Brian Maurer young investigator award finalists 2021

1 INCIDENCE AND PREVALENCE OF MINOCA (MYOCARDIAL INFARCTION WITH NON-OBSTRUCTIVE CORONARY ARTERIES) IN STEMI PATIENTS: EXPERIENCE FROM IRISH TERTIARY CARE CENTRE

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Background MINOCA is a clinical diagnosis of an acute coronary syndrome type presentation with non-obstructive coronary arteries (stenosis $\leq 50\%$) on coronary angiography. It accounts for 5% to 15% of all AMI (acute myocardial infarction) presentations. Aetiology may include plaque disruption with transient occlusion, coronary artery dissection, coronary artery spasm, coronary microvascular obstruction, myocarditis or embolic phenomena. Given the range of aetiologies and potential variability in therapeutic implications, further investigation beyond lumenography may be indicated such as CMR (cardiac MRI) and or intra coronary imaging and provocation testing if clinical suspicion of coronary disease remains high despite initially non-obstructive angiographic appearances.

Purpose The aim of this study is to establish the prevalence of different aetiological diagnoses using CMR in patients with (MINOCA) and raised troponin.

Methods A single centre retrospective observational study of STEMI (ST elevation myocardial infarction) patients admitted for primary PCI between Jan 2016 till sept 2019 and had non-obstructive coronary arteries (stenosis $\leq 50\%$). Consecutive patients presenting as STEMI, with chest pain or syncope and ECG evidence of ST elevation were included. Patient level data was collected from electronic records and local STEMI data base. CMR results of patients admitted to the primary PCI centre were examined to ascertain the aetiology. Troponin levels recorded from PPCI centre.

Results A total of 1687 STEMI patients presented for primary PCI from Jan 2016 to Sep 2019. Of these STEMI patients 7.7% (n=130) had angiographically proven non-obstructive coronary arteries [male (73.8%), female (26.2%)] [figure 1]. Of these 130 patients 55.3% were repatriated to their base hospital according to national STEMI policy and further investigations were undertaken locally if at all, but not recorded in this study. Of the 130 patients with non-obstructive coronaries 44.7% (n=58) were managed in the PPCI centre. Troponin levels were elevated in 2% of patients with non-obstructive coronaries. Of patients with ST elevation who subsequently had an high troponin 59% (n=18) underwent CMR during the index admission or within 30 days. Of these CMR scans 83% (n=15) were abnormal and 3 patients (23%) had a normal CMR [table 2], most common abnormality (33%) was myocardial infarction.

Conclusion Non-obstructive coronaries were found in 2% of all STEMI presentations in this study. CMR can be instructive as to the aetiology of MINOCA, and yields a diagnosis in the majority of cases (83%). However, despite non-obstructive coronary angiography myocardial infarction remains the most common diagnosis in patients with ST elevation and raised troponin, greater consideration may need to be given to intra-coronary imaging or investigation of cardio embolic sources of infarction to ensure appropriate secondary prevention.

Study Limitations This study has some limitations, it is a retrospective analysis and data from a single Irish primary PCI centre. Furthermore, majority of patients with STEMI and

Abstract 1 Figure 1 Study flow chart

Abstract 1 Figure 2 CMR diagnosis

non-obstructive coronary arteries after undergoing coronary angiography were transferred to base hospital and further data on the investigations to ascertain the aetiology of presentation was not available. Also, intracoronary provocation testing and intracoronary imaging was not performed in any of these patients to further clarify coronary cause of presentation.

2 ARRHYTHMOGENIC SUBSTRATE STRATIFICATION OF POSTERIOR LEFT ATRIAL WALL IN ATRIAL FIBRILLATION VERSUS SINUS RHYTHM IN PERSISTENT ATRIAL FIBRILLATION USING AUTOMATED VOLTAGE ANALYSIS

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Introduction Pulmonary vein isolation (PVI) remains the main procedural target in atrial fibrillation (AF) ablation. The posterior left atrial (LA) wall contains multiple potential mechanisms that can initiate and sustain persistent AF (PeAF) and is frequently considered as an important target of both substrate modification and isolation. Higher scar burden in the posterior wall drives the motivation for this strategy in patients with PeAF, and accurate quantification of scar burden is crucial in deciding on the benefit of posterior wall isolation (PWI).

Study Aim To analyse and quantify low voltage area (LVA) burden on the posterior wall in PeAF and analyse the effect of mapping rhythm on LVAs.

Methods We retrospectively selected patients undergoing de novo ablation for PeAF with no additional lines. Patients had failed at least one antiarrhythmic drug. We selected a standardised procedure of initial mapping in AF, followed by repeat mapping in SR post PVI. Each map required ≥ 1000 voltage points in AF and SR. Each atrial map was split into 6 anatomical segments for regional comparison, including the Posterior, Anterior, Lateral, Septal, Roof and Floor anatomical segments. We removed the mitral annulus, trans-septal puncture site and pulmonary veins from analysis (figure 1). Each segment was analysed using an automated Voltage Histogram Analysis tool (VHA) to categorise endocardial area into 10 voltage ranges between 0-0.5mV (figure 1). Voltage categories

≤ 0.2 mV were assigned as 'Dense Scar' and categories 0.21-0.5mV designated 'Diseased LA Tissue'. Output data were analysed with SPSS v.26.

Results The posterior wall had significantly higher burden of Dense Scar (≤ 0.2 mV) points when mapped in AF (AF=234 mm² $\pm$ 150.45, SR=138.27mm² $\pm$ 112.3, $p < 0.001$), while all other walls were comparable in this range (table 1). The inter-rhythm difference between anatomical segments was much greater at voltages 0.21-0.5mV, with significant differences in all segments except for the roof and the floor (figure 2). The greatest observed difference between rhythms in this range

Abstract 2 Figure 1 Example of posterior anatomical segment VHA analysis

Figure 1: Example of fast anatomical map prior to analysis (Top image). The second image (Bottom Image) is an example analysis of the anterior anatomical segment, by temporary removal of other anatomical segments in addition to the trans-septal puncture site, mitral annulus and pulmonary veins. An example voltage histogram analysis table has been generated based on this segment voltage, to the right.

Abstract 2 Table 1 Table demonstrating mean LA wall LVA identified in different voltage ranges when mapped in different rhythms

Table 1: Comparison of LVA burden of the Poster Wall, followed by each anatomical segment when mapped in SR and AF. The mean area difference between rhythms, in mm², is displayed in addition to percentage difference.

Anatomical Segment	LVA Burden ≤ 0.2 mV (mean area $\pm$ SD mm ²)				LVA Burden 0.21-0.5mV (mean area $\pm$ SD mm ²)			
	SR	AF	Mean Difference (%)	P value	SR	AF	Mean Difference (%)	P value
Posterior	102.14 $\pm$ 157.47	159.03 $\pm$ 194.65	56.89 (55.7%)	0.02*	138.27 $\pm$ 112.28	234 $\pm$ 150.45	95.73 (69.2%)	<0.001*
Lateral	70.5 $\pm$ 80.00	90.57 $\pm$ 117.99	20.07 (28.5%)	0.36	87.52 $\pm$ 66.82	137.05 $\pm$ 104.99	49.53 (56.5%)	<0.001*
Anterior	131.8 $\pm$ 169.53	126.5 $\pm$ 154.57	5.3 (4%)	0.85	158.53 $\pm$ 99.22	220.87 $\pm$ 173.07	62.34 (39.3%)	0.002*
Roof	82.72 $\pm$ 117.32	83.68 $\pm$ 113.56	0.96 (1%)	0.95	115 $\pm$ 77.14	150.61 $\pm$ 93.17	35.61 (31%)	0.01*
Floor	105.1 $\pm$ 134.91	106.42 $\pm$ 148.67	1.32 (1.2%)	0.96	117.62 $\pm$ 85.41	151.2 $\pm$ 110.07	33.58 (28.5%)	0.052
Septal	80.99 $\pm$ 89.03	74.16 $\pm$ 87.59	6.83 (8.4%)	0.68	99.123 $\pm$ 73.62	115.37 $\pm$ 84.83	16.25 (16.4%)	0.18

*Denotes significance. LVA = Low Voltage Area; SR = Sinus rhythm; AF= Atrial Fibrillation.