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ARTYKUŁ ORYGINALNY / *ORIGINAL ARTICLE*

Comparison between fragmented QRS and Q waves in myocardial scar detection using myocardial perfusion single photon emission computed tomography

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Abstract

Background: Accurate diagnosis of myocardial infarction (MI) is of paramount importance in patient management, which necessitates the development of efficient and accurate diagnostic methods. Q wave is not present in all patients with MI, and its prevalence is declining. Recently, fragmented QRS (fQRS) complex has been introduced as a marker of prior MI.

Aim: To investigate diagnostic value of fQRS compared to Q wave.

Methods: We included 500 consecutive patients with known or suspected coronary artery disease who underwent two days of gated myocardial perfusion imaging using dipyridamole pharmacologic stress. Electrocardiogram (ECG) was evaluated to detect fQRS as well as Q-wave. Finally, subjects were compared in terms of ventricular perfusion and function indices.

Results: A total of 207 men and 269 women with mean age of 57.06 ± 12 years were studied. ECG analysis showed that 14.3% of the patients had both fQRS and Q waves, 30.7% had fQRS, and 3.8% had Q waves. Fixed myocardial perfusion defect was noted in 22.3% of patients according to MPIs. Sensitivity, specificity, and positive and negative predictive values for myocardial scar detection were 78%, 65%, 39%, and 91%, respectively, for fQRS and 61%, 94%, 76%, and 89%, respectively, for Q wave.

Conclusions: Although fQRS had lower specificity compared to Q wave in the detection of myocardial scar, due to higher sensitivity and negative predictive value can be an invaluable diagnostic index. There is also an incremental value for fQRS in association with Q-wave in myocardial scar assessment.

Key words: myocardial infarction, fragmented QRS, Q wave, myocardial perfusion imaging

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INTRODUCTION

Coronary artery disease (CAD) is known as a leading cause of death, and the most serious complication of this entity is myocardial infarction (MI), which results in serious damage to cardiac function [1]. Previous MI largely affects patient management and prognosis [2], and non-invasive diagnostic markers for detection of previous MI are exhaustively sought.

The considerably high global incidence of CAD with its dire health repercussions in terms of morbidity, mortality, and treatment costs [3] shows the importance of simple, accessible, and cost–effective diagnostic tools. The most attractive and universal modality that meets almost all of the mentioned attributes is electrocardiography (ECG).

Pathological Q wave on a 12-lead ECG is a well-known marker for detecting previous MI with certain limitations: Firstly, Q-waves do not always appear on post-MI ECG and can regress or even disappear over time in 25–60% of patients [4]. Secondly, the Q-wave to non-Q-wave MI ratio drastically declines in response to immediate and aggressive therapeutic

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interventions [5]. Finally, MI, particularly in the posterolateral segment, does not always manifest as Q wave [6].

Q waves can occur in other clinical situations besides MI. Therefore, although pathological Q waves on 12-lead ECG are indicative of abnormal cardiac electrophysiology, they cannot be specifically inferred as irreversible myocardial damage. Indeed, certain reports have not found Q waves to be of any practical use in MI detection in two thirds of cases [7, 8].

Recent studies suggested that fragmentation in QRS complex may be correlated with ventricular electrical malfunction due to myocardial scar and/or ischaemia [9]. The most plausible explanation for this phenomenon is QRS morphology alteration as a result of electrical disruption following myocardial damage [10]. Nevertheless, this warrants further investigation because fragmented QRS (fQRS) is a relatively new marker with contradictory results reported in different studies. This study was originally intended to compare fQRS and Q wave in terms of their diagnostic value for prior MI detection, as well as their correlation with perfusion and functional abnormalities detected on myocardial perfusion imaging (MPI).

METHODS

In this prospective study, from November 2012 to July 2013, 500 consecutive patients with suspected or confirmed diagnosis of CAD, who were referred to our department for MPI, have been evaluated. Following a thorough medical history, they all underwent a two-day dipyridamole stress-rest 99m-Tc-MIBI Gated single photon emission computed tomography (GSPECT). On the first day, each patient received 740–925 MBq 99m-Tc-sestamibi intravenously following dipyridamole infusion for 4 min at a dose of 0.142 mg/kg/min. Post-stress gated tomographic images were obtained 90 min afterwards in the supine position, using a dual-head gamma-camera (Dual-Head Variable-Angle E.CAM; Siemens), equipped with low energy, high-resolution collimator, with the energy photo-peak set at 140 keV and a 20% symmetric window, while the two heads were placed in an L-shaped configuration. Thirty-two projections were taken with 25 s per view over a 180° arc commencing from the right anterior oblique to left posterior oblique view. We used a zoom factor of 1.45, gating at eight frames per cardiac cycle.

The next day, rest GSPECT was performed 90 min after another intravenous injection of 740–925 MBq Tc99m-sestamibi with the same acquisition protocol. The images were stored in a 64 × 64 matrix on a computer and reconstructed by filtered back projection using a Butterworth filter. No attenuation or scatter correction was applied. All reconstructed tomographic images were consensually interpreted by two experienced physicians, blind to clinical as well as ECG findings. Stress and rest tomogram images were evaluated visually with respect to defect reversibility, categorised as normal, completely reversible, fixed defect, and partially reversible defect.

The 17-segment model and five-point scoring system (0 — normal perfusion; 1 — mildly reduced uptake; 2 — moderately reduced uptake; 3 — severely reduced uptake; and 4 — absent uptake) was used for semi-quantitative assessment of myocardial perfusion (including six basal, six mid-ventricular, and four apical segments in short-axis slices and one additional mid-ventricular apical slice in the vertical long axis). The summed stress score (SSS), summed rest score (SRS), and the summed difference score [(SDS) = SSS – SRS] were subsequently calculated.

Regional myocardial scar was defined as a total regional SSS and SRS equal to or more than three, and stress-induced ischaemia was defined as a regional SSS and SRS of three or more and SDS equal to or more than two, corresponding to anterior (left anterior descending artery [LAD] territory), lateral (left circumflex artery [LCX] territory), and inferior (right coronary artery [RCA] territory) regions.

We used a commercially available automated program, quantitative gated SPECT (QGS), for calculation of end-diastolic volume, end-systolic volume, and left ventricular ejection fraction. Transient ischaemic dilation (TID) ratio was calculated using ECTb software.

In the next step, the patients' 12-lead resting ECGs were evaluated by a cardiac electrophysiologist who was also blind to MPI results. The ECGs with QRS morphology indicating typical bundle branch block, pace rhythm, or any kind of significant conducting abnormalities were excluded from the study. Fragmentation in QRS complex as defined by Das et al. [11] includes the presence of an initial R wave followed by an S wave and a terminal positive deflection (R') on the resting 12-lead ECG (filter range: 0.16–100 Hz, AC filter: 60 Hz and paper speed: 25 mm/s, 10 mm/mV). The presence of ST segment elevation with or without RSR' pattern or fragmentation was also recorded. Figure 1 shows different patterns of fQRS. Fragmented wide-QRS complexes (QRS duration > 120 ms) were also excluded from the study.

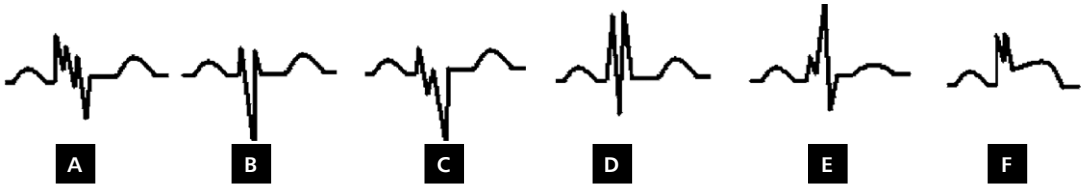

Figure 1. Examples of different patterns of QRS complex which categorised as fragmented QRS (fQRS); **A**. fQRS; **B**. rSr'; **C**. Notched S; **D**. RSR'; **E**. Notched R; **F**. RsR' with ST elevation

Table 1. The comparison of the main coronary artery disease (CAD) risk factors among patients with and without fragmented QRS (fQRS) in 12-lead electrocardiogram

Risk factor (n)	Age	fQRS	No fQRS	P
Hypertension (n = 239)	59.12 ± 11.06 (23–87)	106 (44.35%)	133 (55.65%)	0.431
Diabetes mellitus (n = 131)	58.86 ± 11.19 (31–87)	71 (54.19%)	60 (45.81%)	0.008
Hyperlipidaemia (n = 184)	57.12 ± 10.77 (23–85)	89 (48.36%)	95 (51.64%)	0.137
Smoking (n = 54)	54.07 ± 10.89 (30–77)	32 (59.26%)	22 (40.74%)	0.018
History of known CAD (n = 116)	58.18 ± 10.70 (33–82)	72 (62.07%)	44 (37.93%)	< 0.001
PCI (n = 21)	58.71 ± 9.83 (43–78)	11 (52.38%)	10 (47.62%)	0.316
CABG (n = 66)	58.47 ± 10.90 (33–82)	43 (65.15%)	23 (34.85%)	< 0.001

CABG — coronary artery bypass graft; PCI — percutaneous coronary intervention

Fragmented QRS included various RSR′ patterns with or without Q waves in two contiguous leads corresponding to a major coronary artery territory [11, 12]. As defined by Das et al. [11], fQRS on two or more consecutive anterior leads (V_1 to V_5) were considered as a sign of myocardial scar in LAD territory. Fragmented QRS in two or more lateral (I, V_5, V_6 and aVL) or inferior (II, III, aVF) leads was assigned to myocardial scar in LCX and RCA territories, respectively. By definition, a pathologic Q was one with duration of ≥ 0.04 and a depth of more than one fourth of the consequent R wave [11]. Pathological Q waves in at least two anterior, lateral, and inferior leads were considered a marker of MI in LAD, LCX, or RCA territories, respectively. The frequency of different fQRS patterns was assessed in each coronary artery territory separately.

Data was analysed by SPSS 11.5 software. Univariate analysis was used for description of the data. χ^2 test, independent sample t-test, one-way ANOVA, and Mc-Nemar tests were used for statistical comparisons. A p-value of < 0.05 was considered significant in all comparisons.

Fragmented QRS and Q waves were subsequently assessed in terms of sensitively, specificity, positive (PPV) and negative predictive values (NPV), and accuracy for detection of scar, and their 95% confidence interval in each myocardial territory was determined.

Finally, logistic regression was done for the effect of the different variables for prediction of myocardial scar.

RESULTS

With 24 cases excluded from the study (according to the exclusion criteria delineated before), a total of 476 patients (207 men) ranging from 23 to 87 years of age (57.06 ± 12) were registered. There were 18 (3.8%) patients with only Q waves, whereas 146 patients had only fQRS on ECG. Those with neither Q-wave nor fQRS totalled 244 (51.3%).

From 269 female patients 93 (34.57%) had fQRS and 176 (65.42%) did not have fQRS in their ECG (p < 0.001). There was fQRS in the ECGs of 121 (58.45%) patients from 207 male patients, while 86 (41.54%) male patients did not have fQRS (p < 0.001). As shown in Table 1, there was a statistically significant difference between those with and without fQRS regarding sex, diabetes mellitus, smoking, past history of CAD/coronary artery bypass grafting (CABG). Yet, these variables were not statistically different when comparing patients with fQRS and Q waves.

The mean age was higher in patients with fQRS compared to patients without fQRS: 58.4 and 55.96, respectively (p = 0.02), whereas it was statically non-significant between patients with fQRS and Q wave (59.33 vs. 57.05, p = 0.55).

From 476 patients, 276 (58%) had normal MPI while 94 (19.7%) patients showed some degree of myocardial ischaemia, 28 (5.9%) patients had myocardial scar, and 78 (16.4%) patients showed a combination of MI and ischaemia. Thus, there were 106 (22.3%) patients with and 370 (77.7%) patients without evidence of myocardial scar in their scintigraphy, respectively. The most frequent fQRS pattern in the LAD zone was "notched S" (36.9%), while "notched R" was the most common pattern in fQRS pertaining to RCA (31.9%) and LCX (68.75%) zones. The most frequent fQRS pattern combination in all territories was the concurrent existence of "notched S" and "notched R". As the other patterns of fQRS were not quantitatively frequent enough in main vessel territories, the correspondence of these patterns with myocardial scar in the same zones was not statistically assessable. Figure 2 shows an example of a patient with MI and the presence of fQRS in his corresponding ECG leads.

The frequency of fQRS in patients with normal MPI, reversible defect, fixed defect, and reversible + fixed defects was 36.2%, 33.9%, 75.8%, and 78.1%, respectively. Fragmented QRS showed a sensitivity of 57%, specificity of 64%, and PPV and NPV of 53% and 67%, respectively, in the perdition of any MPI abnormality (reversible defect, fixed defect, or both). The frequency of abnormal MPI in patients with fQRS was significantly higher than in patients without this marker (p < 0.001).

Table 2 shows the diagnostic values of fQRS and Q wave for myocardial scar detection. We also compared fQRS and Q wave in territories of LAD, RCA, and LCX separately (Table 2).

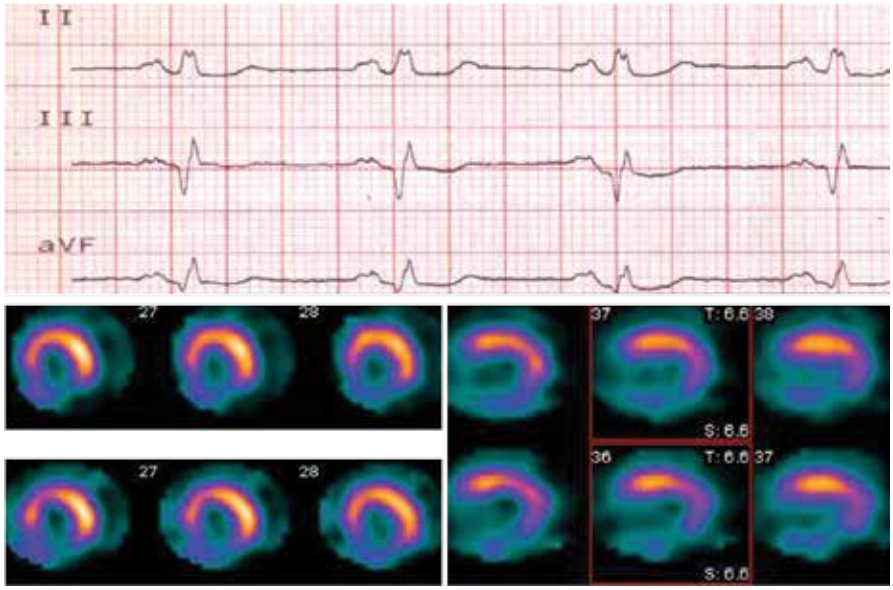

Figure 2. A 67-year-old male with history prior myocardial infarction and recent atypical chest pain was referred for myocardial perfusion imaging. The 12-lead resting electrocardiogram showed fragmentation in QRS complexes in inferior leads (II, III, and aVF). The two-phase myocardial perfusion scintigraphy showed severely decreased tracer uptake in the inferior and infero-septal segments in both phases, corresponding to right coronary artery territory

Table 2. Diagnostic values of fragmented QRS (fQRS) and Q wave in all as well as in different coronary artery territories (with 95% confidence intervals)

		Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
LAD	fQRS complex	52 (42–62)	87 (83–90)	52 (43–62)	87 (83–90)
	Q wave	40 (31–50)	98 (96–99)	82 (72–93)	85 (82–89)
	fQRS and Q	31 (24–40)	99 (99–100)	94 (86–100)	84 (80–87)
	fQRS or Q	88 (81–94)	62 (57–67)	39 (33–46)	95 (92–97)
RCA	fQRS complex	51 (41–61)	77 (73–81)	38 (30–46)	85 (81–89)
	Q wave	25 (17–33)	98 (96–99)	74 (60–89)	82 (79–86)
	fQRS and Q	19 (12–27)	98 (97–99)	74 (58–91)	81 (78–85)
	fQRS or Q	57 (47–66)	76 (72–81)	40 (32–48)	86 (83–90)
LCX	fQRS complex	15 (18–22)	96 (94–98)	50 (33–67)	80 (76–84)
	Q wave	7 (2–12)	99 (98–100)	70 (42–98)	79 (75–83)
	fQRS and Q	5 (1–9)	100	100	79 (75–83)
	fQRS or Q	17 (10–25)	95 (93–97)	49 (33–65)	80 (77–84)
Total	fQRS complex	78 (70–86)	65 (60–69)	39 (32–45)	91 (88–95)
	Q wave	61 (52–71)	94 (92–97)	76 (67–85)	89 (86–93)
	fQRS and Q	53 (43–62)	97 (95–99)	82 (73–91)	88 (85–91)
	fQRS or Q	87 (80–93)	62 (57–67)	40 (33–46)	94 (91–97)

LAD — left anterior descending artery; LCX — left circumflex artery; RCA — right coronary artery; NPV — negative predictive value; PPV — positive predictive value

The myocardial perfusion and function indices were compared in patients with and without fragmentation in QRS complex. Except for TID ratio, all indices showed statistically significant differences between the two groups (Table 3).

Univariate analysis showed that age, sex, smoking, history of CAD, percutaneous coronary intervention (PCI), or CABG and fQRS in ECG were significantly different between patients with myocardial scar (fixed defect or fixed defect + reversible

Table 3. The comparison of different myocardial perfusion and function indices achieved by gated myocardial perfusion SPECT among patients with and without fragmented QRS (fQRS) in 12-lead electrocardiogram

	No fQRS	fQRS	P
Visual summed stress score	2.80 ± 4.97	7.71 ± 9.11	< 0.001
Visual summed rest score	1.30 ± 3.68	5.62 ± 8.18	< 0.001
Visual summed difference score	1.4 ± 2.69	2.05 ± 3.00	0.032
Stress ejection fraction	73.94 ± 16.08	61.08 ± 21.36	< 0.001
Rest ejection fraction	73.77 ± 15.97	60.89 ± 20.31	< 0.001
Stress end-systolic volume	19.28 ± 30.10	39.67 ± 44.32	< 0.001
Rest end-systolic volume	19.52 ± 30.60	38.78 ± 40.12	< 0.001
Stress end-diastolic volume	57.59 ± 39.22	81.06 ± 52.05	< 0.001
Rest end-diastolic volume	57.69 ± 37.48	80.82 ± 47.52	< 0.001
Stress volume	50.36 ± 38.37	74.90 ± 51.11	< 0.001
Rest volume	51.10 ± 37.41	74.95 ± 48.32	< 0.001
Transient ischaemic dilatation	1.016 ± 0.16	1.017 ± 0.16	0.962
Summed stress score	2.95 ± 4.99	7.42 ± 8.83	< 0.001
Summed rest score	1.22 ± 3.88	4.97 ± 7.33	< 0.001
Summed stress motion score	4.15 ± 8.29	12.82 ± 14.14	< 0.001
Summed rest motion score	4.18 ± 8.17	11.67 ± 13.24	< 0.001
Summed stress thickening score	1.88 ± 5.26	6.90 ± 9.54	< 0.001
Summed rest thickening score	1.98 ± 5.30	6.72 ± 9.09	< 0.001
Heart rate before dip injection	75.27 ± 3.34	73.84 ± 5.06	0.289
Heart rate after dip injection	86.72 ± 15.17	85.65 ± 13.67	0.478
Heart rate difference dip injection	11.45 ± 16.60	11.80 ± 15.73	0.730
Heart rate during stress acquisition	72.99 ± 13.32	73.32 ± 13.08	0.783
Heart rate during rest acquisition	69.50 ± 13.24	69.89 ± 12.70	0.747

defect) and without the myocardial scar, whereas in multivariate analysis (using multiple logistic regression), only age, sex, CAD history, and fQRS were statistically significant (Table 4). Therefore, as shown in Table 4, fQRS comes second to the history of CAD as the most powerful predictor of myocardial scar.

DISCUSSION

This prospective study was performed with the aim of comparing the diagnostic value of two ECG markers, fQRS and Q wave, in myocardial scar detection.

Q waves, as an established sign of previous MI, is limited in its diagnostic value, as shown by several reports [4–6, 8]. Hence, looking for other available marker(s) with acceptable accuracy is warranted.

Attention to changes in QRS complex morphology dates back to the 1960s [13], but only recently it was proposed as a diagnostic marker of prior MI [14]. Thus far, some prognostic and diagnostic studies have been published to assess the significance of fQRS, with contradictory results [15–19]. In the current study, patients with fQRS were older than patients without fQRS ($p < 0.001$). This finding was similar to that of the study by Cetin et al. [20], while it was contrary to the results of Das et al. [11], which reported a non-significant difference in age between patients with and without fQRS ($p = 0.348$). In order to minimise the bias we decided to compare this parameter in patients with and without Q waves, with both groups showing significant differences in mean age. This was also true for comparison between those with and those without myocardial scar ($p < 0.0001$). These findings show that the differences in age and gender are probably clinically relevant. There were also statistically significant differences in the frequency of other CAD risk factors including diabetes mellitus, smoking, and history of PCI and/or CABG, between patients with and without fQRS. This finding was also corroborated by Mahenthiran et al. [21], but it is still contrary to the findings of Das et al. [11].

As seen in Table 2, fQRS has higher sensitivity than NPV but lower specificity and PPV than Q wave in the detection of scar, i.e. its presence is not highly in favour of myocardial scar, whereas its absence almost rules out previous MI: 94% of those with neither fQRS nor Q waves on ECG were shown to have no myocardial scar in their MPIs. On the other hand, the simultaneous occurrence of fQRS and Q wave on 12-lead ECG increased the specificity and PPV for MI detection considerably.

In Table 5, there are brief findings of diagnostic values of fQRS in previous studies. Sensitivity and NPV of fQRS in our study were, to a large extent, similar to Das et al. [11], yet they reported higher specificity (89% vs. 65%) and PPV (84% vs. 39%). Another cohort study on 466 consecutive patients

Table 4. The influence of modelled factors in prediction of myocardial scar using myocardial perfusion imaging

CAD risk factors	Regression coefficient	Odds ratio	95% CI	P
Sex (female)	–1.3	0.272	0.15–0.47	< 0.001
Age	0.03	1.03	1.01–1.06	0.001
Hypertension	–0.18	0.83	0.48–1.42	0.501
Smoking	0.62	1.86	0.87–3.95	0.106
PCI	–0.28	0.75	0.22–2.45	0.634
CABG	–1.09	0.33	0.13–0.85	0.021
Known CAD	2.14	8.56	3.65–20.11	< 0.001
fQRS	1.60	4.98	2.82–8.76	< 0.001

CAD — coronary artery disease; CABG — coronary artery bypass graft; CI — confidence interval; PCI — percutaneous coronary intervention

Table 5. A brief description of diagnostic values for fragmented QRS (fQRS) in myocardial scar detection in some previous studies

Authors	Study design	Sensitivity (%)			Specificity (%)			PPV (%)			NPV (%)		
		fQRS	Q	Both	fQRS	Q	Both	fQRS	Q	Both	fQRS	Q	Both
Das et al. 2006 [11]	Prospective on known or suspected for CAD (479)	85.6	36.3	91.4	89.4	99.2	89.0	83.7	95.7	84.2	87.6	70.0	94.2
Mahenthiran et al. 2007 [21]	Prospective on known or suspected for CAD (409)	75			94			88			84		
Wang et al. 2010 [17]	Prospective on known or suspected for CAD (462)	31.7	18.3	1.7	83.6	98.1	98.9	6.1	25.0	5.0	97.3	97.3	96.8
Ozdemir et al. 2013 [22]	Retrospective on known or suspected for CAD (261)	82.7			55.5			31.6			92.8		

Diagnostic values from Ozdemir et al. [22] were calculated based on reported data in their manuscript. CAD — coronary artery disease; NPV — negative predictive value; PPV — positive predictive value

reported a sensitivity of 32%, specificity of 84%, and NPV and PPV of 97% and 6%, respectively [17]. In other words, they reported excellent NPV but poor sensitivity for fQRS, which was not concordant with other similar studies.

The current study reported higher sensitivity for fQRS in LAD (52%) and RCA territories (51%) compared to LCX (15%). However, fQRS specificity was higher in the LCX zone (96%) than in the LAD (87%) and RCA (77%). Most notably, the simultaneous occurrence of fQRS and Q wave in LCX showed 100% specificity and PPV for regional scar detection. It is also noteworthy to mention the high rates of false positive results of fQRS in RCA territory because QRS fragmentation in lead III can be a normal variant in the elder population [12].

Another interesting finding in our study was a non-significant SDS difference between patients with or without fQRS, despite the significant difference of SSS and SRS. Our result was contrary to the Pietrasik et al. [15] study, which proposed that fQRS may identify ischaemic myocardium. Das et al. [11] and Mahenthiran et al. [21] also came up with a significant difference in all three variables — SDS, SSS, and SRS. However, they only considered fQRS as a reliable marker for previous MI with no comment on the association of fQRS with ischaemia. For further clarification, we evaluated the correlation between fQRS and TID. TID is a known marker of severe ischaemia, and we failed to show any correlation between fQRS and TID ($p = 0.9$). To our knowledge, there is no report regarding the correlation between fQRS and TID in the literature. As mentioned earlier, fQRS seems to occur equal in patients with normal MPI and in those with myocardial ischaemia (36% vs. 33.9%, $p = 0.55$). Additionally, fQRS frequency in patients with MI and those with both MI and ischaemia is almost the same (78.1% vs. 75.8%, $p = 0.4$). These findings show that there is no clinically significant correlation between fQRS and myocardial ischaemia.

Limitations of the study

Our study has several limitations. Firstly, as gated myocardial perfusion SPECT is a semi-quantitative modality, it cannot

measure the absolute myocardial blood flow in any given region. Secondly, we applied the terms "myocardial scar" and "myocardial infarction" interchangeably, ignoring the pathological processes leading only to the former. In fact, MPI is an index of myocardial scar, despite the fact that the most plausible explanation for fixed defect in MPI is previous MI; the two entities are not exactly the same. Thirdly, our assessments were subject to inaccuracy due to variable coronary blood supply to myocardial segments. Fourthly, as the survey was conductive, recruiting a population consisting merely of CAD patients, the results cannot be extrapolated to the normal population.

CONCLUSIONS

In conclusion, fQRS can be used in the detection of myocardial scar with higher sensitivity and NPV than Q wave. Simultaneous occurrence of fQRS and Q wave on 12-lead ECG improves the predictive value in predicting the presence of myocardial scar. However, there was no correlation between fQRS and myocardial ischaemia.

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Porównanie znaczenia fragmentacji zespołu QRS i występowania załamka Q w wykrywaniu blizny pozawałowej na podstawie oceny perfuzji mięśnia sercowego za pomocą tomografii emisyjnej pojedynczego fotonu

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Streszczenie

Wstęp: Dokładna diagnoza zawału serca (MI) ma istotne znaczenie dla postępowania leczniczego. Dlatego konieczne jest opracowanie skutecznej i dokładnej metody diagnostycznej. Załamek Q nie występuje u wszystkich chorych z MI, a jego obecność stwierdza się coraz rzadziej. Ostatnio wprowadzonym markerem przebytego MI jest fragmentacja zespołu QRS (fQRS).

Cel: Niniejsze badanie przeprowadzono w celu oceny wartości diagnostycznej fQRS w porównaniu z załamkiem Q.

Metody: Do badania włączono 500 kolejnych pacjentów z rozpoznaną lub podejrzewaną chorobą wieńcową (CAD), u których wykonano scyntygrafię perfuzyjną mięśnia sercowego techniką bramkowania zgodnie z protokołem dwudniowym, stosując test farmakologiczny z dipiridamolem. Zapisy elektrokardiograficzne (EKG) przeanalizowano pod kątem obecności fQRS i załamków Q. Porównano parametry perfuzji i wskaźniki czynności serca u poszczególnych chorych.

Wyniki: Do badania włączono dane 207 mężczyzn i 269 kobiet, których średnia wieku wynosiła 57,06 ± 12 lat. Analiza EKG wykazała, że u 14,3% osób występowały fQRS i załamki Q, u 30,7% — fQRS, a u 3,8% — załamki Q. W badaniu scyntygraficznym trwały defekt perfuzji stwierdzono u 22,3% chorych. Czułość, swoistość, wartość predykcyjna dodatnia i wartość predykcyjna ujemna w wykrywaniu blizny pozawałowej wynosiły odpowiednio 78%, 65%, 39% i 91% w przypadku fQRS oraz 61%, 94%, 76% i 89% w przypadku załamka Q.

Wnioski: Mimo że fQRS cechowała się mniejszą swoistością niż załamek Q w wykrywaniu blizny pozawałowej, może ona być nieocenionym wskaźnikiem diagnostycznym ze względu na większą czułość i wartość predykcyjną ujemną. Analiza fQRS w połączeniu z załamkiem Q ma dodatkowe znaczenie prognostyczne w ocenie blizn pozawałowych.

Słowa kluczowe: zawał serca, fragmentacja QRS, załamek Q, obrazowanie perfuzji mięśnia sercowego

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