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Non Obstructive Coronary Artery Disease upon Computed Tomography in Patients with Acute Chest Pain

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Background: Multi-detector computerized tomography (MDCT) has emerged as an efficient tool for detection of significant coronary disease and assessment of patients with acute chest pain. MDCT may detect premature, non-obstructive atherosclerotic lesions which otherwise would have not been detected upon functional cardiac imaging tests. There is scarce data regarding the clinical significance of these lesions. In this study we prospectively analyzed the long term outcome of patients admitted to our chest pain unit (CPU) with findings of non obstructive coronary artery disease (CAD) in MDCT.

Methods: The study comprised 959 patients without known CAD admitted to the CPU and evaluated by MDCT for complaints of acute chest pain. Studies were classified as: normal; Non obstructive CAD (defined as any narrowing < 50% diameter stenosis); obstructive CAD (defined as narrowing of ≥ 50% diameter stenosis) and non interpretable. Patients were followed up for a minimum of 1 year. We compared the outcome of patients with non-obstructive CAD and those with normal coronaries upon MDCT with regard to MACE (death, re-ACS, and revascularization).

Results: Comparing patients with non-obstructive CAD (n=312) vs. patients with normal coronaries (n=545) upon MDCT, the aforementioned were older, more likely to be male, dyslipidemic and hypertensive. During a median follow up of 2.2 (±1.04) years MACE was low and not different between the 2 groups (4.2% vs. 2.1% p=0.09) rates of death, repeated ACS, and need for revascularization were also equally low between the 2 groups.

Conclusions: Patients presenting with acute chest pain and found to have non-obstructive CAD upon MDCT have a benign clinical outcome as those with normal findings upon MDCT.

FDG-PET-CT in Early Detection of Cardiac and Extra-Cardiac Complications of Infective Endocarditis

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Background: The exact incidence of extra-cardiac complications (ECC) in patients with infective endocarditis is unknown but presumed to be high. These patients, although mostly asymptomatic, may require a different therapeutic approach. Different imaging modalities are being used for the diagnosis of ECC, but none of them can provide a complete diagnostic image. FDG-positron emission tomography- CT (FDG-PET-CT) has been used in diagnosis of endocarditis, pacemaker related endocarditis and other endovascular infections, but its role in the early diagnosis of ECC still unknown. Aim: To prospectively evaluate the yield of FDG-PET-CT in early diagnosis of ECC in infective endocarditis.
Methods: A prospective cohort study. Patients with diagnosis of definite infective endocarditis (according to modified Duke's criteria) were included and underwent FDG-PET-CT study within 7 days from it's diagnosis.
Results: 16 patients (9 men, age range 22-84), were included in our preliminary data. 6 patients had prosthetic valves (one TAVI) and 4 had an implantable device (ICD, CRT, and pacemaker). FDG-PET-CT demonstrated ECC in 7 (43.7/%) patients and included among others: osteomyelitis, lung infection, psoas abscess and line infection. Out of 14 cases with typical echographic endocarditis findings (including perivalvular abscess), only 2 cases (12.5%) were demonstrated by FDG-PET-CT. Treatment plan was altered according to the FDG-PET-CT findings in 6 (37.5%) patients (surgical procedures and prolongation of antibiotic therapy).
Conclusions: According to these preliminary results, FDG-PET-CT may be a useful diagnostic tool for early detection of ECC of infective endocarditis and limiting unnecessary studies and procedures. Interestingly, FDG-PET-CT shows low diagnostic yield for valvular endocarditis including perivalvular abscess.

3D Geometric Relationship between the Mitral Annulus and the Coronaries from a Surgeon's Perspective

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Background: Mitral annuloplasty involves sewing a rigid ring to support the mitral annulus. This involves a risk of damaging the surrounding structures in the left atrioventricular (AV) groove, especially the left circumflex artery (LCx) which may be inadvertently sutured, causing a coronary occlusion. We aimed to use cardiac CT scans to study the 3D relationship between the mitral valve annulus (MVA) and the neighbouring coronary arteries in the AV groove and to map the distance between the arteries and the circumference of the MVA.

Methods: We examined cardiac CT exams of two patient groups: 40 normal subjects (Group 1) and 20 patients with left ventricular dysfunction and/or mitral regurgitation (Group 2). The mitral annulus as well as the nearby coronaries were manually marked on a CT workstation and 3D coordinates saved in digital format. Dedicated software was developed to calculate the plane of the MVA and the smallest distance between each point on the mitral annulus and each of the LCx and right coronary arteries (RCA), called local minima. The global minimum for each heart is defined as the minimum of all local minima.

Results: The global minimum for the LCx averaged 6.2±1.9mm usually occurring in the proximal LCx, just laterally to the left trigone; 30% of patients had a global minimum of less than 5mm. The latter was more common in patients with left dominance and in group 1 subjects. The major component of the line vector is in-planar while the through plane component is usually in an atrial direction. For the RCA the global minimum distance to the MVA is 14.3±5.6mm, occurring at an angle of 92±47 degrees from the right trigone. No RCA approaches closer than 5mm with respect to the MVA, however 18% were closer than 10mm.

In conclusion, a significant percentage of LCx are situated in very close proximity to the MVA. Knowledge of the precise 3D relations between the structures would be expected to minimize iatrogenic complications.

Dobutamine Magnetic Resonance Stress Testing: Initial Experience in Israel

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Background: Over the past years, dobutamine stress magnetic resonance (DSMR) has proven its efficacy as an integrated part of the diagnostic armamentarium in cardiology; however, the use of DSMR has just been started in Israel. Therefore, we sought to present our initial experience.
Methods: Twenty three patients (54 ± 15.5, range) with suspected or known coronary artery disease (CAD) were referred for DSMR. Cine images were acquired in 3 short- and 3 long-axis views. Patients were examined at rest and during a standard dobutamine-atropine protocol (10 mg increments every 3 minutes up to 40 mg dobutamine/kg body weight/minute plus atropine if required to reach the target heart rate). The examination was terminated if new or worsening wall-motion abnormalities or chest pain occurred or when > 85% of age-predicted maximum heart rate was reached. Image quality and wall-motion at rest and maximum stress level were evaluated using a four-point scale for the visibility of the endocardial border (score: 1 = barely or not visible; 2 = moderately or partly visible; 3 = well visible; and 4 = excellently visible).
Results: Diagnostic DSMR studies were completed in all patients in an average of 53 ± 7 minutes. The clinical indications for the study were: Assessment of cardiac ischemia (18 patients), viability (1 patient), and perioperative evaluation of non-cardiac surgery (4 patients). No patients experienced myocardial infarction, ventricular fibrillation/tachycardia, or death. Target heart rate had been reached in 96% of the patients. The segmental intra-observer agreement for wall motion assessment was nearly perfect (k = 0.80; p < 0.0001) and the average image quality was excellent without difference of the rest versus maximal stress cine images (3.8 ± 0.38 vs. 3.7 ± 0.40, p = 0.125; respectively).
Conclusion: Our initial clinical experience demonstrated the clinical application and safety of DSMR in Israel.

Assessment of Aortic Stiffness by CMR Imaging in Systemic Autoimmune Rheumatic Diseases

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Background: Systemic Lupus Erythematosus (SLE) and rheumatoid arthritis (RA) are known to cause premature arterial aging and early atherosclerosis hence leading to increased stiffness of the large arteries. Recently, CMRI was introduced as a new technique for assessment of aortic stiffness by measuring the Pulse Wave Velocity (PWV). Therefore, we aimed to assess aortic stiffness by CMRI in RA and SLE patients.

Methods: We prospectively recruited 14 SLE female patients, 14 RA female patients and a control group of 19 matching healthy female volunteers. Clinical and laboratory data were gathered. CMRI was performed using a 1.5T scanner and included phase contrast images of the ascending and the descending aorta. A dedicated cardiovascular analysis software was used the measure the flow at the level of the ascending and the descending aorta. The distance between these 2 levels was obtained and PWV was calculated accordingly.

Results: The mean age was 54 ± 15, 39 ± 12 and 43 ± 14 for the RA, SLE and the control group respectively, $p<0.05$. There was no difference in the rates of HTN, dyslipdemia, and smoking. DM was more frequent in the RA patients vs. SLE patients and controls, 29% vs. 4% and 9%, respectively, $p<0.05$. The mean systolic BP (mmHg) was 133 ± 18, 117 ± 19 and 114 ± 15 and the PWV was 9.3 ± 5, 7.1 ± 3 and 6.8 ± 4, $p<0.05$ and $p=0.07$, respectively. The median PWV was 6.3 m/s. In a regression analysis only age and systolic BP were positively associated with PWV. A multivariate analysis also demonstrated that age is associated with higher than the median (>6 m/s) PWV, OR 1.2 per 1 year. RA and SLE, each, only showed a trend toward association with higher than the median PWV but did not reach statistical significance.

Conclusions: Our initial results are in concordance with previous data that showed a positive association between age and systolic BP to PWV. Further analysis is needed to ascertain whether elevated PWV is also associated with autoimmune disease.

Myocardial Perfusion Imaging with Radiation Dose Reduction by Half in Obese Patients

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Purpose: On 2011 we have reported that myocardial perfusion imaging (MPI) with radiation dose reduction by half is feasible with preserved image quality in patients up to 100 Kg. The aim of this study is to assess the feasibility of performing MPI with radiation dose reduction in obese population.
Methods: The study was done on obese patients weighting 100Kg and above who were referred for gated SPECT MPI. The study protocol was done by "half of the standard doses of Tc 99m sestsmibi in one day protocol instead of the standard 2 days protocol used in obese patients. Prone imaging was utilized for attenuation correction. The images were processed by "revolution for cardiac" software. The radiation doses of technetium 99m were adjusted for each patient weight, and recorded by mCi ,Becquerel's units and effective dose equivalent by milisieverts (mSv). The study was approved by local Helsinki committee, each patient signed on inform consent. The results were compared to a matched group
Results: In the half dose protocol, 42 obese patients, mean weight 116 ± 11 Kg, and BMI 38 ± 4 Kg/m2 compared to a matched group (by gender, weight, CAD) of 82 patients in the standard2 days protocol. The mean radiation doses in patients with half dose protocol were 33.4 ± 13.9 mCi compared to 60 ± 10 in 2 days protocol (p<0.001). Total effective dose for stress rest study was 10.1 ± 4 mSv in half dose protocol compared to 21 mSv in the standard dose protocol (p<0.001). All patients showed good image quality. Eighteen (43%) patients with half dose protocol underwent stress only study and were exposed 4.6 ± 1.3 mSv only.
Conclusions: MPI with radiation dose reduction by half in obese patients is feasible with preserved image quality. This protocol enables converting the standard 2 days protocol for obese patients to one day protocol, while further decreasing radiation doe activity.