005 to October, 2006. 30-day outcome data for mortality, myocardial infarction, and further cardiovascular testing were obtained for the first 83 patients by telephone contact. Subsequent patient cardiac enzymes, ECGs, stress tests and cardiac catheterizations, if obtained, were also documented.

Results: Fifteen patients had positive findings on coronary CTA including nine with >50% stenosis: Eight patients had stress test where four had positive tests and two subsequently underwent cardiac catheterization revealing similar findings as coronary CTA. Other positive coronary CTA results included four cases of anomalous coronary artery and two cases of myocardial bridging. Nine patients demonstrated alternative pathology on CTA: six had pericardial effusion and three had pneumonia. None of the patients admitted or discharged from the ED who were followed up had any 30-day cardiovascular events.

Conclusion: The use of CTA in low risk patients presenting to the emergency department with chest pain may allow the rapid discharge of those with negative studies and identify those with significant coronary stenosis. A larger randomized study with long term follow-up will be necessary to determine the actual positive and negative predictive values and utility of this approach.

Feasibility of Low-Dose Multi-Detector Computed Tomography in Follow Up of Patients with Severe Emphysema after Airway Bypass - A Novel Bronchoscopic Procedure for Severe Emphysema

GRGICA, Wilkens H, Heinrich M, Kramann B, Groschel A, Sybrecht GW

PURPOSE:

To evaluate the feasibility of thin-section low-dose multi-detector computed tomography (MDCT) in the radiological monitoring of patients after the placement of bronchial stents for airway bypass.

METHODS: In a prospective setting, 7 patients (5f, 54-76 years) were examined before (up to 2 weeks) and after (1 week, 1 month, 6 months, and one year) stent placement with low-dose protocol (120kV, 40mAs) at maximal inspiration in a MDCT scanner (Philips Mx8000). Consensus reading was done by two radiologists. Image quality was rated on a 5 point scale. The exact position of the stents in bronchi was analysed and compared with the bronchoscopic findings, which served as the gold standard. Statistical analysis was done by receiver operating characteristics or four field table.

RESULTS: The mean image quality of low dose MDCT was $4.89 \pm 0,31$ (SD). The area under the curve for differentiating patent from non patent stents was 0,997 with resulting sensitivity and specificity values of 92,1% and 98,5%. In exact diagnosis of the stent patency low dose MDCT correctly described all but one stent (sensitivity 94,7%, specificity 100%). In prediction of stent dislodging low dose MDCT showed sensitivity of 80 % and specificity of 92%. 5 stents could not be identified during the control bronchoscopies, but they were in regular position in low dose MDCT. There were three instances of minor bleeding and one small pneumothorax, which resolved spontaneously.

CONCLUSION: Low-dose MDCT proved useful in monitoring airway bypass procedure and should be routinely performed as additional tool to bronchoscopy in monitoring airway-bypass procedure.

Combined Endoscopic and Endobronchial Ultrasound Fine Needle Aspiration for Mediastinal Staging of Lung Carcinoma

McComb BL, Pascual JMS, CHEN EF, Raimondo M, Woodward TA, Johnson MM, Al-Haddad M, Hardee J, Odell J, Wallace MB

Purpose: The familiarize radiologists with endobronchial ultrasound guided fine needle aspiration (EBUS-FNA) as an adjunct to endoesophageal ultrasound guided fine needle aspiration (EUS-FNA) in the staging of mediastinal lymph nodes.

Methods: Accessible mediastinal lymph nodes of eighty-four consecutive patients were biopsied with bronchoscopic-FNA, endobronchial ultrasound guided-FNA (EBUS-FNA), and endoesophageal ultrasound guided-FNA (EUS-FNA). Patients all presented with a known malignant or suspicious lung mass or enlarged mediastinal lymph node/s.

Results: Fifty-one malignant lymph nodes were found in a total of 35 patients. Biopsy sensitivities were as follows: Bronchoscopic-FNA 35%, EBUS-FNA 75% and EUS-FNA 69% ($p=0.001$); EUS + EBUS combined 98%, EUS + Bronchoscopic biopsy 86%, EBUS + Bronchoscopic biopsy 80%.

Conclusions: Endoscopic ultrasound guided fine needle aspiration (EUS-FNA) has become a well-known minimally invasive technique that enables biopsy of mediastinal lymph nodes without general anesthesia or major surgery. A major limitation, however, is poor access to anterior mediastinal lymph nodes. Endobronchial imaging can improve access to these nodes. Combined EUS-EBUS lymph nodal biopsy approaches 100% accuracy in the staging of mediastinal lymph nodes. Radiologists should understand the roles of these available and emerging procedures and the accessibility of lymph nodal groups, so as to assist in the selection of patients who may benefit from EUS / EBUS in addition to or in lieu of peripheral biopsy.

The Thoracic Inlet: Normal Anatomy and Selected Pathology

LEE JC, Siddall T, Malhotra A, Wandtke J

Introduction: The thoracic inlet, also known as the cervicothoracic junction, is the narrow space that serves as the junction between the neck and the thorax. Its boundaries are the manubrium anteriorly, the first thoracic vertebra posteriorly, and the first ribs bilaterally. It is often seen at the edge of chest radiographs and of computed tomography of the chest and the neck which can lead to lesions being easily overlooked. The normal anatomy of the thoracic inlet will be reviewed as familiarity of the anatomy is critical in identifying abnormalities. Structures found in the thoracic inlet include neural structures, vascular pathways, lymphatic system, the trachea, the esophagus, the lung apices and musculoskeletal structures. Commonly seen abnormalities originating in the neck or chest which can cross the junction will be discussed.

Methods: Normal anatomy of the thoracic inlet utilizing CT. CT and plain film images of selected pathology found in the thoracic inlet with imaging features described.

Results: To gain a better understanding of the normal anatomy of the thoracic inlet. To learn plain film and CT correlation of thoracic inlet pathology such as thyroid carcinoma, nerve sheath tumors such as schwannomas, superior sulcus tumor, vertebral body tumors, lymphoma and esophageal carcinoma.

Conclusion: The thoracic inlet contains multiple structures all which can have similar plain radiograph findings. To learn imaging features of common pathology found in the thoracic inlet.

Impact of Emergency Department Chest CT on Clinical Management of Immunocompetent Patients with Chest Radiographic Findings of Pneumonia

BANKER PIYUSH, Jain Vineet, Haramati Linda.

Introduction: Literature supports the use of CT in immunocompromised pts to narrow the differential diagnosis (dx) and strengthen clinical management (CM). The purpose of this study is to assess the utility of chest CT (cCT) in the emergency department (ED) in immunocompetent (ICT) pts with suspected PNA on CXR by evaluating its impact in CM.

Methods: We retrospectively identified 1373 cCTs over a 12 month period (7/05-6/06) from the ED of a single institution. CXR (<24 hr prior cCT) reports were reviewed to define the study population as those with findings of PNA. 51 ICT patients met inclusion criteria: 26 women, 25 men, (mean age 60 range 29-103 yrs). ICT age and sex matched controls with ED CXR findings of PNA who did not undergo CT were identified. Charts were reviewed for CM & f/u and analyzed with Fisher's exact and t-test.

Results: Significant differences between pts and controls were found for presenting signs & symptoms(s/s), and CM, with pts representing a sicker population than controls. Pts had more s/s than controls, respectively: auscultation abnormalities 64% vs 47%; abnormal sputum 32% vs 0%; hypoxemia 22% vs 2%; wt. loss 20% vs 4%; and night sweats 16% vs 2%, (p<0.05, each). CM differed significantly between pts and controls, respectively: antibiotics initiated in 82% vs 47%; 29% vs 0% change in antibiotics, procedures were performed in 24% vs 0%; and mean length of stay was 8 days vs <1, (p<0.05, each). 24% of pts had alternative/additional dx to PNA based on CT findings, including TB (n=4), PE, lung cancer, MM, RCC, SBO, lung nodules, hypersensitivity pneumonitis, and neoplasm vs TB, (n=1, each).

Conclusion: ICT ED pts with CXR findings of PNA who underwent cCT were a sicker group than those who were not imaged with CT. Significant alternative/additional dx on CT guided CM in nearly ° of pts.

Clinical Value of 64 Slice Cardiac MDCT in the Preoperative Planning of Complex Adult Heart Surgery

WILLIAM M. STRUB, Christopher A. Meyer, Rhonda Strunk, Walter Merrill

Purpose

With the advent of cardiothoracic surgical procedures that involve minimally invasive techniques clear delineation of the anatomy is imperative. This is especially the case in patients being re-operated for coronary artery bypass grafting, aortic root pathology or congenital heart disease. We report our initial experience with cardiac MDCT performed for preoperative planning.

Methods

Imaging was performed on 7 patients (4 females and 3 males) with an average age of 50.8 years (range 26-68 years). 5 patients had undergone a sternotomy in the past, and 4 had a history of known congenital heart disease (2 Ebstein's anomaly, and 2 Tetralogy of Fallot).

Results

Surgical management was affected in the majority of the cases. In 3 patients, right coronary arteries were demonstrated immediately below the midline sternotomy defect. In one patient, the CT scan demonstrated an anomalous origin of the right coronary artery with severe stenosis, a finding that was not detected at cardiac catheterization. In a fifth patient, the complex relationship of a bypass graft to an ascending aortic pseudoaneurysm was modeled prior to repair.

Conclusion

Cardiac MDCT is a valuable pre-operative tool that can clearly delineate the relationship of native coronary arteries, coronary artery bypass grafts and the cardiac chambers to the sternum and mediastinal structures that may be displaced by prior surgery or mass effect. Armed with this spatial knowledge, the surgical approach may be altered to avoid potential complications related to distorted anatomy.

CT Evaluation of Extrapleural Lymph Nodes in Malignant Mesothelioma

ASTROPE V, Seely J, Matzinger F, Dennie C, Souza C, Peterson R

PURPOSE

Assessment of regional lymph nodes is important in staging malignant mesothelioma. Some nodal stations however are inaccessible to surgical biopsy at mediastinoscopy and are optimally evaluated by CT. The purpose of this study was to determine the frequency of extrapleural lymph node enlargement on staging MDCT and monitor their appearance on serial CT.

METHODS

44 patients with malignant mesothelioma underwent staging with MDCT over a 5 year period. Twenty nine (66%) were found to have extrapleural lymphadenopathy, 19 (17 M, 2 F, mean 69 years old) of whom underwent follow-up CT. The presence, size and number of nodes were assessed for every patient, at each location on serial follow up CT (average 7.6 months interval). Malignant involvement was inferred if there was interval growth of the nodes on serial studies.

RESULTS

In the 19 patients, adenopathy was identified on the initial CT: 9 (47%) at internal mammary (IM), 12 (63%) cardiophrenic (CP) and 6 (32%) retropleural (RP) locations. Increase in size was identified in 4 patients with IM nodes (44%), 9 (75%) CP, and 7 (100%) RP nodes, despite disease progression in all patients.

CONCLUSION

Extrapleural adenopathy is observed in the majority of patients with mesothelioma on MDCT. Growth of extrapleural nodes is observed most commonly at RP and CP locations, and least likely with IM nodes. A targeted search of these nodal areas should be performed when staging patients with mesothelioma.

CT of Congenital Heart Disease

SAURABH JHA, Sridhar Charagundla, Harold Litt

Background:

Computed tomography has been gaining a role in the imaging of congenital heart disease particularly in the post-surgical scenarios where the anatomy is altered and often complex. Although a domain of magnetic resonance imaging, the rapidity of acquisition of CT images, the higher temporal and spatial resolution afforded by the latest scanners and the ability to manipulate the 3 D data set to display anatomy and function, has allowed CT to be an important, if not a primary imaging modality for the follow-up of such patients who are benefitting from greater life expectancy. The frequent use of CT places responsibility of practicing radiologists to be able to understand the principles of image acquisition, ECG-synchronization, contrast medium administration and, most importantly, the radiation doses involved.

Objectives:

1. To appreciate the acquisition protocols used in the Siemens Sensation 64 and Siemens Definition (dual head) for imaging patients with congenital heart disease.
2. To understand the altered cardiac anatomy in the post-surgical patient with an emphasis on "what the cardiologist wants to know".
3. To be cognizant of the radiation doses involved and the implications of cumulative radiation dose with long term use of CT.

Conclusions:

CT is a useful modality for evaluating the surgically-corrected congenital heart disease patient. Its long term use must be balanced with the radiation imparted to a relatively young cohort of patients.

Influence of CT Imaging Parameters on Automatic Measurement of Airway Wall Thickness with FWHM Method Using a Physical Phantom

EUN JIN CHAE, Namkug Kim, Joon Beom Seo, Suk-Ho Kang

Purpose: To assess the influence of CT imaging parameters, such as reconstruction kernel, field of view and slice thickness on automatic measurement of airway wall thickness with FWHM method.

Methods: The phantom, consists of 11 poly-acryl tubes with various inner lumen diameters and thickness, was used in this study. The measured density of the wall was 150HU. The airspace outside of tube was filled with poly-urethane foam, whose density was -900HU. CT images, obtained with MDCT (Sensation 16, Siemens), was reconstructed with various reconstruction kernel (B10f, B30f, B50f, B70f and B80f), field of views (180mm, 270mm, 360mm), and thicknesses (0.75, 1, and 2mm). Using in-house airway measurement software, the luminal area, outer boundary, and wall thickness was measured by FWHM method. Real dimension of each tube and measured CT values on each CT data set was compared.

Results: The accuracy of measured wall thickness was influenced by reconstruction kernel. Images reconstructed with softer kernel resulted in thicker measured value. B50f is the most accurate reconstruction kernel (Mean error: 0.037 ± 0.095 mm). There was a threshold point of 1-mm wall thickness, below which the measurement failed to represent the change of real thickness. Even using the smaller FOV, the accuracy was not improved.

There was no significant difference in accuracy among images with variable slice thicknesses.

Conclusion: The accuracy of airway wall measurement was strongly influenced by reconstruction kernel. For the accurate measurement we recommend the CT images reconstructed with B50f or B30f with sharpening post-processing filter.

Keyword: airway wall measurement, CT imaging parameters, full width at half maximum, phantom.

Radiologic Findings of Pulmonary Aspergillosis in Solid Organ Transplant

EUN JIN CHAE, Yangsin Park, Joon Beom Seo, Young Kyung Lee, Kyung Hyun Do, Jin Seong Lee, Jae Woo Song

PURPOSE: To know the clinical and radiological findings in patients with pulmonary aspergillosis after solid organ transplantation.

METHODS: We recruited 14 recipients having pulmonary aspergillosis (liver(6),kidney(4),and heart(4)) among 1745 who underwent solid organ transplantation. Diagnosis was made by percutaneous needle biopsy(8), sputum culture(4), and surgical resection (2). Initial symptoms and time interval between transplantations and diagnosis were checked. The type, number, size, and distribution of parenchymal abnormality were reviewed. Changes in radiologic findings and clinical response after treatment were assessed.

RESULTS: The mean time interval between transplantation and diagnosis was 29.4 days (range 15-64 days). The most common radiologic finding was multiple nodules in all patients. One patient showed disseminated micronodules. Associated findings were surrounding ground glass opacity(7), central low density(5), central air-cavity(4), and air-bronchogram(3). Other findings included pleural effusion(10), myocardial abscess(1), and perirenal abscess (1). Follow up CT after treatment showed interval decrease of parenchymal abnormality in nine patients. Lesions were persistent in two patients; aggravated in three patients even after treatment. There was no radiologic finding predicting the response of treatment at initial CT scan. There were two aspergillosis-associated deaths during the follow up period.

CONCLUSION: The most common radiologic finding of pulmonary aspergillosis after solid organ transplantation is multiple nodules, which commonly appeared within 2 months after transplantation.

Pseudoemboli

EMMA C. FERGUSON, Eugene A. Berkowitz, Sandra A.A. Oldham

Purpose:

The purpose of this educational exhibit is to review causes of apparent filling defects within the pulmonary arteries on computed tomographic pulmonary angiography other than pulmonary emboli.

Principal information:

Numerous entities may mimic the appearance of pulmonary emboli on computed tomographic pulmonary angiography (CTPA), and therefore serve as imaging pitfalls in the diagnosis of pulmonary emboli. A comprehensive review of the numerous causes of pseudoemboli will serve to increase the awareness and knowledge of all types of potential pitfalls that may be encountered on CTPA. Entities which simulate pulmonary emboli such as lymph nodes, mucus bronchograms, endobronchial tumors, tumor emboli, primary pulmonary artery tumors, venous defects, perivascular edema, scanner artifacts, as well as more uncommon causes, such as peripherally calcified lymph nodes, collateral vessels extending around the pulmonary arteries down to the level of the distal subsegmental branches, foreign bodies, and even left atrial appendage thrombi mimicking pulmonary emboli will be covered.

Conclusion:

It is important to be familiar with the various imaging pitfalls for pulmonary emboli on CTPA and to understand their causes. An illustrative review of these numerous entities, some common some rare, will serve to increase knowledge and understanding of these findings.

Dual Time Point PET-CT in the Differentiation of Non-small Cell Lung Cancer

HAM SY, Oh YW, Choi EJ, Kim SE, Kang EY, Lee KY, Kim YH,

Purposes: To evaluate the SUV in the primary mass, metastatic nodes, correlate the histology of non-small cell lung cancers.

Materials & Methods: We retrospectively reviewed CT scan, PET-CT, and histology in our lung cancer referrals from Sep, 2003 to Jan, 2006. Patients with primary non-small-cell lung cancer and pathologic confirmation of nodal status for analysis. We acquired RI (Retention Index)=(SUV 1h-SUV2h)x100/SUV 1h. CT stage and PET-CT staging were compared with final pathologic stage. Sixty-eight patients (M:F = 51:17, mean age 63.1 yr old) had results of CT, PET, and confirmation of nodal or distant disease.

Results: Pathology was 37 squamous cell ca, 31 adenoca. The stages were IA(6), IB(11), IIA(9), IIB(12), IIIA(14), IIIB(11), IV(5). There is a significant correlation between SUV of primary lesion and presence of nodal or distant metastases at the time of presentation and RI value were higher than squamous cell carcinoma than adenoca. Mean SUV was 16.1:5.6 (squamous:adenoca.). And the RI was 20.5:12.5 (squamous: adenoca.). The SUV of the metastatic nodes were similar pattern RI to the primary mass lesion in adenocarcinoma.

Conclusion: We can predict the specific pathology for non small cell cancer. Higher level SUV of primary mass favors squamous cell carcinoma than adenocarcinoma.

Pulmonary Blastoma: Radiological and Pathological Correlation of a Rare Disease.

Sergy Shkurovich, AMIT NEWATIA, Stephanie Soohoo, Rakesh Shah, Arfa Khan

Pulmonary blastoma is a rare malignancy with peak incidence around age 35-40. It is a distinct entity from Pleuropulmonary Blastoma which occurs in children. Imaging can be variable and nonspecific. Pulmonary blastoma can present as a well demarcated, lobulated peripheral mass of variable size. Cavitation may be present. Open lung biopsy is diagnostic with histology showing immature epithelial and mesenchymal tissue. The purpose of this exhibit is to provide an overview of pulmonary blastoma including pathophysiology and clinical presentation, to demonstrate the imaging findings, and to provide pathological correlation.

Correlation with PET-CT and Follow Up CT for Primary and Metastatic Lung Cancers Treated with Cryoablation

HAM SY, Cho SB, Oh HW, Kim YH, Kim SE, Lee SH, Kim KT

Purposes: To determine the accuracy of positron emission tomography (PET)/computed tomography (CT) in the detection of residual tumor after cryoablation of pulmonary tumors regardless of primary or metastatic lesions.

Materials & Methods: Eight patients with 10 lesions (mean size: 4.9 cm) were evaluated in this study. Total 25 procedures of cryoablation were performed and 23 PET/CT examinations (including pre and post ablation) were analyzed. The patients had PET/CT before and after ablation using [18F]-2-fluoro-2-deoxy-D-glucose. CT images were interpreted not correlated with the results of PET-CT scan. PET-CT images were also evaluated. The accuracy for detection of residual tumor by the different imaging modalities following ablation was assessed.

Results: Eight patients with a mean age of 64.8 (range 52-73) years were reviewed. The histopathology was primary lung cancers (8, squamous -6, adenocarcinoma -2, metastatic cancers (2, from rectum and trachea). The mean follow-up period was 194 days. Two patients had residual tumor after ablation, six patients were revealed near total cavitation developed and no evidence of hypermetabolic foci in the cavitory lesion on 2nd follow up PET/CT. The above finding were correlated with enhancing solid component on enhanced CT scan within 2 weeks of PET-CT scan. The difference of the HU between pre and post CE study were correlated with SUV (standardized uptake value) for the cavity on PET-CT.

Conclusion: PET-CT has potential roles in the evaluation for the residual viable tumors after cryoablation and has been proved to be superior to CT alone when assessing the pulmonary malignant lesions after cryoablation.

Low-dose Computed Tomography in Prior Asbestos-exposed Workers: Assessment of Pleural Plaques and Screening for Lung Cancer and Malignant Mesothelioma

HAMID BAYANATI, Heidi Roberts, Zhi Dong, Andre Pereira, Igor Sitartchouk, Ashwini Kale, Narinder Paul, Michael Johnston.

Purpose

To screen asbestos-exposed workers for lung cancer and malignant pleural mesothelioma (MPM) and report on pleuropulmonary abnormalities.

Material and methods

Since May 2005, we enrolled 349 individuals with asbestos exposure at least 20 years ago and/or documented pleural plaques. A LDCT is performed (1.25 mm, 60 mA, 120 kV). Indeterminate nodules and suspicious pleural plaques are followed in 3–6 months.

Results

To date, 344 men and 5 women are screened (average 62 years). 195 (55.9%) are former, 84 (24.1%) current smokers and 70 (20.1%) are life-time non-smoker. One or more pulmonary nodules were detected in 247 (70.8%) patients, 58 nodules were ≤ 5 mm. On follow-up, 2 nodules had grown and both proved to be malignant (stage 1 adenocarcinoma and stage 1 squamous cell carcinoma). In 3 cases an immediate biopsy revealed a benign pleural plaque, a mesothelioma and an extensive small cell carcinoma. One highly suspicious central 2cm nodule is under surveillance and biopsy for a pleural plaque with new effusion is pending. All cases of malignancy were heavy smokers (average 36 pack-year). 271 (77.7%) individuals had pleural plaques. In 37 (13.7%) they were lobular and in 30 (8.6%) they had an asymmetric distribution. Of the asymmetrical plaques, 23 (76.7%) were more prominent on the left. 82% (120/147) of smokers with more than 20 pack/year of smoking had pleural plaques, compared to 72% (48/66) of non-smokers ($p=0.02$).

Conclusion

Screening prior asbestos workers does result in the early detection of lung cancer and advanced mesothelioma. The detection of an early mesothelioma requires understanding its imaging appearance. We defined suspicious plaques as lobulated, asymmetric, in particular when right dominant. These plaques are currently under surveillance.

PET/CT of Lung Cancer: An Educational Exhibit

SUNG JS, Gefter WB, Alavi A, Torigian DA

Purpose: This exhibit will present a spectrum of imaging manifestations of lung cancer using state of the art PET/CT.

Principal Information: The strengths and weaknesses of integrated PET/CT will be discussed. The role of this modality in lung cancer diagnosis, staging, treatment planning (particularly for radiation target planning), and therapeutic monitoring as well as tumor recurrence will be illustrated. Quantitative patterns for both structure and metabolic activity will be emphasized.

Cryptogenic Organizing Pneumonia

EMMA C. FERGUSON, Eugene A. Berkowitz, Sandra A.A. Oldham

Purpose: The purpose of this educational exhibit is to describe and illustrate the various imaging manifestations of cryptogenic organizing pneumonia.

Principle information: Cryptogenic organizing pneumonia (COP) has diverse radiographic features. This educational review will describe the causes, associations and imaging features of COP. COP may appear radiographically as multiple peripheral opacities, a single focal consolidation, small or large nodules or masses, or as a crescentic opacity referred to as the iatoll sign. While many cases of COP are idiopathic, there are a variety of conditions associated with COP such as collagen vascular diseases, infections, drugs, among others, which will be described. The pathophysiology and current understanding of this disorder will also be discussed.

Conclusion: It is important to be familiar with the various imaging features and manifestations of COP, particularly since it may resemble a variety of other diseases.

Mosaic Perfusion on HRCT: Disease Characterization and Etiologies

AMIT NEWATIA, Sergey Shkurovich, Stephanie Soohoo, Rakesh Shah, Arfa Khan

Mosaic ground glass attenuation is a relatively common finding on HRCT. Etiologies can vary from airway disease (bronchiectasis, Cystic Fibrosis, constrictive bronchiolitis), to infiltrative disease (pulmonary edema, hemorrhage, pneumonia, idiopathic interstitial pneumonia, bronchoalveolar carcinoma, etc.) to vascular causes (chronic pulmonary embolism, pulmonary artery HTN). The purpose of this exhibit is to characterize the various causes of mosaic perfusion and to discuss the pathophysiology of this finding.

The Effect of Saline Flush for Enhancement of Aorta and Coronary Artery Using Cardiac Multidetector-Row Computed Tomography (MDCT) Angiography

SANG JIN KIM, Dae Joong Kim, Tae Hoon Kim

Purpose: To investigate the effect of the injection rate of saline solution as a bolus chaser for the enhancement of aorta and coronary arteries in MDCT coronary angiography.

Methods and Materials: One hundred patients underwent 64-slice MDCT coronary angiography to screen for coronary artery disease. They were divided into five groups (each group; n =20). 60 ml contrast agent (Xenetix 350) was injected intravenously at a rate of 4 ml/sec.

Immediately afterward, 60 ml saline solution was administered intravenously at a rate of 3 - 7 ml/sec. The CT number of contrast enhancement was measured at the aortic root, right coronary artery, left anterior descending artery, and left circumflex artery, and the results were compared, according to the injection rate of saline solution using a Post Hoc test with Scheffe's method.

Results: The degree of contrast enhancement was affected by the injection rate of the saline solution, and the mean attenuation values were continuously increased accordingly. The values formed a plateau at an injection rate above 5 ml/sec saline solution at the aorta and above 4 ml/sec saline solution at the coronary arteries.

Conclusion: The injection rate of 4 - 5 ml/sec for a saline solution chaser is optimal for achieving good attenuation values at the aorta or coronary arteries on the 64-slice MDCT scanner with 60 ml contrast material.

A Clue to Lung Cancer in Lobar Consolidation: Bronchial Wall Thickening and Diffuse Enhancement

YOO HS, Kwon W, Kim S-H, Kim MS

Purpose: To differentiate between lung cancer and pneumonia in cases of lower lobar consolidation

Methods: We retrospectively analyzed lower lobar consolidation, lung cancer in 6 patients and lobar pneumonia in 7 patients. Exclusion criteria are endobronchial mass, bronchial wall destruction by adjacent mass, surrounding focal infiltration, and associated metastatic lymph node enlargement. All patients were pathologically confirmed by transbronchial lung biopsy. An organism of lobar pneumonia was identified by culture study. Wall thickening was measured on end-on cutting plane (shortest thickening) at window level 40 HU and window width : 400 HU. Wall enhancement was measured at 4 area.

Results: An average age is 71.3 years old in cancer and 65.7 years old in pneumonia. All cancers were proven by squamous cell carcinoma. Among the pneumonia, 4 patients were revealed tuberculosis, 1 invasive aspergillosis, 1 mucormycosis, and 1 unidentified organism with information about negative for malignancy. Average bronchial wall thickening was 2.3mm in cancer and 1.4 mm in pneumonia. Average enhancement was 36.56 (SD 25) in cancer and 23.64 (SD 12.11) in pneumonia. The combination with bronchial wall thickening and diffuse enhancement are noted in all 6 cancer patients. Only bronchial wall thickening is noted in 4 pneumonia, diffuse enhancement without bronchial wall thickening in 1 pneumonia, and no bronchial change in 2 pneumonia.

Conclusion: When lobar consolidation without findings suggesting cancer is seen, pay attention to bronchial wall thickening and diffuse enhancement. It can be a clue to lung cancer in lobar consolidation.

Expanding the Differential Diagnosis of Cystic Lung Disease at HRCT

MATTHEW GILMAN, Francis X. McCormack, Cris A. Meyer

OBJECTIVES: To describe the uncommon causes of cystic lung disease that may mimic lymphangiomyomatosis (LAM) or Langerhan's cell histiocytosis and review the pertinent clinical and pathologic features of these rare lung diseases.

METHODS: A review of patient case files referred to the Rare Lung Disease Consortium with a suspected diagnosis of LAM resulted in a series of cases with alternative cystic lung disease diagnoses. The CT findings in patients with documented LAM mimics will be displayed and the disease processes reviewed.

RESULTS: Multiple cystic lung diseases may mimic LAM on chest CT. These include uncommon entities such as lymphoid interstitial pneumonia (LIP), follicular bronchiolitis associated with Sjogren's disease, amyloidosis, light chain deposition disease, Birt Hogg Dube, bronchopulmonary dysplasia and metastatic endometrial cell sarcoma. When applicable, clinical or radiologic findings that may assist in differentiating these entities will be reviewed.

CONCLUSION: Although cystic lung disease is most often secondary to LAM or Langerhan's cell histiocytosis, other entities may result in a similar radiographic appearance and should be considered in the differential diagnosis.

Paravertebral Lesions of the Thorax

BERKOWITZ EA, Ferguson EC, Oldham SAA

Purpose:

Organize a wide array of lesions of the paravertebral space based on their tissue of origin to devise a differential diagnosis.

Principle information:

The anatomic boundary for the wedge-shaped paravertebral space from T4 through T12 is limited at its apex anteriorly by the pericardium, posteriorly by thoracic vertebral bodies/discs, laterally by an imaginary line through the posteromedial mediastinal pleura, superiorly by the thoracic inlet and inferiorly by the diaphragm (Figure 1). Normal structures contained within this space are depicted in Table I. Lesions found in the paravertebral space include those in the categories of vascular, neoplasm, esophageal, infection/inflammatory, and congenital (Table II).

Neoplasms of the paravertebral space include neurogenic tumors, the neuroblastoma family, and paraganglioma/pheochromocytoma. Hematopoietic malignancies (non-Hodgkin's lymphoma, multiple myeloma), metastases and vertebral element lesions may arise within this space. Infectious/inflammatory lesions (discitis/osteomyelitis, mediastinal abscess, Langerhans cell histiocytosis and echinococcal cyst) and congenital/foregut duplication cysts (meningoceles, bronchogenic cyst, extralobar sequestration, neurenteric cysts) may arise in the paravertebral space. Vascular lesions include aneurysm/dissection/ectasia, dilated azygos vein, and paraesophageal varices. Traumatic lesions (hematoma, loculated hemothorax, traumatic pseudomeningocele) and fat containing lesions (lipoma, Bochdalek hernia, extramedullary hematopoiesis) may arise in the paravertebral space.

Conclusion:

Lesions arising from the paravertebral space are defined by their anatomic tissue of origin and imaging characteristics to obtain a differential diagnosis.

Imaging Findings in Vascular Mediastinal Masses

PARKER K, Ko JP, McGuinness G, Rubinowitz A

Objectives: To describe and illustrate the imaging characteristics of mediastinal masses of vascular etiologies, including both normal anatomic variants and pathologic processes. The major systemic and pulmonary venous and arterial anatomic anomalies which can produce masses will be reviewed. Less common vascular causes of mediastinal masses including hemangioendothelioma, coronary apex varix, and coronary artery bypass graft aneurysm will also be presented.

Methods/Results: Characteristic CT, MR, and plain film imaging features of various forms of mediastinal vascular pathology and anatomic variants will be discussed. Demonstration of the utility of multiplanar imaging, enabled by multi-detector CT and MRI, in evaluating these lesions will be emphasized. Optimal utilization of contrast will be reviewed. Pertinent clinical features of these lesions, and imaging and interpretive pitfalls, will be reviewed.

Conclusions: Awareness of mediastinal vascular pathology and normal variants helps avoid misinterpretation of mediastinal masses. MPR images aid in diagnosis and differentiation of vascular mediastinal lesions.

Coronary CTA in the Setting of Cocaine Related Chest Pain

PEEKE J, Flukinger T, Jeudy J, White C

Purpose: Cocaine induced chest pain (CP) is often postulated to be due to coronary vasospasm. We studied whether patients presenting to the ED with acute CP and recent cocaine use have a lower prevalence of coronary artery disease (CAD) compared to matched controls.

Materials and Methods: A retrospective database analysis of 168 patients who underwent ECG-gated 64-detector cardiac CT (Philips Brilliance) after presenting to an urban ED with acute CP during a one year period resulted in 21 (12.5%) patients with urinalysis positive for cocaine metabolites. From this database 21 age and sex matched control patients with no evidence of cocaine use were randomly selected by using a commercially available randomizer program (www.randomizer.org). Lesions were graded and scored based on luminal narrowing: mild (<30%, 1 point), moderate (30-50%, 2 pts) and severe (>70%, 3 pts). The coronary arteries of each patient were analyzed by two cardiac radiologists. A paired t-test was used to determine significance ($p < 0.05$).

Results: Each group consisted of 13 males and 8 females. The average age of the cocaine and control groups was 45.7 (33 to 56 years) and 46.6 (37 to 56 years), respectively. Nine patients in the cocaine group (21 points) and 8 patients in the non-cocaine group (16 points) had some degree of atherosclerotic narrowing. These differences did not meet statistical significance ($p=0.204$). No patient ruled in for MI.

Conclusion: There was little difference in the extent of CAD among cocaine and non-cocaine using patients who presented with chest pain to the ED. Structural heart disease may account for CP symptoms in both groups.

Evaluation of Coronary Artery Stent Occlusion Using 64-detector CT Angiography

GOYAL N, Goldman Y, Kakkanatt A, Boxt LM

Purpose:

Evaluation of the lumen of intracoronary stents is difficult due to small lumen caliber and artifact caused by the stent itself and adjacent arterial calcification. We aim to design an objective method of evaluating stent occlusion

Methods:

49 stents in 26 patients were examined by CTA. Stents judged to be occluded by visual inspection were further evaluated by comparing intra stent attenuation prior to and after administration of contrast. Pre and post contrast images were reformatted a 0.6 mm slice thickness on a 64-slice MDCT. Intra luminal attenuation was measured by placement of 3 ROI's within each stent in both pre and post contrast series, and the mean attenuation difference calculated. Results of visual inspection were compared with the results of catheter angiograms, when available.

Results:

By visual inspection, 13 stents in 6 patients were diagnosed "occluded" and 36 stents in 26 patients were judged to be patent. By catheter angiography, stent occlusion was confirmed in 9/13. Partial (50-95%) occlusion was found in an additional 4/13. Significant difference was found between mean attenuation difference in "occluded" (79 ± 65 HU) and "patent" (244 ± 104 HU) stents ($p < 0.001$, using student's t-test).

Conclusion:

Visual inspection of coronary artery stent occlusion is subjective and may be inaccurate. Measurement of intra stent attenuation prior to and after contrast administration provides an objective means of differentiating patent from severely narrowed or occluded stents on CTA. Quantitative analysis of CTA is promising and will be helpful for designing future clinical studies.

A Review of Atypical Intrathoracic Manifestations of Sarcoidosis

WALSHAM AC, Ng Y-L, Paul N, Weisbrod G, Chung T-B, Herman S, Roberts H, Balter M, Patsios D.

Introduction: Sarcoidosis can present with a wide spectrum of clinical and radiological findings in the thorax and has been described as the 'great masquerader'. The purpose of this exhibit is to outline and present several atypical manifestations of intrathoracic sarcoidosis involving the mediastinum, the pleura, airways, lung parenchyma and the heart as demonstrated on plain radiographs, radioisotope studies, CT and MR imaging. We retrospectively reviewed the radiology of clinically proven cases of sarcoidosis with uncommon clinical-pathologic presentations and radiologic features. We illustrate case examples of cardiac sarcoid presenting as myocardial ischaemia, endobronchial sarcoid with secondary lung atelectasis, the clinical syndrome of fibrosing mediastinitis, peripheral subpleural consolidation, dominant alveolar ground glass opacities, septal thickening, the 'galaxy sign' of conglomerate nodules, pulmonary arterial involvement, necrotizing angiitis, and pleural effusions.

Conclusion: Having an appreciation of the wide variation in radiological manifestations of sarcoidosis, including atypical features should alert the radiologist to consider sarcoid in the differential diagnosis.

Evaluation of Aortic Regurgitation in Congenital Heart Disease: Value of Magnetic Resonance Imaging in Comparison to Echocardiography

LEY S, Arnold R, Ley-Zaporozhan J, Schenk J-P, Ulmer H, Kauczor H-U

Background: Evaluation of the severity of aortic insufficiency (AI) and the follow-up is an important task in pediatric cardiology. Based on clinical and echocardiographic (echo) findings like the configuration of the valve and the regurgitation fraction (RF), the severity is judged.

Goal of this study was to evaluate the value of magnetic resonance imaging (MRI) compared to echocardiography (echo) for determination of clinical severity, valve morphology and RF.

Methods: 30 patients (3 – 27 years, mild to severe insufficiency) were evaluated by clinical examination, echo (2D and Doppler), and MRI (1.5T, 2D trueFISP Cine short axis, phase-contrast flow in the ascending aorta).

Results: Both methods identified correspondingly 13 bicuspid and 17 tricuspid valves. Good correlations between echo and cine-MRI were found for the ventricular mass, stroke volume, and the ejection fraction. A good linear correlation was found for the RF determined by echo and phase-contrast MRI ($r=0.7$). The RF was 6% in mild insufficiency, in moderate 17%, and in severe 30%. The different severity groups showed significantly different RF ($p<0.02$) and it was possible to discriminate between clinical severity using this parameter.

Conclusion: Echo and MRI showed good agreement for morphology and function of the left ventricle. Using MRI the clinical severity of the disease can be evaluated correctly.

Typical and Atypical Multi-Detector Computed Tomographic Findings in Acute Traumatic Aortic Injuries – A Pictorial Review

SCOTT D. STEENBURG, James G. Ravenel MD

Purpose: To review the typical and unusual blunt acute traumatic aortic injuries (ATAI) that may be encountered at multi-detector computed tomographic from the aortic root to the aortic bifurcation.

Methods: Multi-detector CT imaging features of typical and unusual ATAI are described and multi-planar CT images of each type of injury are presented.

Results: The typical location of blunt ATAI is at the aortic isthmus. Less frequently, injuries may occur at the aortic hiatus of the diaphragm or within the ascending aorta. We have also encountered injuries of the mid-thoracic and abdominal aorta. Minimal aortic intimal tear is also being encountered more frequently. The aorta may occasionally be injured in more than one location.

Conclusion: Acute traumatic aortic injuries are a significant cause of morbidity and mortality trauma patients. With the improved trauma systems and wide availability of multi-detector computed tomography, both typical and unusual manifestations of blunt traumatic aortic injury are more likely than ever to be imaged with MDCT. Because of this, radiologists should be aware of the CT findings of acute traumatic aortic injuries, both the typical and unusual presentations.

Various Findings of Breast Lesions on Routine Chest CT

YIJG, Park JH, Kim SJ

The organ, breast has many diseases and the incidence of breast lesions are increasing. Although the basic diagnostic modalities for breast diseases are mammography, breast ultrasound, and magnetic resonance imaging, these pathologic conditions sometimes can be visualized on routine chest CT. Exact diagnosis of breast lesions are determined usually with these three modalities. With increasing number of chest CT studies and increasing incidence of breast pathology, chest radiologists may meet various images of breast lesions on routine chest CT.

Various benign and malignant breast lesions such as, fibroadenoma, implants, feeding breast, accessory breast, gynecomastia, etc. and breast cancer, breast metastasis, hematogenous/lymphogenous lung metastasis, post-operative changes, etc. can be visualized on routine chest CT (conventional CT, thin-section CT and low-dose CT for lung cancer screening).

In this exhibit, we will illustrate the various CT findings of several conditions involving breast, incidentally shown on routine chest CT (protocols for chest lesions, not for breast lesions).

However, chest CT is the modality for chest, mainly lung disease, so chest CT should be used solely for evaluation of chest pathology and the breast diseases must be re-evaluated with breast imaging modalities such as, mammography, breast ultrasound and if necessary, breast MRI, etc.

Acute Aortic Syndrome: Pictorial Assay

PEREIRA AM, Paul NS, Doyle DJ, Pen V, Ng Y, Provost Y

ABSTRACT:

A review of the pathophysiology and terminology of the aortic diseases presenting on an acute basis in the absence of trauma. Distinctive features of chronic diseases, mainly atherosclerosis will be presented.

Discussion of terminology and pathophysiology of non traumatic aortic conditions presenting in an acute setting; presentation of a pictorial review. We will outline the management with emphasis on which condition are treated medically versus surgically with an overview of current therapeutic and surgical procedures. There are mainly three entities which will be reviewed: aortic dissection, both typical and atypical cases, intramural hematoma and penetrating ulcer.

This presentation focuses mainly on pathophysiology and terminology of the aortic diseases presenting on an acute basis in the absence of trauma.

Audit of Missed Lung Cancers on Chest Radiographs

MANOJ SRIVASTAVA, M.G. Cowling, N. Watson

Background to the audit: Accuracy of chest radiograph interpretation for lung cancers is reported as 61%; sensitivity and specificity are 23% and 96% respectively. Chest radiographs are poor at visualizing CT detectable lung cancers of 20 mm in diameter or less. There is no agreed figure for the acceptable number of missed lesions on chest radiographs.

Standard, indicator and target: To audit our Hospital incidence of missed abnormalities on chest radiographs Standard was set to maximum of 5% misses.

Methodology: Seventy patients over three months identified from Lung Cancer MDT. Chest radiographs on these patients in previous year were reviewed along with the notes and reports. If a lesion was missed then the chest radiographs were reviewed by two consultant radiologists.

Results of first audit round: Lung cancers were missed in five patients (7.1%). There was no report on two patients (2.8%) and in three (4.3 %) the lesion was missed by the reporting radiologist. Delay in diagnosis in those three patients averaged to 8.6 months. In the 2 unreported patients there was no delay in diagnosis, as they had been diagnosed by clinicians reviewing the films. The overall rate of missing lesions on chest radiographs in our hospital is therefore 4.3%.

Action plan: The misses illustrated the classic 'catches' in reporting chest radiographs which are a. Review areas b. Lung apices c. Behind the heart d. The airways e. Distraction by a significant change in one area of the film, thus missing a lesion elsewhere f. Comparison with previous films.

Effect of Different Tidal Volumes and PEEP on Lung Compartments Using Respiratory Gated 4D-CT

LEY-ZAPOROZHAN J, Ley S, Unterhinninghofen R, Weinheimer O, Saito Y, Szabo G, Kauczor H-U

Purpose: 3D quantitative assessment of lung volumes (LV) and different lung compartments (atelectasis, poorly ventilated, normal ventilated, hyperventilated) during ongoing mechanical ventilation was not feasible up to now. Using respiratory-gated volumetric 4D-CT the influence of different ventilation settings were evaluated.

Methods: Five ventilated healthy pigs underwent 16-row MDCT (collimation 1 mm) with retrospective respiratory gating (CCD camera device). Two tidal-volumes (300 mL, 450 mL) and three PEEP levels (0, 5 and 10cmH₂O) were applied resulting in 6 scans per animal. Images were reconstructed throughout the whole respiratory cycle in 10% increment. Segmentation provided LV, mean lung density (MLD) and lung compartments.

Results: [1] At tidal-volume 300 mL the inspiratory LV were 1.05, 1.26 and 1.5 L and expiratory LV 0.75, 0.99 and 1.24 L (PEEP 0, 5, 10 cmH₂O respectively). Differences of MLD between inspiration/expiration were 86, 65 and 46 HU. [2] At tidal-volume 450 mL the inspiratory LV were 1.21, 1.43, 1.72L and expiratory LV 0.78, 1.01, 1.34 L (for PEEP 0, 5, 10 cmH₂O). Differences of MLD between inspiration/expiration were 108, 87 and 60 HU.

A clear oscillation of the normal and hypoventilated volumes was found at PEEP 0, with increase in PEEP the hypoventilated areas became increasingly normal ventilated, the oscillation of the curves decreased and hyperventilated areas increased.

Conclusion: Higher PEEP levels result in higher LV together with a decrease of the effective tidal-volume. 4D-CT allows a quantitative in-depth analysis of the effect of mechanical ventilation parameters over time. Based on the ratio of lung compartments the individual adjustments of ventilation setting can be done.

Cystic Lung Disease

EL-SHERIEF A, Wandtke J

Purpose: Lung cysts may be small or large, solitary or multiple; but their etiology can often be difficult to determine. Tips for differentiating between different types of cystic lung diseases will be shown.

Materials/Methods: Chest radiograph and CT findings of various cystic lung diseases will be included.

Results: Cysts are thin-walled, well-defined, circumscribed, air- or fluid containing lesions, 1 cm or more in diameter, which have an epithelial or fibrous wall. Lung cysts may be solitary or multiple, unilateral or bilateral. Lung cysts may be congenital, acquired, or a manifestation of diffuse lung disease. This exhibit will demonstrate the spectrum of cystic lung disease with selected examples.

Conclusions: Lung cysts can be found in many conditions but some patterns are diagnostic for specific lung diseases.

Multidetector CT (MDCT) for the Evaluation of Congenital Heart Disease in Adults.

PALACIO D, Hughes D, Jadhav S, Parada S, Cuellar J.

PURPOSE: To illustrate with a variety of examples the potential of MDCT in providing anatomical detail in adult patients with Congenital Heart Disease (CHD).

PRINCIPAL INFORMATION: CHD of moderate and severe degree occurs in about 6 per 1000 live births. New surgical procedures and advances in medical treatment of patients with CHD have made survival into adolescence and adult life more possible than ever before. Approximately 1.5 million adults with functionally significant congenital cardiac malformations have reached adulthood in the past four decades. The majority of these patients will have undergone corrective or more commonly palliative surgery during childhood that will require long-term surveillance. Whether reoperation is being planned or a non-cardiac related evaluation of the chest is being performed, the radiologist should be familiar with the post surgical and/or physiologic anatomic variations of the intrathoracic structures in this patient population. Ongoing development in MDCT techniques and software, availability of 3D evaluation, multiplanar reformatting, cine analysis and improved spatial resolution even compared to MRI, makes MDCT a valuable tool in the evaluation of adults with CHD. MDCT also provides critical information regarding adjacent structures including mediastinum, lungs and airways, commonly affected in these patients.

CONCLUSION: The role of MDCT in the evaluation of patients with CHD continues to expand, as new techniques and improved scanners become available. It is important for the radiologist to be familiar with variations of the intrathoracic anatomy, recognize potential complications related to physiologic or post surgical changes and provide accurate information in patients undergoing reoperation.

Differential Diagnosis of Delayed Contrast Enhancement of Myocardium in Cardiac MRI

SATINDER SINGH, Nagaraj Hosakote, Cecilia Corros-Vincente, Steve Llyod, Himanshu Gupta, Hrudaya Nath

Background: Delayed contrast enhancement of myocardium is not specific for evaluating sequelae of ischemic heart disease but can be seen in several other disorders such as infectious myocarditis, sarcoidosis, cardiomyopathy, vasculitis, arrhythmogenic right ventricular dysplasia, cardiac masses, blunt cardiac trauma and even pulmonary hypertension.

Purpose: Here we discuss the various etiological entities that manifest as delayed contrast enhancement on CMRI and their salient features to distinguish one from another.

Methods: All contrast enhanced CMRI done in the last 10 years at our institution will be reviewed.

Results: The salient features of various ischemic and non-ischemic causes of delayed CMRI will be discussed with special emphasis on distinguishing features.

Conclusion: Delayed myocardial enhancement cardiac MRI is not specific for assessing myocardial ischemia but can be seen in many other cardiac pathologic disorders. The pattern of enhancement along with careful clinical correlation is critical in making correct diagnosis for appropriate clinical management.

Imaging Of Pulmonary Hypertension in 21st Century

SATINDER SINGH, Hrudaya Nath, Steve Lloyd, Himanshu Gupta

Purpose: Imaging play important role in determining the etiology of pulmonary hypertension and its effect on heart, lung and pulmonary vessels. In this poster we will describe the new WHO classification of pulmonary hypertension (PHTN) and discuss the role of imaging.

Methods: The imaging features and indication of each modality (echocardiography, chest radiograph, computed tomography, ventilation-perfusion scan, pulmonary angiography, and magnetic resonance imaging) in five different categories of new PHTN classification will be discussed along with a brief description of underlying patho-physiology and current treatments available for PHT.

Results: Echocardiography remains the most common screening study in patients with unexplained dyspnea and is very useful for congenital cardiac disorders, left cardiac myocardial and valvular diseases. CTA is frequently used in evaluating chronic PTE and with gated cardiac CT studies one can evaluate the right ventricle function. MRI is best to evaluate right ventricle function. Both CTA and MRA can be used to follow patients on medical treatment for PHT. Pulmonary angiography is usually done in selected situations where there is equivocal findings on non-invasive imaging or if there is discrepancy between clinical scenario and imaging findings. V/Q scanning and pulmonary angiography both also are often done in many centers pre-operatively before thrombo-embolectomy.

Conclusion: Imaging plays a vital role in detecting the etiology of PHT, its effect on heart, lung and pulmonary arteries, and has a role in follow-up and guiding treatment.

PET/CT and Endoscopic Ultrasound (EUS) in Management of Esophageal Carcinoma: A Pictorial Review

ESHETU T, Shah SN, Mohammed TL

Along with upper endoscopy and conventional imaging, EUS and PET/CT are complementary modalities used in the initial evaluation and management of esophageal carcinoma. EUS is the modality of choice for evaluating the extent of loco-regional disease, while PET/CT plays a vital role in staging, monitoring therapy and disease surveillance.

The purpose of this exhibit is to review the disease process of esophageal carcinoma, illustrate the staging of esophageal carcinoma utilizing various modalities, and review the current utility of PET/CT and EUS in the management of esophageal carcinoma.

This exhibit is expected to foster interest in conducting prospective research in the use of PET/CT and molecular imaging in the management of esophageal carcinoma, including staging, following neo-adjuvant treatment, detecting recurrence, and assessing its impact on patient management and survival.

CT and Pathologic Correlation in Patients with NSIP

SHALIN AMIN, Carol Farver, Tan-Lucien H. Mohammed

Introduction: Nonspecific interstitial pneumonia (NSIP) is a less common interstitial pneumonia. It may be idiopathic or may be associated with collagen-vascular diseases, hypersensitivity pneumonitis, drug toxicity, infection or immunodeficiency. The histologic pattern and the idiopathic interstitial pneumonia are both called NSIP. There are two subtypes the cellular and fibrotic forms which have different survival rates. The histologic pattern is characterized by diffuse inflammation with or without fibrosis, without destruction of the underlying parenchyma (as seen in UIP). The fibrosis in NSIP is uniform in age with little or no honeycombing.

High resolution CT is a sensitive examination in the detection of lung abnormalities that can occur in NSIP. HRCT findings that are typical include a variable combination of ground-opacity, irregular reticular opacities, and patchy consolidation. In most cases, the disease predominates in the peripheral lower lobes. Honeycombing is uncommon and relatively inconspicuous compared to UIP.

Objective: The purpose of this study is to evaluate the HRCT findings in patients with histologically proven NSIP and correlate them to their pathologic findings.

Methods & Materials: Retrospective review of the pathologic database at our institution (Cleveland Clinic Foundation) was performed from January 1995 through June 2006. This query yielded 16 cases of pathologically proven NSIP. The age of patients included in this study ranged from 32 years old to 75 years old. Of the 16 cases, there were 1 men and 15 women.

Results: Of these 16 cases, the most common HRCT findings were areas of ground glass attenuation changes (14 of 16, 88%) and irregular reticulation (12 of 16, 75%). Two of the sixteen patients had patchy consolidation. One of the sixteen patients had honeycombing.

Conclusion: In this study, we correlated the HRCT findings with the histologic findings in 16 patients with pathologically proven cases of nonspecific interstitial pneumonia. The most common HRCT findings were areas of ground glass attenuation and irregular reticulation. Honeycombing as not a prominent feature.

Utility of CT in Evaluating Patients With Suspected Arrhythmogenic Right Ventricular Dysplasia (ARVD)

AQEEL A CHOWDHRY, Tan-Lucien H. Mohammed

INTRODUCTION: ARVD is a rare type of cardiomyopathy in which the myocardium of the right ventricle (RV) is replaced by fat and/or fibrous tissue. The RV becomes dilated and poorly contracts.

High resolution cardiac CT can be used to diagnose ARVD. HRCT findings typical for ARVD include an infiltrative process involving the RV, RV dilatation, ventricular dyskinesia, and abnormal enhancement on delayed images.

OBJECTIVE: Describe the role of HRCT and imaging findings in patients with known ARVD.

METHOD AND MATERIALS: 15 consecutive patients with known ARVD were studied. Two blinded, independent readers evaluated the cases, one cardiologist and one cardiac fellow. 14 CT criteria were used.

RESULTS: Of the patients studied abnormalities detected by one or both readers on HRCT are as follows: intramyocardial fat 14/15 (93%), RV aneurysm 11/15 (73%), RV dilatation 10/15 (67%), RV wall thinning 9/15 (60%), RV dysfunction 7/15 (47%), RV hypokinesis 6/15 (40%), major RV dyskinesia 5/15 (33%), mildly reduced RV ejection fraction (EF) 5/15 (33%), abundant epicardial fat 5/15 (33%), low attenuation trabeculations 3/15 (20%), severely reduced RVEF 2/15 (13%), LV fat infiltration 2/15 (13%), LV wall thickening 1/15 (7%), and LV scalloping 1/15 (7%).

Discrepancy between readers was common when evaluating RV thinning 5/15 (33%), intramyocardial fat 5/15 (33%), RV aneurysm 4/15 (27%). There was complete agreement when evaluating low attenuation trabeculations, LV fat infiltration, and LV scalloping.

CONCLUSIONS: The most common findings on HRCT for ARVD are the presence of intramyocardial fat, RV aneurysm, RV dilatation, and RV wall thinning. Of these, our readers showed the least amount of discrepancy while evaluating for RV wall dilatation (20%) and RV aneurysm (27%).

Low-Dose Computed Tomography as a Screening Tool Post Prior Asbestos Exposure For Early Lung Cancer and Mesothelioma

DEMETRIS PATSIOS, Hamid Bayanati, George Dong, Narinder Paul, Michael Johnston, Heidi Roberts

Aim: To screen asbestos workers for lung cancer and mesothelioma using low-dose computed tomography (LDCT).

Methods: Enroll subjects with asbestos exposure of at least 20 years and/or documented pleural plaques. LDCT is performed (40-60 mA, 120 kV, 1.25mm). We record: nodules, pleural plaques (extent, location, shape, thickness and calcification). Nodules are followed as per I-ELCAP protocols; lobulated or asymmetric plaques, or plaques associated with pleural fluid are followed in 3-6 months. Interstitial lung patterns are noted: inter/intralobular septal thickening, ground glass opacities, honeycombing, architectural distortion, subpleural curvilinear lines, parenchymal bands, round atelectasis. In each lobe, each pattern is scored as 0(absence), 1(1 cm from the pleura), 2(within 2 cm from the pleura) and 3(>2 cm from the pleura).

Results: 300 subjects screened so far, average age 62. 166(55.3%) are former, 72(24.0%) current and 62(20.7%) never smokers. Four lung cancers and one advanced mesothelioma were detected (1.7%). 77% had pleural plaques: calcified (>80%), flat (>84%), and symmetric (>90%), involving the costal (>97%) and diaphragmatic (>88%) pleura. Abnormal plaques have a lobulated, asymmetric appearance with right-sided dominance, are associated with pleural effusions and are currently under surveillance. Qualitative scoring of non specific interstitial changes is possible on LDCT: 35% demonstrated features of parenchymal lung disease with scores ranging from 1-25/120.

Conclusion: Screening prior asbestos workers can result in the early detection of lung cancer. For the detection of early mesothelioma we defined the appearance of normal vs. abnormal pleural plaques. The description of diffuse interstitial findings is an additional benefit of this screening program.

Eponyms in Thoracic Radiology

JP KANNE, J David Godwin

In medicine, an eponym is a name of a disease, structure, or drug, based on or derived from the name of a person. Eponyms are frequently encountered throughout radiology, including in the chest, and knowledge of these terms is important for proper reporting and communication. Although eponyms are a means to honor a person's contribution to medicine, the use of an eponym often fails to convey a precise meaning or definition, and could potentially lead to miscommunication. Furthermore, not only may more than one person contribute to the discovery or description of a structure or disease, but also an eponym may be applied incorrectly and this error propagated by years of misuse in the medical literature. The purpose of this educational exhibit is to review many of the eponyms encountered in thoracic radiology, briefly illustrate the radiologic manifestations, and explore the historical background of the person or persons whom the eponym honors.