The diagnostic equivalent of a mean RHC PAP of 25 mmHG was for a PASP 35.9 mmHG and a MPAP of 23.3 mmHg. Pulmonary artery systolic pressure being the most often reported in general echocardiographic reports in this institution.
Conclusion These results demonstrate that TTE derived measures of Rap correlate poorly with invasive measurements. However, this has no impact on the traditional calculations for mean PAP and PASP by echocardiography, which correlate well with the RHC data.

121 LEFT VENTRICULAR MORPHOLOGY IN ELITE ATHLETES WITH EXTREME ANTHROPOMETRY

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Background Body size measurements are critical in the correct assessment of cardiac adaptation to exercise in athletes. However, the impact of high body mass index (BMI) on cardiac dimensions in athletes is largely unknown. The aim of the study was to describe the normal cardiac parameters of a cohort of elite athletes characterised by BMI in the obesity range.
Methods Between 2007 and 2014, 1857 elite athletes with complete anthropometric data (age 21±5 years, males 70%) free from any cardiac disease after a normal echocardiogram were studied. The analysis was focused on the echocardiograms of 50 athletes (72% rugby players) with BMI 30 and height <1.95 m (Group 1). We compared them with athletes matched for age and body surface area (BSA) with height >1.95 m and BMI<30 (Group 2, n=87) and age matched athletes with height<1.90 m and BMI between 20 and 29 (Group 3, n=243).
Results The number of hours per week of exercise was lower in athletes of Group 1 (17±6 vs 22±7 in Group 2 and 19 ±7 in Group 3, p<0.001 between Group 1 and Group 2). Athletes belonging to Group 1 exhibited larger left ventricular end-diastolic diameter (LVEDD) compared with Group 3 (57 ±6 vs 53±6 mm, p<0.001), but not with Group 2 (57±4, p=0.98). Twenty-five (50%) athletes of Group 1 vs 33 (38%) of Group 2 and 31 (13%) of Group 3 had a LV end-diastolic diameter >57 mm (p<0.001 between Group 1 and Group 3, p=0.23 between Group 1 and Group 2). Left ventricular (LV) wall thickness was higher in athletes of Group 1 (11±1 vs 10 ±2 in Group 2, p=0.001, vs 9±1 in Group 3, p<0.001). Twelve (24%) athletes in Group 1 vs 19 (21%) in Group 2 and 16 (6%) in Group 3 exhibited a LV wall thickness>11 mm (p<0.001 between Group 1 and Group 3, p=0.85 between Group 1 and 2). Left atrial diameter was significantly higher in Group 1 compared to Group 3 (40±5 vs 36 ±1 mm, p<0.001). BMI had a lower correlation coefficient for LVEDD with respect to BSA (r=0.39, p<0.001 vs r=0.59, p<0.001).
Conclusions Athletes with BMI 30 are characterised by significantly increased LV size and left ventricular hypertrophy with wall thickness exceeding normal values in one in four cases.

122 MID-TERM ECHOCARDIOGRAPHIC FOLLOW UP OF TRANS-CATHETER AORTIC VALVE IMPLANTATION AND INCIDENCE OF VALVULAR DEGENERATION

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Purpose Trans-catheter Aortic Valve Implantation (TAVI) is a well-established procedure in severe aortic stenosis with high surgical risk. However an understanding of the longer-term haemodynamic flow profile of these valves is limited, as assessed by echo parameters. This study aims to collate several key echocardiographic parameters over mid term follow up and highlight incidence rates of valvular degeneration.
Methods 49 consecutive post TAVI patients seen within the Papworth physiologist-led valve service underwent retrospective analysis performed using standard 2D/Doppler-derived echo data. Data was compared during three follow up intervals (FU1 – 3 months; FU2 – 1 year; FU3 – 2 years) and between different TAVI sizes (23, 26 and 29 mm).
Results Data was analysed in all 49 patients, 26 patients reached FU3 (53%), with a total mortality rate of 8%. The majority had Sapien XT valves implanted (Sapien – 8; SapienXT – 34; Sapien3 – 7). Mean prosthetic valve Doppler measurements were similar from FU1 to FU3 – MPG (11.5 ±7.2; 12.1±7.3; 13.3±9 FU1-3 respectively), AVA (1.70 ±0.59; 1.61±0.50; 1.69±0.51) (p=>0.05), whilst LVEF showed significance between FU2-FU3 (51%–54%; p=0.04). Secondary analysis comparing different valve sizes indicated that the smaller valve size (23 mm) had slightly higher peak/mean valve gradients and lower aortic valve area (AVA), AVA index and Dimensionless Index. At FU1, the incidence of paravalvular leak (PVL) was 53%; although significant PVL (moderate) was less than 16%. Progression of PVL was noted from FU1 to FU3 only in 3%. Within valve sizes, 29 mm valves

Abstract 122 Table 1 Baseline Characteristics (n=49)

Age, yrs	79 ± 7
Male	42 (86)
Diabetes	15 (31)
Hypertension	18 (37)
Coronary Artery Disease	39 (80)
Previous myocardial infarction	5 (10)
Previous open heart surgery	37 (76)
Previous cerebrovascular accident	7 (14)
COPD	3 (6)
Atrial Fibrillation	13 (27)
Anticoagulation	13 (27)
Antiplatelet	42 (86)
Trans-femoral TAVI	41 (84)
EuroSCORE II	7.7 ± 4.9
LV Ejection Fraction, %	53 ± 12
TAVI size 23mm	9 (18)
TAVI size 26mm	20 (41)
TAVI size 29mm	20 (41)
Values are mean ± SD or n (%)	

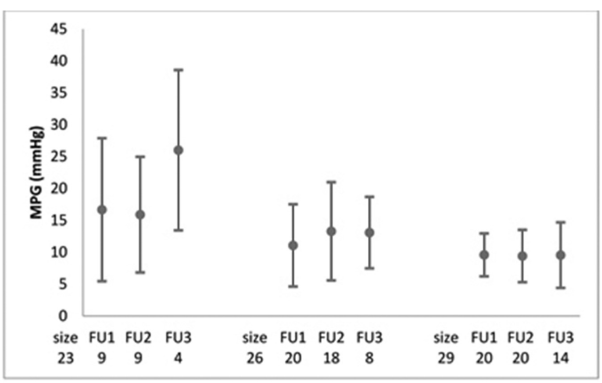
Abstract 122 Table 2 Mean echo parameters (Baseline to FU2)

	FU1	FU2	FU3	Change FU1-FU3 (%)	p value (FU1-FU2; FU1-FU3; FU2-FU3)
n	49	47	26		
PPG (mmHg)	**21.8** ± 13	**22.2** ± 12.6	**23.4** ± 15.4	7.5	0.91; 0.72; 0.83
MPG (mmHg)	**11.5** ± 7.2	**12.1** ± 7.3	**13.3** ± 9.3	15.5	0.45; 0.80; 0.65
AVA (cm^2)	**1.70** ± 0.59	**1.61** ± 0.50	**1.69** ± 0.51	-0.4	0.19; 0.70; 0.56
AVAi (cm^2/m^2)	**0.87** ± 0.34	**0.84** ± 0.24	**0.87** ± 0.27	0	0.48; 0.71; 0.53
DI	**0.5** ± 0.15	**0.45** ± 0.12	**0.5** ± 0.15	0	0.11; 0.55; 0.17
EF (%)	**50.8** ± 9.1	**50.6** ± 9.6	**54.3** ± 7.81	7.0	0.35; 0.12; 0.04
SVi (ml/m^2)	**41.4** ± 14	**38.7** ± 10.3	**39.7** ± 8.5	-4.1	0.21; 0.52; 0.56
sPAP (mmHg)	**36.1** ± 9.6	**33.5** ± 9.27	**34.3** ± 7.1	-5.0	0.32; 0.76; 0.77

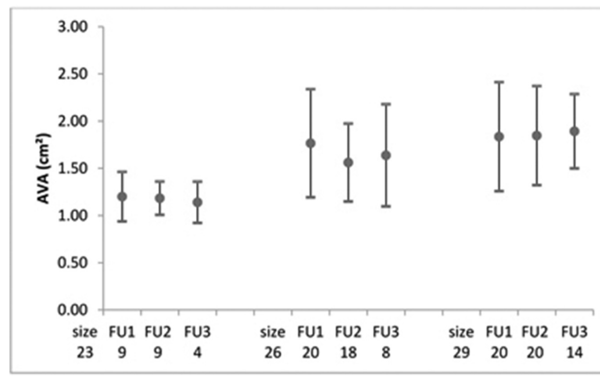
Values are mean ± SD or n (%). Statistical analysis by Students Paired T-test

showed the greatest increase in PVL during follow up (FU1 10%-FU3 21%). 3 patients (6%), developed progressive obstructive valve parameters suggesting possible early valve thrombosis; all three showing improvement in these parameters towards baseline following commencement of oral anticoagulation.

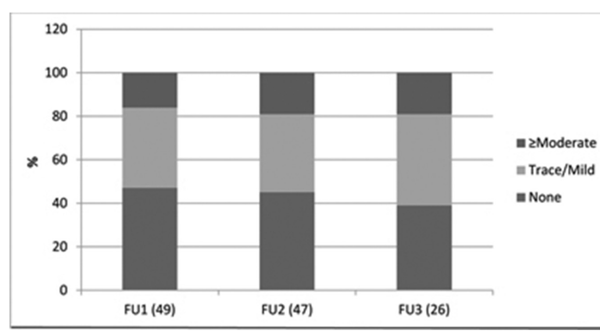
Conclusion Our data shows a range of traditional prosthetic valve Doppler values which may be used as a guide to assess different TAVI valve types/sizes. It highlights rates of significant valvular degeneration over midterm follow up. Further studies with larger sample sizes are needed to further assess the validity of these findings.



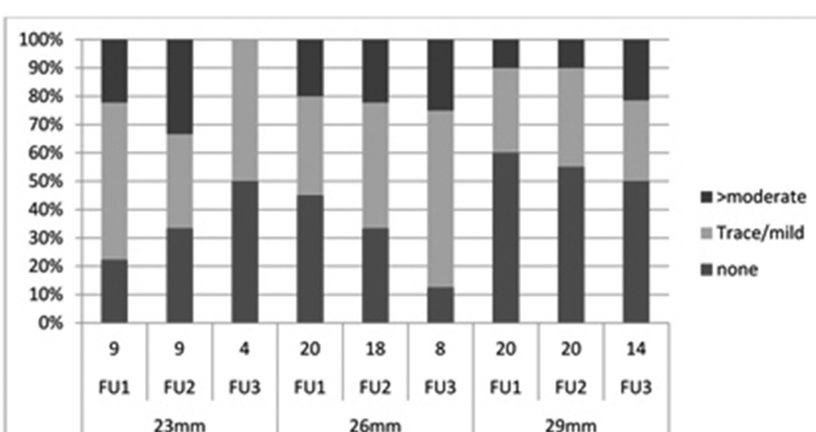
Abstract 122 Figure 1 MPG by valve size (mean± SD; FU1-FU3)



Abstract 122 Figure 2 AVA by valve size (mean± SD; FU1-FU3)



Abstract 122 Figure 3 Paravalvular leak incidence from FU1-FU3 (n)



Abstract 122 Figure 4 Paravalvular leak incidence from FU1-FU3 according for valve size

123 DOPPLER ASSESSMENT OF AORTIC STENOSIS: READING THE PEAK VELOCITY IS SUPERIOR TO VELOCITY TIME INTEGRAL

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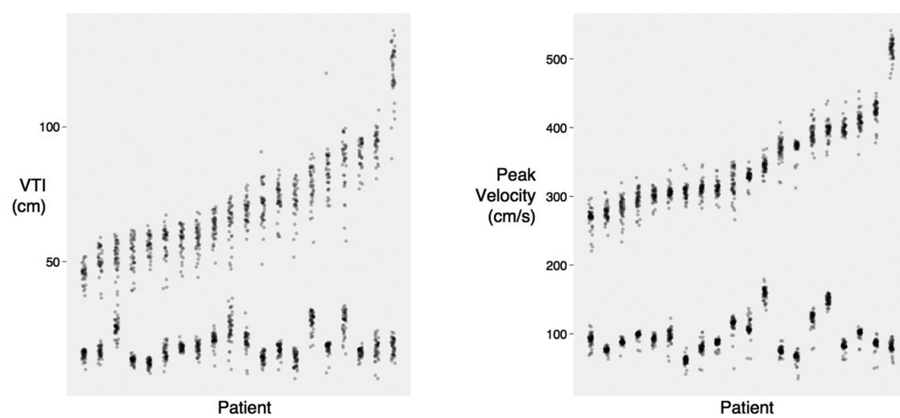
Introduction Previous studies of the reproducibility of echocardiographic assessment of aortic stenosis have compared only a pair of observers. The aim of this study was to assess reproducibility across a large group of observers and compare the reproducibility of reading the peak versus the velocity time integral.

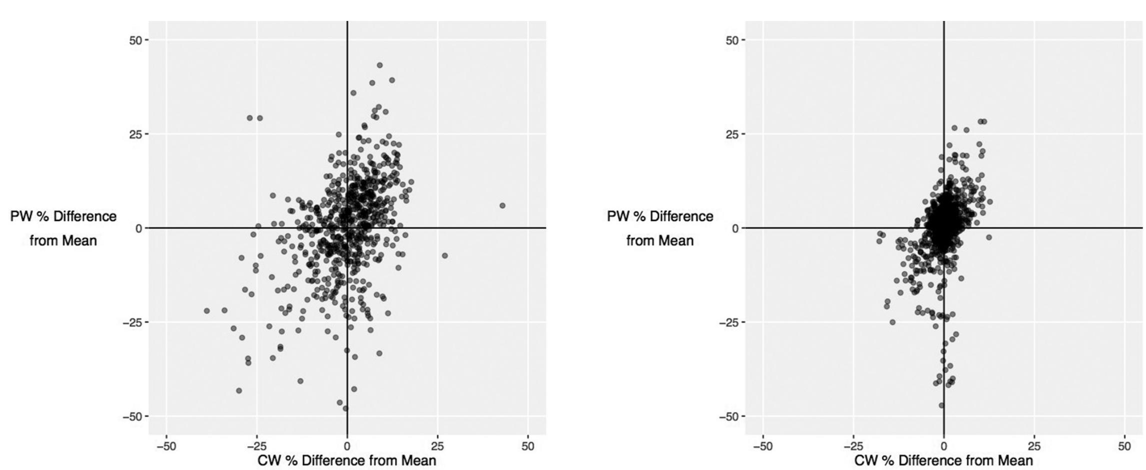
Methods 25 observers reviewed continuous wave (CW) aortic valve and pulsed wave (PW) LVOT Doppler traces from 20 sequential cases of aortic stenosis in random order. Each operator unknowingly measured the peak velocity and velocity time integral (VTI) twice for each case, with the traces stored for analysis. We undertook a mixed-model analysis of the sources of variance for peak and VTI measurements.

Results Measuring the peak is more reproducible than VTI for both PW (coefficient of variation 9.6% versus 15.9%, $p<0.001$) and CW traces (coefficient of variation 4.0% versus 9.6%, $p<0.001$), as shown in Figure 1. VTI is inferior because, compared to the middle, it is difficult to reproducibly trace the steep beginning (standard deviation 3.7x and 1.8x larger for CW and PW respectively) and end (standard deviation 2.4x and 1.5x larger for CW and PW respectively). Dimensionless index reduces the coefficient of variation (19% reduction for VTI, 11% reduction for peak) partly because it cancels correlated errors: an operator who over-measures a CW trace is likely to over-measure the matching PW trace ($r=0.39$, $p<0.001$ for VTI, $r=0.41$, $p<0.001$ for peak), as shown in Figure 2.

Conclusions It is more reproducible to measure the peak of a Doppler trace than the VTI, because it is difficult to trace the steep slopes at the beginning and end reproducibly. The difference is non-trivial: an average operator would be 95% confident detecting a 11.1% change in peak velocity but a much larger 27.4% change in VTI. A clinical trial of an intervention for aortic stenosis with a VTI endpoint would need to be 2.4 times larger than one with a peak velocity endpoint. Part of the benefit of dimensionless index in improving reproducibility arises because it cancels individual operators tendency to consistently over- or under-read traces.



Abstract 123 Figure 1 Variation in velocity time integral (left panel) and peak (right panel) measurements. Each column represents a different case, ordered from the smallest average measurement on the left to the largest on the right. Each point represents an operator's measurement for a case. The upper group are aortic valve CW measurements, the lower group are PW LVOT measurements.



Abstract 123 Figure 2 Relationship between under-reading and over-reading for pulsed-wave and continuous wave traces from the same patient for VTI (left panel) and peak (right panel). Each point represents a case reviewed by a single operator. The tendency to over- or AV measurements is represented on the y-axis.