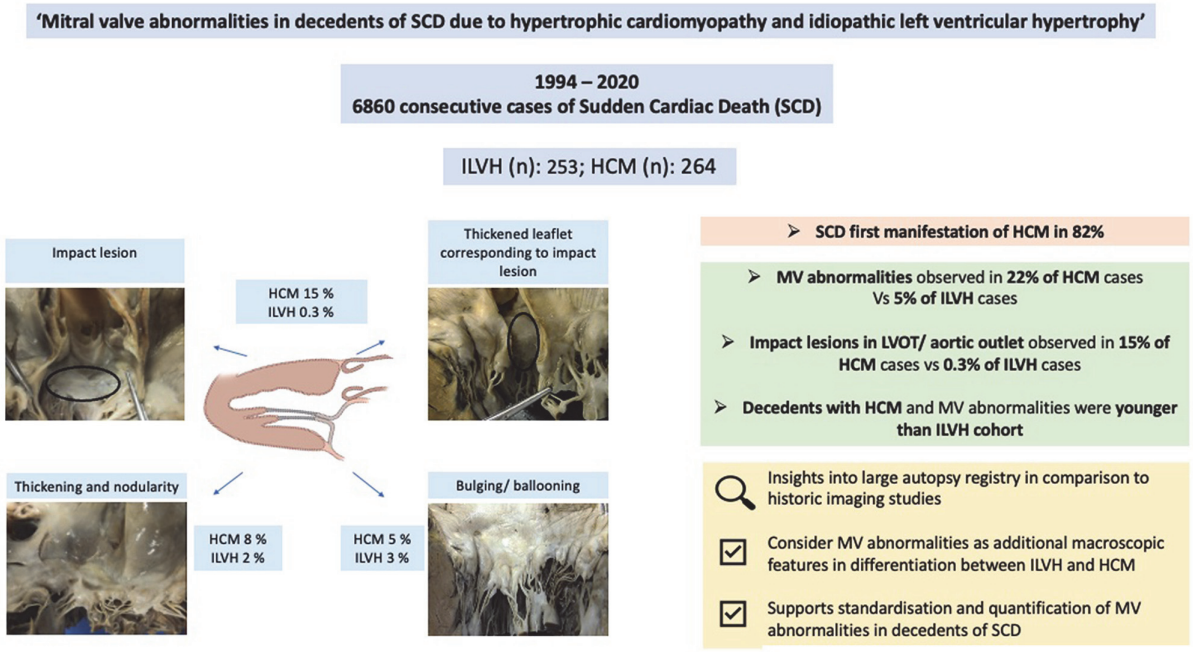


Abstract 1 Figure 2

support a greater emphasis on the standardisation and quantification of MV abnormalities as part of the autopsy in victims of SCD.

Conflict of Interest None

2 PREVALENCE AND DIAGNOSTIC SIGNIFICANCE OF NOVEL 12-LEAD ECG PATTERNS FOLLOWING COVID-19 INFECTION IN ELITE SOCCER PLAYERS

[1]Raghav Bhatia, [2]Aneil Malhotra, [3]Hamish MacLachlan, [4]Sabiha Gati, [3]Sarandeep Marwaha, [3]Samar Al-Turaihi, [5]Paul Catterson, [5]Sean Carmody, [3]Nikhil Chatrath, [6]Rob Cooper, [3]Harshil Dhutia, [3]Saad Fyyaz, [5]Ravi Gill, [5]Chris Jones, [5]Dimitri Kalogiannidis, [7]Antoinette Kenny, [5]Tamin Khanbhai, [5]Adil Ladak, [3]Chris Miles, [5]Chris Mogekwu, [5]Gary O'Driscoll, [3]Paulo Angelo Bulleros, [3]Zephryn Fanton, [8]Rebecca Osborne, [6]David Oxborough, [5]John Quartermain, [3]Kashif Quazi, [9]Dhrubo Rakhit, [5]Max Sala, [10]Amanda Varnava, [3]Maria Teresa Tome Esteban, [3]Gherardo Finocchiaro, [3]Alexandros Kasiakogias, [3]Shafik Khoury, [5]Shoaib Amaan, [5]Subhashis Basu, [5]Rishi Dand, [5]Jamie O'Shea, [3]Michael Papadakis, [3]Sanjay Sharma. *[1]St. George's, University of London and St. George's University Hospitals NHS Foundation Trust, Cardiovascular Clinical Academic Group, St. George's, University of London, London, LND SW17 0RE, United Kingdom; [2]Manchester University National Health Service Foundation Trust, Manchester Academic Health Science C; [3]St. George's, University of London and St. George's University Hospitals NHS Foundation Trust; [4]Royal Brompton & Harefield NHS Foundation Trust; [5]The English Football Association (FA); [6]Liverpool Heart and Chest Hospital; [7]Cardiothoracic Centre, Freeman Hospital; [8]Cardiac Risk in the Young (CRY); [9]University Hospital Southampton NHS Foundation Trust, Southampton, UK; [10]Imperial College Healthcare NHS Trust*

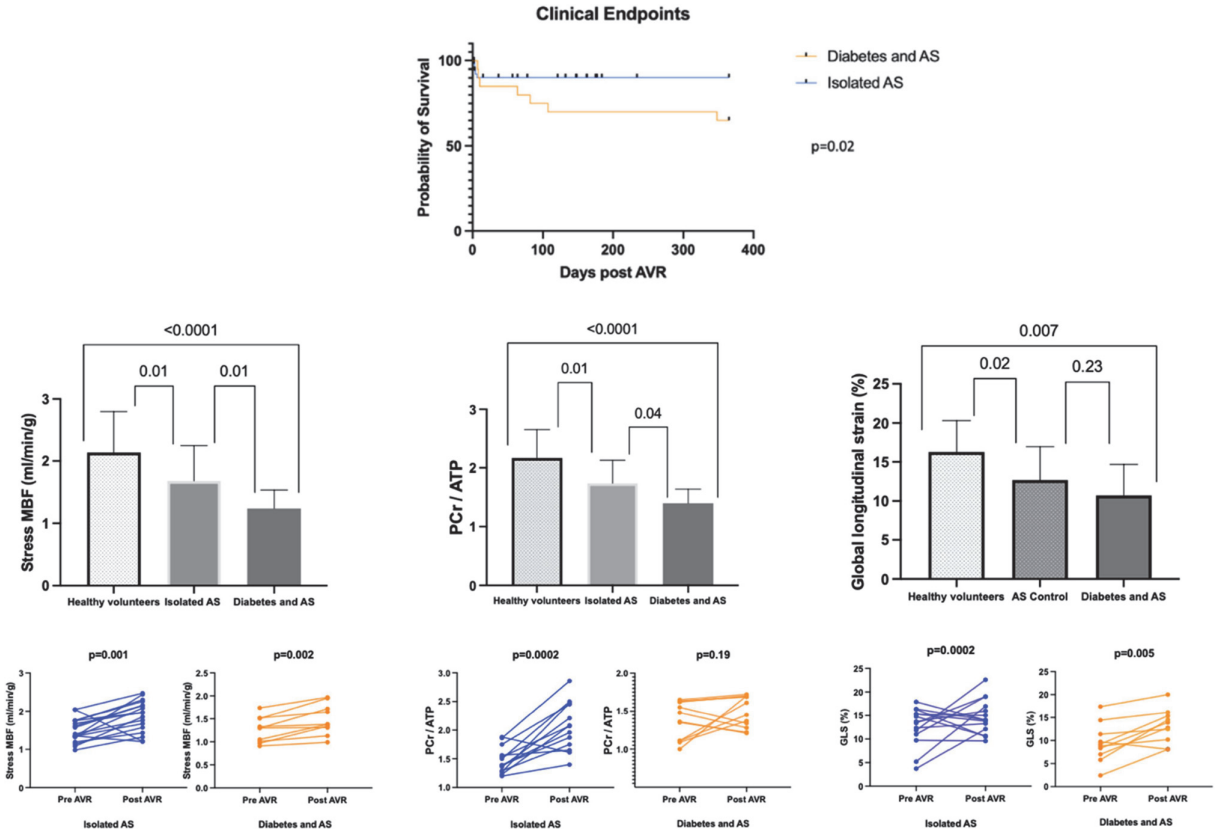
10.1136/heartjnl-2022-BCS.2

Background Identification of athletes with cardiac inflammation following COVID-19 can prevent exercise fatalities. The efficacy of pre and post COVID-19 infection electrocardiograms (ECGs) for detecting athletes with myopericarditis has never been reported.

Purpose To assess the prevalence and diagnostic significance of novel 12-lead ECG patterns following COVID-19 infection in elite soccer players.

Methods We conducted a multicentre study over a 2-year period involving 5 centres and 34 clubs and compared pre COVID and post COVID ECG changes in 455 consecutive athletes who were infected. ECGs were reported in accordance with the International recommendations for ECG interpretation in athletes. The following patterns were also considered abnormal if they were not detected on the pre COVID-19 infection ECG: (a) biphasic T waves; (b) reduction in T wave amplitude by 50% in contiguous leads; (c) ST segment depression; (d) J-point and ST segment elevation > 0.2 mV in the precordial leads and >0.1 mV in the limb leads; (e) tall T waves ≥ 1.0 mV (f) low QRS amplitude in > 3 limb leads and (g) complete right bundle branch block. Athletes exhibiting novel ECG changes underwent cardiovascular magnetic resonance (CMR) scans. One club mandated CMR scans for all 28 (6%) athletes, despite the absence of cardiac symptoms or ECG changes.

Results Athletes were aged 22 ± 5 years, 89% were male and 57% were white. 65 (14%) athletes reported cardiac symptoms. The mean duration of illness was 3 ± 4 days. The post COVID ECG was performed 14 ± 16 days following a positive PCR test. 440 (97%) athletes had an unchanged post COVID-19 ECG. Of these, 3 (0.6%) had cardiac symptoms and CMRs resulted in a diagnosis of pericarditis. 15 (3%) athletes demonstrated novel ECG changes following COVID-19 infection. Among athletes who demonstrated novel ECG changes, 10 (67%) reported cardiac symptoms. 13 (87%) athletes with novel ECG changes were diagnosed with inflammatory cardiac sequelae; pericarditis (n=6), healed myocarditis (n=3), definitive myocarditis (n=2), and possible/probable myocarditis (n=2). The overall prevalence of inflammatory cardiac sequelae in the cohort based on novel ECG changes was 2.8%. None of the 28 (6%) athletes, who underwent a CMR, in the absence of cardiac symptoms or novel ECG changes revealed any abnormalities. Athletes revealing novel ECG changes, had a higher prevalence of cardiac symptoms (67% v 12% p<0.0001) and



Abstract 2 Figure 1 Cumulative incidence of the clinical events after valve replacement (AVR) is shown in the top row. Differences in myocardial PCr/ATP ratio, global stress myocardial blood flow and global longitudinal strain between healthy volunteers, patients with isolated severe AS and patients with severe AS and DM before the AVR in PCr/ATP ratio; global stress myocardial blood flow (ml/min/g) and global longitudinal strain are shown in the middle row. Changes in energetics, stress MBF and GLS after AVR are shown in the bottom row.

Abstract 2 Table 1 Clinical Characteristics and CMR and ^{31}P-MRS findings

	HV n=15	Isolated AS n=63	Diabetes and AS n=25	P value
Age, y	71±4	71±12	72±7	0.73
Female, n (%)	6(40)	7(28)	25(40)	0.3
BMI, kg/m^2	26±2*	27±4€	31±4	**<0.0001**
Systolic BP, mmHg	136±9	132±17	131±20	0.44
HbA1c, mmol/mol	37±3*	37±4€	56±14	**<0.0001**
NT- proBNP, ng/L	67[21-112] *	1411[629-2194]†	1376[390-2362]	**<0.0001**
Euro Score II	-	1.13	1.14	0.27
Rockwood Score	-	2.15	2.22	0.23
CARDIAC STRUCTURAL AND FUNCTIONAL CHANGES				
LV end-diastolic volume indexed to BSA, mL/m^2	78±15	80±22	84±21	0.53
LV end-systolic volume indexed to BSA, ml/m^2	28±6	32±22	35±19	0.24
LV mass, g	102±25*	147±41†	164±59	**0.0003**
LV mass to LV end-diastolic volume, g/mL	0.66 ±0.11*	0.99 ±0.26†	0.96±0.25	**<0.0001**
LV stroke volume, ml	95±22	94±22	100±20	0.42
LV ejection fraction,%	64±3	64±12	60±12	0.25
LV maximal wall thickness, mm	10±1*	14±3†	14±3	**<0.0001**
RV end-diastolic volume indexed to BSA, mL/m^2	83±12	79±18	78±20	0.36
RV end-systolic volume indexed to BSA, ml/m^2	32±7	37±14	37±16	0.6
RV stroke volume, ml	97±17†	82±20	84±22	**0.03**
RV ejection fraction,%	62±5*	55±9†	54±10	**0.01**
LA biplane end-systolic volumes, mL	72±20	95±50	100±44	0.16
Biplane LA EF,%	59±11*	45±17	39±19	**0.008**
Global longitudinal strain, (-),%	16±4*	13±4†	11±4	**0.001**
Peak systolic circumferential strain, (-),%	21±2	19±5	18±5	0.11
Peak longitudinal diastolic strain rate, s^{-1}	0.79±0.2	0.83±0.3	0.65±0.2€	**0.04**
Mean native T1, (ms)	1209±79	1232±88	1262±84	0.16
Extra cellular volume, (%)	24±3	24±2	25±4	0.54
LGE, (%)	-	3.1±2	3.4±4	0.85
MYOCARDIAL ENERGETICS AND PERFUSION				
PCr/ATP ratio	2.17 ±0.5*	1.74±0.4†	1.39±0.25€	**<0.0001**
Increase in RPP,%	25	23	25	0.5
Stress MBF, ml/min/g	2.14 ±0.66*	1.68±0.6†	1.24±0.3€	**<0.0001**
Rest MBF, ml/min/g	0.66 ±0.11	0.73±0.2	0.68±0.22	0.4
MPR	3.83 ±1.8*	2.4±0.78†	1.78±0.47€	**<0.0001**

€ signifies p<0.05 between AS DM and AS Control, * signifies p<0.05 between AS DM and HV, † signifies p≤0.05 between AS Control and HV.
Values are mean ±standard deviations or percentages. BSA indicates body surface area; LV, Left ventricle; RV, right ventricle; DM, type 2 diabetes mellitus; HCM, hypertrophic cardiomyopathy; LV, left ventricular; LA, left atrial; LA EF, left atrial ejection fraction; PCr, phosphocreatine; ATP, adenosine tri-phosphate; RPP, rate pressure product; MBF, myocardial blood flow; MPR, myocardial perfusion reserve.

longer symptom duration (8±8 days vs 2±4 days; p<0.0001) compared with athletes without novel ECG changes. Among athletes without cardiac symptoms, the additional yield of novel ECG changes to detect cardiac inflammation was 20% (n=3).

Conclusion 3% of elite soccer players demonstrated novel ECG changes post COVID-19 infection, of which almost 90% were diagnosed with cardiac inflammation during subsequent investigation. Most athletes with novel ECG changes exhibited cardiac symptoms. Novel ECGs changes contributed to a diagnosis of cardiac inflammation in 20% of athletes without cardiac symptoms.

Conflict of Interest None

3 CLINICAL OUTCOMES AND MYOCARDIAL RECOVERY IN ENERGETICS, PERFUSION AND CONTRACTILE FUNCTION AFTER VAVLE REPLACEMENT SURGERY IN SEVERE AORTIC STENOSIS PATIENTS WITH DIABETES COMORBIDITY

[1]Nicholas Jex, [2]Richard Cubbon, [3]Amrit Chowdhary, [4]Sharmaine Thirunavukarasu, [2]Sindhoora Kotha, [5]Henry Procter, [6]Hui Xue, [4]Peter Swoboda, [6]Peter Kellman, [4]John P Greenwood, [4]Sven Plein, [4]Eylem Levelt. *[1]University of Leeds, Leeds Institute of Cardiovascular and Metabolic Medicine, Leeds General Infirmary, Great George Street, Leeds, WYK LS1 3EX, United Kingdom; [2]University of Leeds; [3]University of Leeds, Leeds Institute of Cardiovascular and Metabolic Medicine; [4]Leeds Institute of Cardiovascular and Metabolic Medicine; [5]Leeds Teaching Hospitals; [6]National Institutes of Health*

10.1136/heartjnl-2022-BCS.3

Background Aortic stenosis (AS) and type 2 diabetes mellitus (DM) are increasingly frequent comorbidities in aging populations, and diabetes is associated with increased morbidity and mortality after aortic valve replacement (AVR). Although distinct pathological entities, AS and DM share common features of impaired myocardial energetics and coronary microvascular dysfunction. The mechanisms for the adverse prognostic association between AS and DM are incompletely understood but are likely to include the collective impact of DM and AS on myocardial metabolism and perfusion.

Purpose Utilizing 31phosphorus magnetic resonance spectroscopy (31P-MRS) and cardiovascular magnetic resonance (CMR), we tested the hypotheses that the collective impact of severe AS and DM on the myocardium aggravates myocardial energetic impairment, contractile dysfunction, and fibrosis, and impairs coronary microvascular function.

Methods Eighty-eight severe AS patients with (AS-DM, n=25) and without DM (Iso-AS, n=63) undergoing AVR were prospectively recruited. A further 15 healthy volunteers served as a control group. Patients with coronary artery disease or renal impairment were excluded. All participants with AS underwent 31P-MRS followed by a comprehensive CMR protocol including cine imaging, native pre- and post-contrast T1 mapping, stress and rest adenosine perfusion and late gadolinium enhancement within 1 month prior to and 6 months after AVR.

Results Demographic, biochemical and CMR/31P-MRS data are shown in Table-1. Study groups had similar age and sex distribution, and the two AS groups were matched for surgical scores and frailty scores (EURO score and Rockwood score respectively). NTproBNP levels were similarly elevated in both AS groups. Left ventricular (LV) volumes and ejection fraction (EF) were similar between the groups, with no significant difference in LV mass, wall thickness or concentricity between the two severe AS groups. The baseline differences in myocardial energetics, stress myocardial blood flow (MBF) and global longitudinal strain (GLS) are shown in Figure-1. Severe AS patients with diabetes showed greater reductions in myocardial energetics (p<0.0001), global stress MBF (p<0.0001) and more significant reductions in GLS (p=0.001) than patients with isolated severe AS. At 6 month post AVR both AS groups showed significant improvements in stress MBF (Iso-AS: p=0.002, AS-DM: p=0.002) and GLS. However, only the patients with isolated AS showed significant improvement in myocardial energetics while no significant improvements in energetics were detected in diabetes patients after AVR. Patients with severe AS were followed up for a median of 12 months. Cumulative incidence of the clinical events post AVR

Abstract 3 Table 1

	Athletes undergoing mandatory CMR assessment (n=28)	Athletes demonstrating novel ECG changes undergoing CMR assessment (n=15)	P value
Age	**25 ± 6**	**22 ± 4**	**0.05**
BSA (m2)	2.03 ± 0.12	2.0 ± 0.1	0.68
Symptom duration (days)	**1.05 ± 1.58**	**8.47 ± 8.22**	**0.0001**
Time between pre & post COVID ECG (days)	**240.08 ± 89.58**	**134.35 ± 108.65**	**0.001**
Positive PCR to ECG	**11.11 ± 1.45**	**15.88 ± 7.61**	**0.0023**
Positive PCR to CMR	18.11 ± 15.63	19.85 ± 12.69	0.7
LV MWT (mm)	9.7 ± 0.9	10 ± 1.9	0.63
LVEDV indexed (ml/m2)	91.9 ± 13.4	104 ± 17	0.1
LVESV indexed (ml/m2)	38 ± 6.3	44 ± 13	0.15
ESV indexed (ml/m2)	53 ± 10	59 ± 8	0.18
LV EF (%)	59 ± 3.4	53 ± 10	0.07
LV mass indexed (g/m2)	71 ± 21	80.2 ± 14.6	0.42
RVEDV indexed (ml/m2)	101.8 ± 16.1	104 ± 14	0.76
RVESV indexed (ml/m2)	49.6 ± 10.3	48.7 ± 11.7	0.87
RV EF (%)	52.4 ± 5.1	55 ± 6.5	0.35