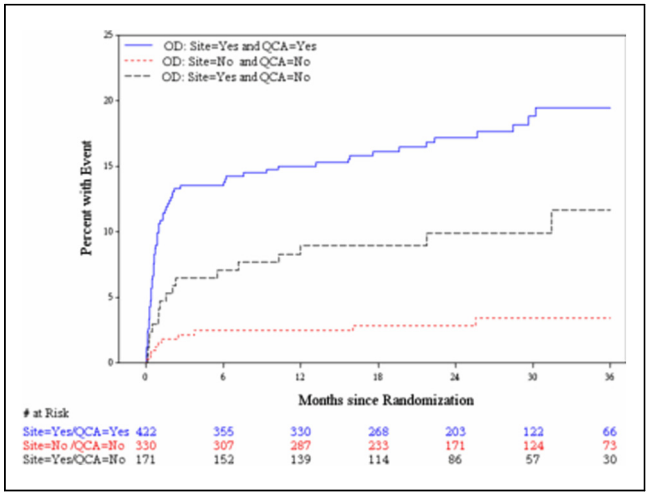
patients who underwent invasive coronary catheterization. Independent, blinded QCA analysis was performed to determine presence of obstructive disease, defined by ≥50% stenosis in 1 or more coronary vessels. The rate of disagreement was determined and cardiovascular event rates were compared between groups.

RESULTS A total of 929 (9.3%) patients had coronary angiograms with corresponding site reports; 593 patients had obstructive disease per site assessment, while 428 had obstructive disease per QCA (Table). The site read and QCA were different in 177 patients (disagreement rate 19.1%, simple κ=0.63) of whom 171 had obstructive disease per site read but not by QCA. One-year event rates were highest (15%) when QCA and site assessment agreed for obstructive disease, lowest (2.4%) when QCA and site agreed for no obstructive disease, and intermediate (7.1%) when disagreement existed between QCA and site reads (Figure).

	CAD > 50%			1 Year K-M Event Rate		
	QCA +	QCA -	TOTALS	QCA +	QCA -	TOTALS
Site +	422	171	593	15.0%	7.1%	13.2%
Site -	6	330	336	NA*	2.4%	2.4%
TOTALS	428	501	929	14.8%	4.7%	8.3%

*Given the low number of patients with Site – and QCA + (6), no Kaplan-Meier rates were reported or graphed.



CONCLUSIONS Routine visual estimation of angiograms overestimates obstructive disease compared to QCA. Site and QCA agreement on CAD >50% or <50% was associated with high and low event rates, respectively; disagreement was associated with intermediate rates. These findings suggest that opportunities exist to improve the assessment of coronary angiography.

CATEGORIES CORONARY: Angiography and QCA

KEYWORDS Angiography, Coronary artery disease, Quantitative coronary angiography

TCT-285

Radiation dose reduction in the cardiac catheterization laboratory utilising a novel protocol

Jurado-Roman Alfonso,[1] Ignacio Sanchez-Perez,[2] Fernando Lozano,[2] Maria T. Lopez-Lluva,[3] Andrea Moreno-Arciniegas,[4] Natalia Pinilla-Echeverri,[5] Pilar Agudo-Quilez[6]
[1]University General Hospital of Ciudad Real, Ciudad Real, Spain; [2]Hospital General Universitario de Ciudad Real, Ciudad Real, Castilla-La Mancha; [3]Hospital General Universitario de Ciudad Real. Servicio de Hemodinámica, Ciudad Real, Castilla la Mancha; [4]Hospital General Universitario de Ciudad Real, Ciudad Real, Castilla La Mancha; [5]McMaster University, Hamilton, Ontario; [6]Hosipital Infanta Leonor, Madrid, Spain

BACKGROUND The cardiac catheterization laboratory is an important source of radiation. A reduction in radiation doses as low as possible, maintaining the quality of procedures is essential. Our aim was to analyze the results of a novel radiation reduction protocol (RRP) system for coronary angiography and interventional procedures and the determinants of radiation dose.

METHODS 1130 consecutive procedures from a single catheterization laboratory [diagnostic coronary angiographies (CA) and percutaneous coronary interventions (PCI)] were analyzed. 539 were performed before RRP and 591 after it. RRP implementation consisted in reducing the number of ventriculographies and aortographies for cases with a clear indication, reducing number of cine runs, and using as much as possible low resolution fluoroscopy and last fluoroscopy hold (a software program that enables dynamic storage of last fluoroscopy sequences).

RESULTS 69.4% were male with a mean age of 66.8 ± 12.6 years. There were no significant differences in clinical baseline features nor in the percentage of PCIs performed during the 2 periods (54.9% vs 52.6%; p=0.5). They had a similar complexity: syntax score (18.1 ± 12.2 vs 18.8 ± 14; p=0.7); acute coronary syndromes (45.8% vs 44.4%; p=0.7); bifurcations (26.4% vs 29.8%; p=0.13)] apart from a higher proportion of total chronic occlusions performed after the RRP implementation (8.6% vs 13.3%;p= 0.01). The angiographic success was similar in both periods (98.3% vs 99.2%; p= 0.6). After the implementation of RRP, there were no significant differences in median fluoroscopy time (12.7 vs 13.6 min; p=0.1) and duration of procedures (25.5 vs 30.4 min; p=0.14). A significant reduction of the percentage of procedures with ventriculography (83.6% vs 12.3%; p<0.0001) or aortography (17.7% vs 6.1%; p<0.0001) was observed, as well as a significant reduction in cine runs (21.1 vs 7.1; p<0.0001) and dose-area product (DAP) (156 vs 71 Gyxcm2; p<0.0001).

CONCLUSIONS With the implementation of a RRP, a highly significant 54.5% reduction of DAP was observed without a reduction in the quality or the complexity of procedures. A RRP should be strongly considered among interventional cardiology practice.

CATEGORIES CORONARY: Complications

TCT-286

Strategy to reduce radiation dose in cardiac catheterization laboratory-a phantom based study

Divyesh Sharma,[1] Ashish Shah,[2] Ali Ursani,[2] Alan Barolet,[3] Peter H. Seidelin[3]
[1]Toronto General Hospital, Toronto, Ontario; [2]Toronto General Hospital, Toronto, ON; [3]Peter Munk Cardiac Centre, University Health Network, Toronto General Hospital, Toronto, ON

BACKGROUND Utilizing lower frame rates (fluoroscopy) is generally considered to reduce the radiation to the patient. However, there is little data on the impact of using lower pulse rate (cine) on total radiation dose. In a phantom-model study, we sought to assess the impact of lower frame/pulse rate and change in intensifier angulation on radiation dose to the patient.

METHODS A commercially available adult thoracic anthropomorphic phantom (Lungman®, Kyoto Kakagu, Kyoto, Japan) was used to determine the dose to various organs as shown in Figure 1. Standard angulations (6 views with 300 and 6 views with 40 0) using cine acquisitions (10 seconds for each acquisition) and similarly fluoroscopy using 30 0 angulations (20 seconds for each run) were chosen to expose the phantom. A sheet (12" x 8") of radiochromic dosimetry film (Gafchromic® XR-QA) was used to determine the position of maximum skin exposure. Strips (1" x 2") of radiochromic films attached to phantom at positions 1 to 6 (Figure 1). The radiochromic strips were changed after every complete cine or fluoroscopy run (with 6 acquisitions in each run). Dose was estimated from the radiochromic strips using dose/intensity calibration curves. Dose-Area product was measured from the X-ray equipment system (using an in-built ionization chamber placed in the X-ray tube assembly) for all patients.

RESULTS Fluoroscopy data: Dose-area product (DAP) was significantly lower in the low frame rate groups (7.5 frames / sec (FPS)) compared to standard practice of 15 FPS (294 vs 500 cGy.cm2). Cine angiography data: DAP was lower in the low pulse rate group (10 pulse/sec) compared to standard pulse rate cine angiography (15 pulse/sec) (1185 vs. 2111 cGy.cm2). Radiation dose was lower in low pulse group as compared to standard group (25.3 vs 16.3 mGy in Cine angiography and 3.3 vs 5.4 mGy in fluoroscopy). Similar reduction in estimated radiation doses were noted at all the sites as shown in Figure 1. We also found that steep angulation (40o) also contributed to a significant increase in radiation dose in comparison to 30o angulations across all groups (low BMI: 1522 vs. 1299; normal BMI: 3289 vs. 2111; and large BMI: 4506 vs. 2852 cGy.cm2).

CONCLUSIONS Lowering frame/pulse rate resulted in radiation dose reduction in our phantom study. Such changes should be implemented in routine catheter laboratory practice.

CATEGORIES CORONARY: Angiography and QCA

KEYWORDS Frame count, Radiation dose

FFR AND PHYSIOLOGIC LESION ASSESSMENT

Tuesday, October, 13, 2015, 4:00 PM-6:00 PM

Abstract nos: 287 - 312

TCT-287

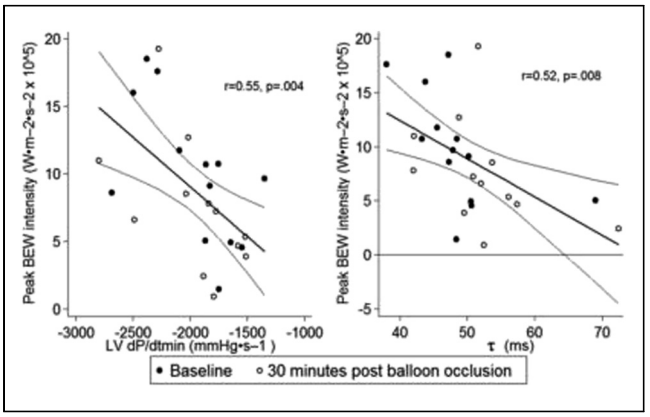
The diastolic backwards-travelling decompression "suction" wave correlates with simultaneously acquired indices of diastolic function: corroboration of the origin of the suction wave

Andrew Ladwiniec,[1] Paul A. White,[2] Sukhjinder S. Nijjer,[3] Michael O'Sullivan,[1] Nick E. West,[1] Justin E. Davies,[4] Stephen P. Hoole[1]
[1]Papworth Hospital, Cambridge, United Kingdom; [2]Cambridge University Hospitals NHS Foundation Trust, Cambridge, United Kingdom; [3]Imperial College London, London, London; [4]Imperial College London, London, United Kingdom

BACKGROUND Wave intensity analysis can distinguish proximal and distal influences upon coronary blood flow and underpins the concept of the wave-free period. The predominant driver of coronary flow is thought to be the backwards expansion wave (BEW) (or suction wave), generated by myocardial microcirculatory decompression in early diastole. Simultaneous analysis with left ventricular (LV) pressure-volume (P-V) loop data in man has not been previously reported. We investigated the relationship between coronary wave intensity and simultaneous LV hemodynamics to confirm if there was a relationship between the BEW and LV diastolic function measured invasively.

METHODS Thirteen male subjects with single-vessel, type A coronary disease, and normal ventricular function had simultaneously measured LV P-V loops recorded with a conductance catheter as well as coronary pressure and flow velocity using a dual sensor tipped coronary guide-wire to derive coronary wave intensities (ComboWire, Volcano Corporation, San Diego, California). Simultaneous measurements were recorded at baseline (n=13) and at 30 minutes (n=12) after a 1 minute balloon occlusion. Systolic LV function was assessed by maximum rate of pressure generation: LV dP/dtmax; diastolic function was assessed by maximum rate of pressure decline: LV dP/dtmin and the time constant of LV isovolumic relaxation: τ.

RESULTS Peak BEW intensity correlated with greater indices of diastolic LV function: LV dP/dtmin (r=0.55, p=.004) and τ (r=0.52, p=.008) (Figure 1); but not with systolic function. In those patients with paired measurements, LV dP/dtmax decreased from 1437±164 to 1299±153 mmHg·s-1 (difference -137.7(-28.3 to -247.0, p=.02)) and τ increased from 48.3 to 52.4 ms (difference 4.1(1.3 to 6.9, p=.01)) indicating LV stunning post balloon occlusion. The peak BEW intensity also decreased from 10.0±5.4 W·m-2·s-2 x 105 to 7.5±5.0 W·m-2·s-2 x 105 (difference -2.4 x 105(-4.7 x 105 to -0.02 x 105, p=.04) at 30 minutes post balloon occlusion.



CONCLUSIONS The magnitude of the BEW assessed by coronary wave intensity analysis is related to invasively derived indices of LV diastolic function and is influenced by temporal changes in LV lusitropy, confirming a link between the coronary BEW and LV diastolic function. This raises the hypothesis that impaired diastolic function will impair coronary flow.

CATEGORIES IMAGING: FFR and Physiologic Lesion Assessment

KEYWORDS Coronary flow, Coronary Physiology, Left ventricular function

TCT-288

Invasive Coronary Microcirculacion Assessment In Aortic Stenosis: Index Of Microvascular Resistance

Alejandro Gutierrez-Barrios,[1] Dolores Ruiz-Fernandez,[2] Sergio Gamaza-Chulián,[2] Antonio Agarrado,[1] Jesus Oneto,[1] Javier Benezet[1]
[1]Hospital Universitario de Jerez, Jerez de la Frontera, Cadiz; [2]Hospital Universitario de Jerez, Jerez de la Frontera, Cádiz

BACKGROUND Recent studies have demonstrated the importance of the coronary microvasculature in various clinical settings. Patients with aortic stenosis (AS), can develop a microcirculatory dysfunction (MD). However the MD in AS has never been invasively assessed. The index of microcirculatory resistance (IMR) enables investigation of the coronary microvasculature directly with high reproducibility and reliability. The aim of the study was to invasively determine the IMR in AS patients.

METHODS 35 patients with severe AS, who were referred for cardiac catheterization were enrolled in this prospective study. Patients with severe aortic regurgitation or mitral valve disease were excluded. A pressure sensor/thermistor-tipped guidewire was used and IMR was calculated from the ratio of the mean distal coronary pressure at maximal hyperemia to the inverse of mean hyperemic transit time. In arteries with fractional flow reserve (FFR) <0.75, IMR was corrected for coronary wedge pressure using the method proposed by Yong et al. IMR and other physiological measurements were performed in the left anterior descending (LAD) artery. Maximal hyperemia was induced by adenosine perfusion (140mcg/kg/min).