25 TAVI OPERATOR RADIATION DOSE COMPARED TO PCI AND ICD OPERATORS: DO WE NEED ADDITIONAL RADIATION PROTECTION FOR TRANS-CATHETER STRUCTURAL HEART INTERVENTIONS

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Introduction Trans-catheter cardiac aortic valve implantation (TAVI), implantable cardiac defibrillators (ICD), and percutaneous coronary intervention (PCI), are common procedures associated with radiation exposure to the operator and the patient. Radiation dose exposure is cumulative and if above the recommended annual levels may have significant consequences for the operator. The radiation dose TAVI operators are exposed to is not widely known, but it is an important consideration in view of the increasing volume of procedures and the potential risks of over-exposure. Our aim was to monitor and compare, radiation exposure time, dose, and individual operator dose, in TAVI, PCI and ICD.

Method Ten TAVIs were performed, 6 via the trans-femoral route and 4 via the subclavian approach. Radiation protection was employed in all cases using standard lead skirts and screens. During each procedure the radiation dose exposure was monitored for each operator using ThermoLuscent Dosemeters (TLD) on the left finger (LF), right finger (RF) and forehead. The six TAVI procedures performed via the transfemoral approach used only two operators, while the subclavian approach involved three operators. The third operator was a surgeon who was nearest to the x-ray images. Radiation exposure doses were also collected from ICD and PCI operators during the same period, using the same type of TLDs on LF and RF. Operator specific radiation doses were obtained from a central RRPPS Approved Dosimetry Service. PCI was considered a standard trans-catheter procedure. TAVI and ICD operator doses were compared to the mean standardised PCI operator dose.

Results The mean exposure times and doses for the different types of trans-catheter procedures performed are detailed in the tables below. Despite the use of standard radiation protection measures, the mean dose to operators undertaking TAVI was 6 times higher than the trans-femoral PCI operator (p=0.008). The mean radiation exposure time of TAVI was seven times more than PCI. Although subclavian TAVI and ICD procedures were expected to be comparable with respect to operator dose, subclavian TAVI operators have an unexpectedly higher dose (p=0.03).

Conclusions Overall TAVI operators are exposed to significantly higher radiation doses compared to PCI and ICD operators. Additional radiation protection for TAVI operators is strongly advocated. We are currently evaluating the impact of using a RADPAD as additional protection during TAVI procedures.

Abstract 25 Table 1

Variable	TAVI	ICD	PCI	p Value
Mean exposure Time (mins)	27.0*	3.26	3.825	<0.001*
Mean exposure Dose (Gy/cmq) ± SD	196.25±150.96†	11.03±9.01	33.09±11.5	0.008†

*Significantly increased radiation exposure time in TAVI procedures compared to ICD and PCI.
†Significantly increased radiation exposure dose in TAVI procedures compared to ICD and PCI.

Abstract 25 Table 2

	Mean radiation dose (Gy/cmq) per operator	±SD	p value
Trans-femoral TAVI	1.67	1.23	0.03
Subclavian TAVI	2.53	3.09	0.03
ICD	1.95	0.14	0.03
PCI	0.18		0.36

26 THE EFFECTS OF PRE-EXISTING SIGNIFICANT CORONARY ARTERY DISEASE UPON OUTCOME AFTER TRANSCATHETER AORTIC VALVE IMPLANTATION USING THE EDWARDS BIOPROSTHESIS

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Introduction Patients undergoing surgical aortic valve replacement (sAVR) routinely undergo simultaneous coronary artery bypass grafting (CABG) for significant coronary artery disease (CAD) due to adverse prognostic impact. While manufacturers advise percutaneous intervention (PCI) of significant CAD prior to transcatheter aortic valve implantation (TAVI) there is considerable variation among operators.

Methods We performed a retrospective analysis of 168 patients who underwent TAVI using the Edwards bioprosthesis from March 2008 to October 2010 at St. Thomas Hospital, London. They were divided into two groups according to the results of the pre-TAVI coronary angiogram: (Group 1) patients with ≥1 coronary stenosis of ≥70% severity and those without (Group 2). The end-point was all-cause mortality.

Results In total, 70 patients (41.7%) had significant CAD prior to TAVI, with 10 (6.0%) undergoing PCI prior to their procedure. There were no significant differences in either the baseline characteristics or access approach between the two groups (Abstract 26 tables 1 and 2). At a mean follow-up of 335±277 days (mean±SD), the overall mortality was 22.6%; Group 1 mortality was 30% and in group 2 was 17.3% (p=0.124) (see Abstract 26 figure 1) There was no difference seen in the length of stay in the intensive care unit (2.7±6.2 vs 4.1±14.9 days, p=0.462) nor in the number of days to discharge (12.6±10.1 vs 12.8±13, p=0.928). Among those patients who underwent PCI in Group 1, 8 had single vessel intervention and 2 had PCI to 2 vessels. The target vessels were left main stem (LMS) (n=2), proximal left anterior descending artery (LAD) (n=5), circumflex (n=1), right coronary artery (RCA) (n=2), saphenous vein graft (SVG) to LAD (n=1) and SVG to circumflex (n=1). Mortality in this sub-group was not significantly different from the CAD patients who did not receive PCI (50% vs 26.7%, p=0.272).

Abstract 26 Table 1

	Group 1 Significant CAD (n=70)	Group 2 No significant CAD (n=98)	p Value
Age (years±SD)	83.7±7.5	81.7±8.5	0.112
Diabetes Mellitus	16 (22.9)	27 (27.6%)	0.492
Cerebrovascular disease	11 (15.7%)	17 (17.3%)	0.780
Peripheral vascular disease	15 (21.4%)	12 (12.2%)	0.110
Glomerular filtration rate	48.4±27.9	46.8±23.1	0.685
Logistic Euroscore (%±SD)	23.5±12.9	21.5±16.2	0.399
LV ejection fraction (%±SD)	48.8±11.3	47.9±12.4	0.658
Aortic valve area (cm²±SD)	0.63±0.20	0.67±0.22	0.219
Previous CABG	18 (25.7%)	27 (27.6%)	0.791
Previous PCI	16 (22.9%)	12 (12.2%)	0.070

Abstract 26 Table 2

	Group 1 Significant CAD (n=70)	Group 2 No significant CAD (n=98)	p value
Transfemoral	44 (44.9%)	29 (41.4%)	0.778
Transapical	47 (48.0%)	37 (52.9%)	
Transaortic	7 (7.1%)	4 (5.7%)	

Conclusion The presence of significant CAD had no significant impact upon the all-cause mortality of patients after TAVI in our
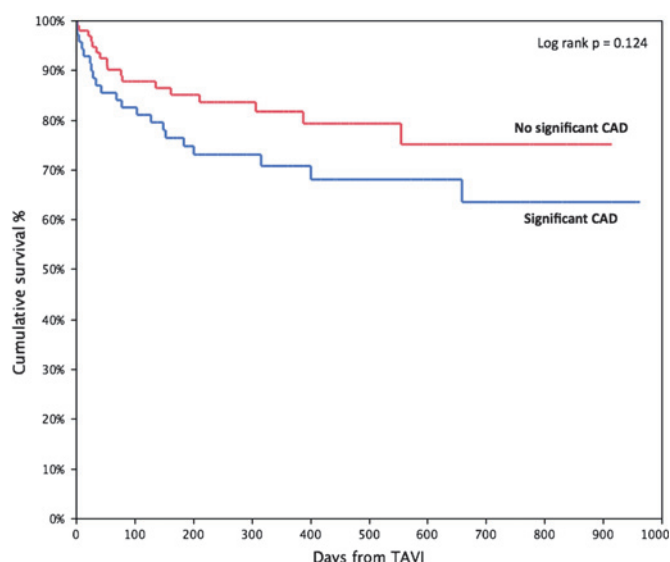
Abstract 26 Figure 1

study. As yet, the impact of PCI to significant CAD upon outcome after TAVI is not known and will be assessed in a prospective, randomised controlled trial currently underway.

27 | PLATELET MONOCYTE AGGREGATES ARE DETERMINANTS OF MICROVASCULAR DYSFUNCTION DURING PERCUTANEOUS CORONARY INTERVENTION FOR STABLE ANGINA AND NON-ST SEGMENT ELEVATION MYOCARDIAL INFARCTION

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Background Microvascular dysfunction is associated with adverse outcome in patients with acute coronary syndrome (ACS). During ACS platelet and monocyte derived chemokines, in conjunction with adhesion molecule expression, promote the inflammatory process. Activated platelets express p-selectin which binds to the p-selectin glycoprotein ligand on the monocyte forming platelet monocyte aggregates (PMA). PMA expression is a sensitive marker of platelet activation and inflammation. Although platelet mono-cyte interaction is a normal physiological process, in the presence of platelet activation, activated (CD62+ PMA) may be directly involved in the pathophysiology of intracoronary inflammation and microvascular dysfunction in ACS.

Aim To investigate the relationship between microvascular dysfunction and PMA expression in patients with stable angina and non-ST elevation myocardial infarction (NSTEMI).

Methods Six patients with stable angina undergoing elective PCI and six patients with NSTEMI undergoing non-elective PCI were recruited. Microvascular dysfunction was assessed by measuring the coronary wedge pressure (CwP) and the index of Microvascular resistance (IMR) using a single pressure-temperature sensor-tipped coronary wire from the simultaneous measurement of distal coronary pressure and ther-modilution derived mean transit time (Tmn) of a bolus of saline injected at room temperature into the coronary artery during maximum hyperaemia. Blood samples were taken from the coronary artery (distal to the culprit lesion), aorta and the right atrium for PMA estimation. PMAs were assessed using fluorescent monoclonal anti-bodies and flow cytometry. Total PMAs were calculated and expressed as a percentage of the total monocyte count. Activated CD62+ PMAs were expressed as a percentage of total PMAs.

Results As expected CwP was higher in patients with NSTEMI (46.5 (SD) 18.8) compared with the stable angina patients (Mean (SD) 21.1 (9.3) p=0.01). IMR was also higher in patients with NSTEMI (Mean (SD) 27.6 (12.6)) compared with patients with stable angina (Mean (SD) 20.7 (5.4) p=0.2). Total PMAs were non-significantly higher in patients with NSTEMI (Mean (SD) 14 (4.8)) compared with stable angina (Mean (SD) 10.9 (4.3) p=0.07). CD62+ PMAs were significantly higher in patients with NSTEMI (Mean (SD) 26.9 (12.2)) compared with stable angina (Mean (SD) 13.7 (5.1) p=0.02) Abstract 27 figure 1. CwP correlated positively with total PMA (p=0.01) in NSTEMI but not in stable angina patients. However, IMR correlated positively with total PMAs in both stable angina (p=0.02) and NSTEMI (p=0.08) Abstract 27 figure 2.
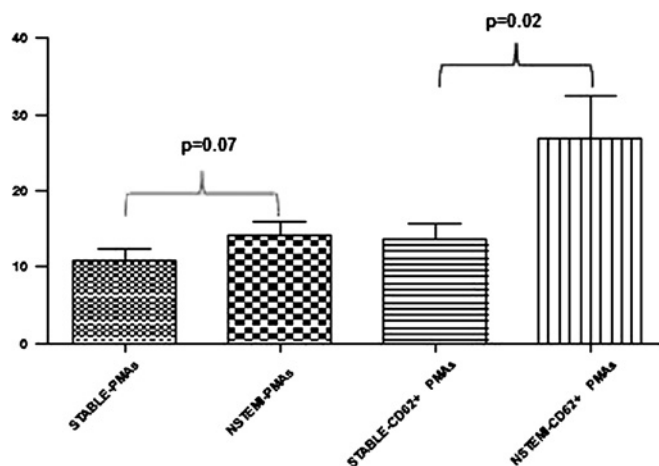
Abstract 27 Figure 1
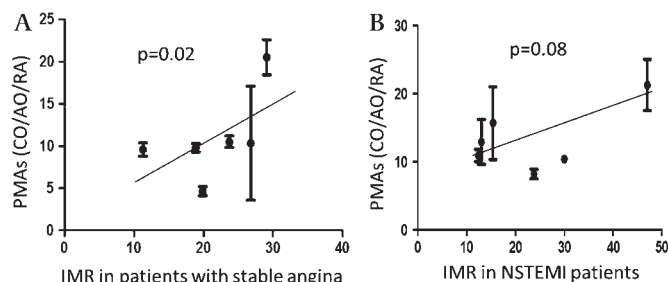
Abstract 27 Figure 2

Conclusions PMAs are elevated in stable coronary disease and ACS with elevated activated CD62+ PMA a hallmark of ACS. PMAs correlate with measured microvascular dysfunction during PCI in stable angina and NSTEMI. This study supports the hypothesis that PMA formation may be important determinants of platelet activation, inflammation and microvascular dysfunction in coronary disease.

28 | LOW FRAME RATE SCREENING DURING PERCUTANEOUS CORONARY ANGIOPLASTY SIGNIFICANTLY REDUCES RADIATION EXPOSURE, GIVES GOOD IMAGE QUALITY WITHOUT AFFECTING PATIENT OUTCOME

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Introduction Minimisation of radiation exposure during cardiac procedures is required by statute (IRMER 2000). During coronary angioplasty 47% of radiation dose is related to screening at standard