

Cardiac magnetic resonance in COVID-19 positive and probable cases: A report from a high volume CMR centre in Ireland

James Sl.; Fallon A.; Waterhouse DF.; O' Hanlon R.

Blackrock Clinic, Centre for Cardiovascular Magnetic Resonance, Dublin, Ireland

Funding Acknowledgements: Type of funding sources: None.

Introduction: Coronavirus disease 2019 (COVID-19) infection can have multisystem involvements. The inflammation sequelae can cause myocarditis. The COVID-19 pandemic has impacted Ireland significantly. Understanding of myocardial involvement in COVID-19 is not fully elucidated but has been reported. The Centre for Cardiovascular Magnetic Resonance, Blackrock Clinic in Ireland is a high volume CMR centre with approximately 4500 cases per year and accepting referral from all hospital in Ireland. These analyses are to describe the CMR findings in COVID-19 positive and probable cases attending the centre.

Methods: Consecutive 65 referrals with mention of "COVID-19" from March 2020 to December 2020 was assessed. 56 cases were included in this analysis. Cases were categorised as COVID-19 positive cases or probable (viral illness like symptoms) cases. The demography and CMR parameters were collected. Serial imaging of selected cases was included. Descriptive analyses methods were applied.

Results: In the period of 10 months, there was 49 COVID-19 positive cases (65.3% male; median age 49 [32 : 61] years) and 7 COVID-19 probable cases (42.9% male; median age 39 [37 : 59] years). In the COVID-19 positive cases, 25 had normal CMR, 11 has evidence of myocarditis, 1 with pericarditis, 2 with infarction/ischaemia, 3 with dilated cardiomyopathy, 2 with hypertrophic cardiomyopathy and 5 with other findings. There were 3 COVID-19 positive cases with serial imaging showing resolving myocarditis (100% female; median age 41 [30 : 47] years). 2 professional athletes with COVID-19 positive test showed no evidence of myocarditis. There are no significant differences in the age of male COVID-19 positive versus female group ($p=0.0752$). Different demography and CMR parameters and tissue characterisation are described in Table 1 and Table 2.

Conclusions: The prevalence of myocarditis in this cohort is approximately 1 in 5 (21.4%). Within the COVID-19 positive cases, the prevalence is 22.4%. These observations may reflect selection bias for CMR referral in those with cardiac symptoms or cardiac enzymes leak.

Abstract Table 1

Table 1: Demography, diagnoses and CMR parameters

Total N=56	COVID-19 status	
	Positive n=49	Probable n=7
Gender (n, % of total)		
Male	32 (57.1%)	3 (5.4%)
Female	17 (30.4%)	4 (7.1%)
Age (n, median [25%:75%])		
Male	49 [32 : 61]	39 [37 : 59]
Female	39 [26 : 72]	36 [26 : 72]
Diagnoses (n, % of category)		
Normal	25 (51%)	4 (57.1%)
Myocarditis	11 (22.5%)	1 (14.3%)
Pericarditis	1 (2%)	0
Ischaemia or infarct	2 (4.1%)	1 (14.3%)
Dilated cardiomyopathy	3 (6.1%)	0
Hypertrophic cardiomyopathy	2 (4.1%)	0
Others	5 (10.2%)	1 (14.3%)
CMR volumes and dimensions (median [25%:75%])		
LVEDV ml	143 [124 : 173]	151 [107 : 180]
LVESV ml	52 [41 : 66]	59 [37 : 64]
LV SV ml	88 [79 : 109]	92 [70 : 126]
LVEF %	62 [57 : 68]	63 [60 : 73]
Wall thickness mm	10 [9 : 11]	12 [9 : 12]
LVMi g/m ²	47 [42 : 58]	54 [41 : 63]
LV Mass g	92 [72 : 119]	77 [71 : 141]
RVEDV ml	149 [122 : 185]	163 [121 : 200]
RVESV ml	62 [45 : 72]	70 [48 : 75]
RV SV ml	87 [73 : 100]	107 [73 : 125]
RVEF %	58 [53 : 64]	63 [54 : 66]
LA horizontal mm	35 [33 : 40]	39 [37 : 45]
LA perpendicular mm	39 [35 : 42]	45 [39 : 45]
RA horizontal mm	35 [31 : 39]	39 [34 : 45]
RA perpendicular mm	38 [35 : 40]	41 [36 : 50]
Aorta mm	27 [24 : 31]	29 [27 : 30]
MPA mm	21 [20 : 23]	23 [20 : 25]
RPA mm	18 [15 : 21]	16 [15 : 20]
LPA mm	18 [15 : 21]	16 [15 : 20]

Abstract Table 2

Table 2: CMR tissue characterisation in myocarditis confirmed cases

Cases	COVID-19 status	STIR sequence		LGE sequence		T2 map (ms)
		Evidence of inflammation	Location (AHA 17 segments)	Evidence of fibrosis	Location (AHA 17 segments)	
Case 1	Positive	Yes	1,5,6,11,12	Mid and epicardial fibrosis	4,5,6	Not acquired
Case 2	Positive	Not acquired	-	Mid and epicardial fibrosis	10,11,12	Not acquired
Case 3	Positive	Yes	1,7	No	-	Not acquired
Case 4	Probable	No	-	Epicardial fibrosis	3,4,5	Not acquired
Case 5	Positive	No	-	Midwall fibrosis	4,5,6	41
Case 6	Positive	Yes	1,2	Midwall fibrosis	2	56
Case 7	Positive	Not acquired	-	Midwall fibrosis	3,4	Not acquired
Case 8	Positive	No	-	Midwall fibrosis	4,5,6,12	Not acquired
Case 9	Positive	No	-	Midwall fibrosis	11,12,15,16	Not acquired
Case 10	Positive	No	-	Mid and epicardial fibrosis	5,6	37
Case 11	Positive	No	-	Midwall fibrosis	1,2,3,4,5,6,9,10	Not acquired
Case 12	Positive	Not acquired	-	Midwall fibrosis	5,6	Not acquired