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The value of Doppler-derived myocardial performance index and tricuspid annular motion in the evaluation of right ventricular function in patients with acute inferior myocardial infarction

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Abstract

Background: *Right ventricular infarction (RVI) accompanies inferior myocardial infarction (IMI) in 30–55% of cases and the proximal segment of the right coronary artery (RCA) is the most common infarct-related artery (IRA). Early successful reperfusion radically improves upon an unfavourable early outcome in patients with IMI. Echocardiography is a valuable method, complementary to electrocardiography (ECG) in the identification of RVI. Tricuspid annular motion (TAM) and myocardial performance index (MPI_R) allow the assessment of RV function independent of any geometrical principle. The aim of the study was to assess the value of MPI_R and TAM in the diagnosis of RVI in patients with a first IMI.*

Methods: *Echocardiography was performed on days 2–3 following IMI in 111 patients. Left (LV) and right (RV) ventricular function was assessed with special attention to the signs of RVI: RV segmental asynchrony (in any available view), RV wall motion score index ($WMSI_R$), MPI_R and TAM. On the grounds of ECG findings two groups of patients were analysed: I — 33 patients with RVI and II — 78 patients with no signs of RVI. Echocardiography parameters of RV function were additionally analysed in two subgroups of patients: A — patients with IRA in the proximal segment of RCA (proxRCA) and B — patients with IRA located elsewhere, as well as in a control group of 24 healthy subjects*

Results: *Group I and group II were comparable with respect to age, sex, history of angina prior to IMI, multi-vessel disease and left ventricular function. The mean interval between the onset of IMI and admission to hospital was significantly shorter and hypotension ($\leq$ 95 mm Hg) was more often observed in group I than in group II. Segmental asynergy of RV walls was present in 88% of group I and in only 11% of group II ($p < 0.001$). There were significant differences between group I and group II in $WMSI_R$ (1.42 $\pm$ 0.28 vs. 1.04 $\pm$ 0.21, $p < 0.0001$), TAM (16.9 $\pm$ 1.5 vs. 21.4 $\pm$ 1.8, $p < 0.001$) and MPI_R (0.42 $\pm$ 0.05 vs. 0.29 $\pm$ 0.06, $p < 0.0001$). Significant differences between control group and group I and between control group and group II in TAM and MPI_R were revealed ($p < 0.01$). Both in group I and group II the mean values of TAM were lower and those of MPI_R higher in the A than in the B subgroups.*

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A sensitivity and specificity test showed that $MPI_R \geq 0.36$ and TAM ≤ 19.5 mm argue for RVI. At least one of these abnormal values was noted in all patients with RVI. Coexistence of both abnormal values of MPI_R and TAM was significantly more often observed in group IA than in group IB (91% vs. 73%, $p < 0.05$) and in group IIA than in group IIB. Multivariate logistic regression analysis has established that MPI_R and TAM increase the probability of a diagnosis of RVI in the same proportion (15.3-time and 15.6-time respectively).

Conclusions: *In patients with IMI echocardiography parameters — MPI_R and TAM are supplementary to clinical and ECG data and are useful easily obtainable indicators of RVI. In patients with IMI RV dysfunction is related to the localisation of IRA.* (Folia Cardiol. 2006; 13: 369–378)

Key words: echocardiography, Doppler, myocardial infarction, myocardial performance index

Introduction

Right ventricular infarction (RVI) accompanies inferior myocardial infarction (IMI) in 30–55% of cases [1–3]. The right coronary artery (RCA) is the most common infarct-related artery (IRA) and the occlusion of the proximal segment of the RCA is often observed in RVI [4, 5]. Characteristic findings on physical examination may be absent despite non-invasive evidence of RV involvement [6]. It has been recognised that RVI unfavourably affects the early outcome in patients with IMI [1, 3, 6, 7], and that early successful reperfusion results in a dramatic recovery of right ventricular (RV) function and an excellent clinical outcome [4, 8, 9].

The mechanism of the relative resistance of the RV to ischaemia is complex and is attributable to it's more favourable oxygen supply — demand characteristics. The RV has less myocardial mass, faces lower preload and afterload and receives a double blood supply from the left and right coronary artery; there is a biphasic — systolic and diastolic RV coronary blood flow and a rich left-to-right collateral system. Several studies have shown the spontaneous recovery of RV function in most patients with IMI [10–12]. However, RV dysfunction after IMI is an independent risk factor of higher long-term mortality [13].

Electrocardiography (ECG) is the most simple and available diagnostic tool for early identification of RVI. Echocardiography is another useful readily available method. Evaluation of RV function with echocardiography is difficult owing to the complex geometry of the RV and the inter-relations between the two ventricles, which is why analysis of several echocardiographic parameters of RV function is recommended [14]. Both the tricuspid annular motion (TAM) that reflects RV motion in the meridional direction [15, 16] and the myocardial performance index (MPI) derived from the time intervals of the cardiac cycle [17] allow assessment of RV function independently of a geometric model.

The aim of the study was to assess the value of RV MPI (MPI_R) and TAM in the diagnosis of RVI in patients with a first IMI.

Methods

One hundred and eleven patients following a first IMI with ST-segment elevation and treated with primary percutaneous coronary intervention (pPCI) entered the study. Myocardial infarction was diagnosed according to accepted criteria [18]. The taking of the decision of stent implantation and infusion of the inhibitor of the platelet receptor IIb/ /IIIa depended on the character of the coronary lesion and the clinical data. Pharmacological treatment was applied in accordance with current standards. The exclusion criteria were: chronic obstructive pulmonary disease, pulmonary embolisation, significant valvular disease and poor quality of echocardiographic recordings. On account of the methodology of derivation of the MPI [19] atrial fibrillation, atrioventricular conduction disturbances and temporal or permanent pacing were additional exclusion criteria.

The presence of hypotension (systolic blood pressure $\leq$ 95 mm Hg), and pulmonary congestion was noted. In view of the fact that blood pressure assessed on admission is a product of haemodynamic compromise arising from myocardial infarction and pharmacological treatment we determined the presence of hypotension on the grounds of the measurement of blood pressure during the pre-hospital period, at the first medical contact, before the initiation of the therapy.

ECG criteria were used to diagnose RVI: ST-segment elevation of $\geq$ 1 mm in the right precordial leads V3–V4 and/or ST-segment elevation in lead III exceeding that of lead II, coexisting with ST-segment depression in lead I and aVL [20]. Coronary angiograms were analysed to determine IRA and the presence of critical lesions in another location.

Echocardiograms were obtained on days 2–3 following IMI with the Sonos 5500 system and S3 probe. Measurements were performed according to the American Society of Echocardiography recommendations [21]. The presence of RV segmental wall asynergy (SA_R) was determined if at least one segment of the RV wall in the parasternal, apical or subcostal echocardiograms was asynergic. Right ventricular wall motion score (normal — 1; hypokinetic — 2; akinetic — 3; dyskinetic — 4) was assessed in three equal segments of the RV free wall at the apical four-chamber view and a wall motion score index ($WMSI_R$) was calculated as the average of the three scores.

Tricuspid annular motion (TAM) was analysed at the apical four-chamber view with an M-mode cursor placed at the junction of the tricuspid annulus and the RV free wall (Fig. 1). MPI_R was derived from the two-pulsed Doppler recordings (Fig. 2): RV inflow from the apical four-chamber view with the pulsed wave Doppler sample volume placed at the tips of the tricuspid valve (TVf) and RV outflow from the parasternal short axis view with the pulsed wave Doppler sample volume placed just below the pulmonary valve (PVf). MPI_R was calculated as (a–b)/b (where *a* represents the time between the two consecutive TVf and *b* represents the PVf). To account for the slight variations in the blood flow within the right heart while breathing the measurements were made on exhalation. The echocardiograms were recorded on magnetic disc for subsequent analysis. Two or three pairs of Doppler recordings of PVf and TVf of the same R-R interval (difference between R-R ≤ 5 ms) were analysed and

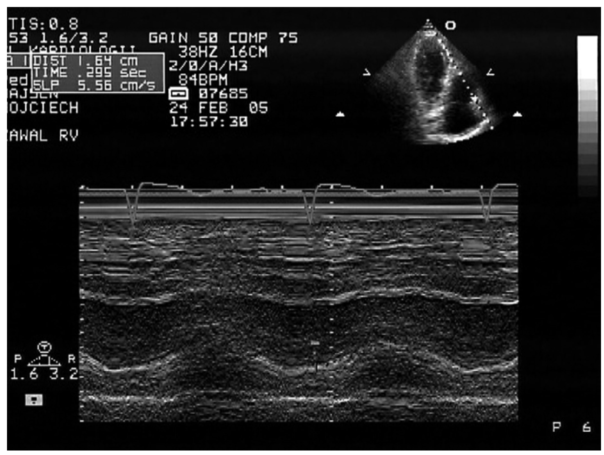

Figure 2. Measurement of tricuspid annular motion.

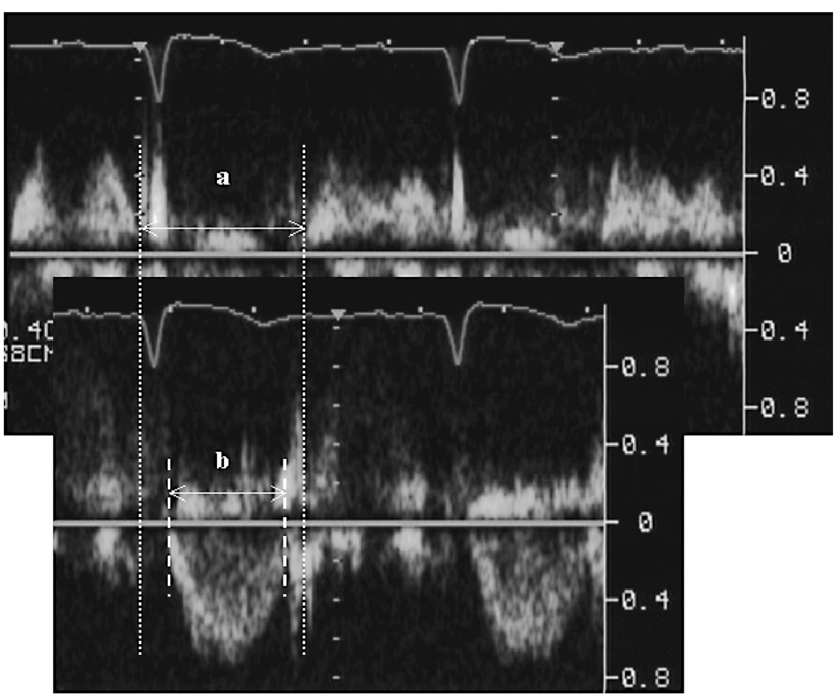

Figure 1. Derivation of RV myocardial performance index.

the mean values of the measurements were used for the calculation of MPI_R. Left ventricular (LV) function was assessed with ejection fraction (EF) derived from the biplane Simpson's formula and wall motion score index calculated for 16 segments ($WMSI_L$).

On the grounds of the ECG diagnostic criteria two groups of patients were analysed: group I — patients with RVI and group II — patients without RVI. Echocardiographic parameters of RV function were additionally analysed in two subgroups of patients: A — patients with IRA in the proximal segment of RCA and B — patients with IRA localised elsewhere, as well as in a control group of 24 healthy subjects.

Statistical analysis

Quantitative data are expressed as mean ± standard deviation (SD). Data that did not demonstrate a Gaussian distribution were log-transformed. The comparison of the two groups was analysed by Student's *t*-test of unpaired samples. A one-way analysis of variance (ANOVA) was performed to test the differences between three or more groups followed by the LSD test (least significant differences). Categorical variables were expressed as the number and percentage of patients and compared between groups by the χ^2 test. The cut-off values of MPI_R and TAM for RVI diagnosis were determined with a sensitivity and specificity test. The probability of RVI diagnosis with cut-off values determined in this way was evaluated with the sensitivity and specificity test. A multiple logistic regression model, including independent variables that related to a dependent variable in the univariate analysis, was utilised to identify echocardiographic predictors of RVI diagnosis. Results were expressed as odds ratio (OR) and confidence interval (CI). The final model of multiple logistic regression is presented in Table 5. $P < 0.05$ was considered statistically significant.

Results

The baseline characteristics of the study group are presented in Table 1. Patients with and without RVI on ECG were comparable with respect to age, sex, and history of angina prior to IMI. The mean interval between the onset of IMI and admission to hospital was significantly shorter and low blood pressure (≤ 95 mm Hg) was observed more often in the group of patients with RVI on ECG. Multi-vessel disease was detected in the same proportion of patients in both groups.

Echocardiographic assessment

Left ventricular function assessed with EF and $WMSI_L$ was comparable in the two groups analysed. Significant differences between groups of patients with or without RVI on ECG were detected in the parameters concerning RV function (Table 2). Right ventricular free wall segmental asynergy was more often observed and was more pronounced (a higher mean value of $WMSI_R$) in group I; mean values of MPI were significantly higher and TAM lower. There was also a significant difference in TAM and MPI_R between the study groups and the control group ($p < 0.01$). Table 3 shows the relation between the location of IRA and the degree of RV dysfunction. In both groups, with and without RVI, the mean value of MPI_R was significantly higher and TAM lower in the subgroup of patients with the IRA in the proximal segment of the RCA than where there was another location of the IRA.

The analysis of sensitivity and specificity revealed that the values of $MPI_R \geq 0.36$ and TAM ≤ ≤ 19.5 mm identify the RVI most accurately (Fig. 3, 4).

Table 1. Clinical characteristics of the study group in relation to the presence (group I) or absence (group II) of electrocardiographic signs of right ventricular involvement.

	Group I (n = 33)	Group II (n = 78)	p
Age (years)	59 ± 10.37	58 ± 9.91	NS
Men	20 (61%)	58 (74%)	NS
History of angina prior to inferior myocardial infarction	33%	39%	NS
Interval between the chest pain and admission to hospital [h]	3.2 ± 2.05	4.4 ± 2.4	< 0.02
Systolic blood pressure	105 ± 23.24	130 ± 21.28	< 0.0001
Systolic blood pressure ≤ 95 mm Hg	16 (48%)	3 (4%)	< 0.0001
Pulmonary congestion	3 (9%)	17 (22%)	NS
Multi-vessel disease	17 (51%)	47 (60%)	NS

Table 2. Echocardiographic parameters of left and right ventricular function in patients with inferior myocardial infarction according to the presence (GI) or absence (GII) of electrocardiographic signs of right ventricular involvement and in the control group (CG).

	GI (n = 33)	GII (n = 78)	CG (n = 24)	p (GI vs. GII)	p (GI vs. CG)	p (GII vs. CG)
EF	60 ± 6.51	57.5 ± 7.99	68.5 ± 6.64	NS	< 0.001	< 0.001
$WMSI_L$	1.33 ± 0.26	1.3 ± 0.33	1.0	NS	NS	NS
MPI_R	0.42 ± 0.05	0.29 ± 0.06	0.23 ± 0.06	< 0.0001	< 0.0001	< 0.0001
TAM	1.69 ± 1.5	21.4 ± 1.8	25.1 ± 1.3	< 0.0001	< 0.0001	< 0.0001
$WMSI_R$	1.42 ± 0.28	1.04 ± 0.21	1.0	< 0.0001	< 0.0001	< 0.0001
SA_R	29 (88%)	9 (11%)	0	< 0.001		

EF — ejection fraction; TAM — tricuspid annular motion; MPI — myocardial performance index; $WMSI_R$ — right ventricular wall motion score index; $WMSI_L$ — left ventricular wall motion score index; SA_R — right ventricular segmental asynchrony

Table 3. Echocardiographic parameters of right ventricular function in patients with inferior myocardial infarction according to the presence (GI) or absence (GII) of electrocardiographic signs of right ventricular involvement and infarct-related artery (A — proximal segment of right coronary artery, B — distal segment of right coronary artery or left circumflex artery).

	GIA	GIB	GIIA	GIIB	p
MPI_R	0.42 ± 0.05	0.41 ± 0.06	0.34 ± 0.06	0.3 ± 0.05	< 0.001
TAM	16.8 ± 1.5	17.1 ± 1.5	20.4 ± 2.1	22 ± 2.0	< 0.001
$WMSI_R$	1.48 ± 0.28	1.3 ± 0.23	1.09 ± 0.2	1.03 ± 0.1	< 0.001
SA_R	20 (91%)	9 (82%)	5 (25%)	4 (7%)	< 0.01

MPI — myocardial performance index; $WMSI_R$ — right ventricular wall motion score index; TAM — tricuspid annular motion; SA_R — right ventricular segmental asynchrony

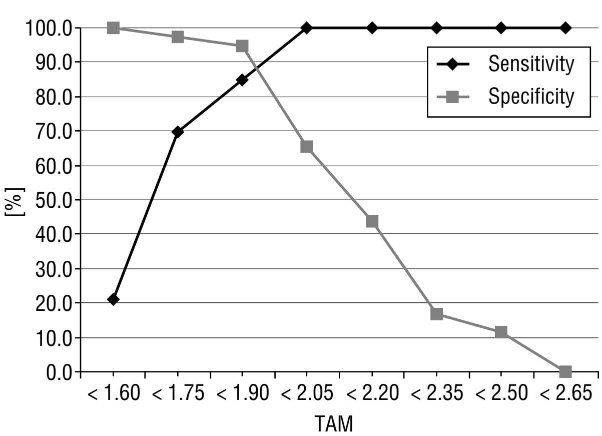

Figure 3. Derivation of the most sensitive and specific values of tricuspid annular motion (TAM) in detecting right ventricular infarction.

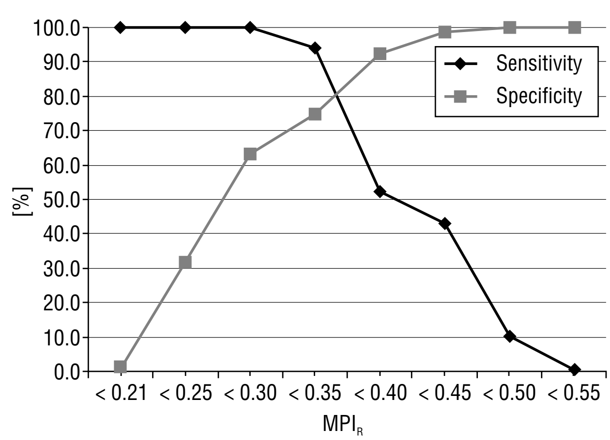

Figure 4. Derivation of the most sensitive and specific values of RV myocardial performance index (MPI_R) in detecting right ventricular infarction.

The proportion of patients with $MPI_R \geq 0.36$ and/or TAM ≤ 19.5 mm in the study groups is shown with regard to the IRA in Figure 5. At least one of the parameters mentioned had an abnormal value in all patients with RVI, and coexistence of abnormal MPI_R and TAM was more often observed in patients with the IRA in the proximal segment of the RCA (group IA) than in those with another localisation of the IRA (group IB) (91% vs. 73%, $p < 0.05$). Similar observations were made in the group of patients without RVI (group II). Sensitivity, specificity, positive and negative predictive value and the

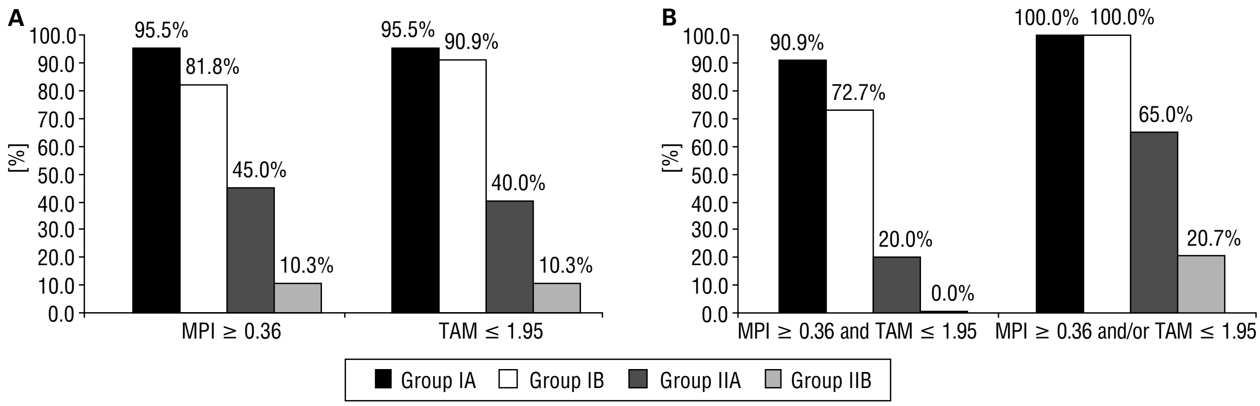

Figure 5. The incidence of abnormal values of derivation of RV myocardial performance index (MPI_R) and tricuspid annular motion (TAM) in groups of patients with (group I) or without (group II) electrocardiographic signs of right ventricular involvement and infarct-related lesion in the proximal segment of the right coronary artery (**A**) and in another localisation — the distal segment of the right coronary artery or the left circumflex artery (**B**).

Table 4. The value of myocardial performance index and tricuspid annular motion in detecting right ventricular infarction.

	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)	Test accuracy (%)
MPI ≥ 0.36	91	81	67	95	84
TAM ≤ 19.5	94	82	69	97	85
MPI ≥ 0.36 and TAM ≤ 19.5	85	95	87	94	92
MPI ≥ 0.36 or TAM ≤ 19.5	100	74	57	100	77

MPI — myocardial performance index; TAM — tricuspid annular motion

accuracy of $MPI_R \geq 0.36$ and TAM ≤ 19.5 mm in detecting RVI are shown in Table 4.

Multivariate logistic regression analysis established that MPI_R and TAM increase a probability of diagnosis of RVI in the same proportion (15.3-time and 15.6-time respectively) (Table 5).

Discussion

It appears that in spite of the extensive knowledge of the consequences of RVI there is still not enough practical significance attached to this condition. We have observed that it is very uncommon for the emergency ambulance service to consider RVI. However, RVI coexisting with IMI is an important negative predictive factor, especially at the early stage of infarction [1, 3, 6, 7]. In patients with RVI appropriate treatment should already be under way at the pre-hospital period before invasive procedures are performed. Therapy requires optimisation of the RV preload with volume expansion, RV afterload reduction and, if necessary, inotropic

Table 5. The relationship between right ventricular segmental asynchrony (SA_{RV}), tricuspid annular motion (TAM) ≤ 19.5 and myocardial performance index (MPI) ≥ 0.36 and right ventricular infarction in a multivariate logistic model.

Independent variables	Odds ratio	–95% confidence interval	+95% confidence interval	p
SA_R	7.6	1.4	42.5	0.021
TAM ≤ 19.5	15.4	2.2	105.4	0.005
MPI ≥ 0.36	15.5	3.0	81.3	0.001

support or optimisation of rhythm. It is critically important to avoid diuretics and drugs that result in venodilation and a decrease in RV filling.

Hypotension, clear lung fields and elevated jugular pressure are the three typical signs of RVI. However, such a clinical outcome is observed in only 10–15% of cases [22]. In our study systolic blood pressure of ≤ 95 mm Hg was noted in a higher proportion of patients with RVI (48% vs. 4%, $p < 0.0001$), and pulmonary congestion was detected in only three patients with RVI. It is worth noticing that among patients with IMI those with RVI were admitted to hospital earlier in the course of the myocardial infarction. This may reflect the important additional role of the discomfort related to the hypotension in the decision of a patient to summon medical assistance.

In patients with IMI ECG with a recording of the right precordial leads should be a standard procedure for the emergency ambulance service [1]. However, in our study in most patients it was only on admission to the hospital that the complete ECG was recorded. The typical ECG changes in RVI are short-lived and may reverse within the first hours of the infarction [37]. Serial measurements of MPI_R showed that RV function abnormalities do not resolve this fast [25]. Our results are in agreement with previous studies on the sensitivity and specificity of echocardiography in diagnosing RVI.

Echocardiographic and Doppler evaluation of RV

Left ventricular dysfunction adversely affects RV properties [23]. Abnormal motion of LV, especially the interventricular septum, has an independent deleterious impact on the effectiveness of the RV function [24, 25]. However, in the current study such an interaction was unlikely, as the patients had no history of previous myocardial infarction and there were no significant differences in EF and $WMSI_L$ between the groups analysed.

Tricuspid annular motion

A strong correlation between TAM and RV ejection fraction assessed by echocardiography with Simpson's formula ($r = 0.48$, $p < 0.001$) [26] and by radionuclide ventriculography ($r = 0.79$, $p < 0.001$) [17] has previously been documented. There are few data on the usefulness of TAM in evaluating RV function in patients with IMI [26–28]. Our study confirms the observations of other authors [27, 28] that mean values of TAM are significantly lower in patients with IMI than in healthy subjects (21 mm vs. 25 mm), and among patients with IMI in the case of coexisting RVI (17 mm vs. 22.7 mm).

Myocardial performance index

In patients with myocardial infarction the MPI may be a valuable diagnostic tool of ventricular function, as the ischaemia results in depression of both contractility and relaxation. It is expressed as the relative prolongation of ventricular isovolumic contraction and relaxation periods to ejection period and consequently as a rise in MPI.

The studies of Tei revealed the significant correlation between MPI and the invasive indices of contractility and relaxation: dP/dt, –dP/dt [29]. Many authors have shown the utility of this index in assessment of RV function in patients with RVI [25, 30–33]. The normal values of MPI_R passed in separate studies are not unanimous and range from 0.2 ± 0.05 [33] to 0.28 ± 0.04 [25, 34] in adults, those defined with tissue Doppler imaging being significantly higher [31]. For this reason we have determined the normal values of MPI_R in a group of 24 healthy subjects. Regardless of these differences, all the authors agree that in patients with ECG or echocardiographic signs of RVI the MPI_R is significantly higher than in patients with isolated IMI: 0.85 ± 0.2 vs. 0.26 ± 0.1, $p < 0.01$ [30], 0.53 ± 0.15 vs. 0.38 ± 0.14, $p < 0.05$ [32], 0.59 ± 0.18 vs. 0.44 ± 0.19, $p = 0.001$ [25], 0.53 ± 0.22 vs. 0.21 ± 0.17, $p < 0.001$ [33], 83 ± 0.12 vs. 0.57 ± 0.11, $p < 0.001$ [31]. Moreover, our study confirms the results presented by Ozdemir et al. [31] that, among patients with IMI, higher values of MPI_R are related to the localisation of the IRA in the proximal segment of the RCA when compared to other localisations.

An interesting observation was made by Yoshifuku et al. [32], who has demonstrated a paradoxical decrease or pseudonormalisation of MPI_R in patients with extensive RVI and an incompliant RV. The authors account for this phenomenon by a rise in end-diastolic pressure, resulting in a shortening of the isovolumic contraction time. In our study, owing to the exclusion criteria, treatment with pPCI and postponed echocardiographic examination (on average 2.5 day following IMI) extensive RVI was unlikely to occur.

Segmental asynergy of RV

Evaluation of RV segmental asynergy requires that it be visualised in several views. Autopsy studies show that in the case of proximal occlusion of RCA infarction of RV affects mainly its inferior wall in the middle and basal segments [35]. This is why parasternal short-axis and subcostal views are most advisable, although in some patients these are difficult to obtain. In the present study, apart from the calculation of $WMSI_R$ assessed from the three segments of RV free wall, we were additionally seeking for asynergic segments in the available views. Such a detailed examination revealed RV segmental asynergy in 88% of group I. In 5 patients with proper contractility of RV free wall ($WMSI_R = 1$) asynergic segments were found in other views.

The impact of localisation of IRA on RV function

In the study of Bowers et al. [5] echocardiographic examination performed before the pPCI did not reveal segmental RV free wall asynergy of RV in 73% of patients with IRA in the proximal segment of RCA, and only in 30% of patients with another localisation of IRA. In our study of 42 patients with a proximal segment of RCA as IRA (groups IA and IIA) RVI was diagnosed on ECG in 22 patients (52%), segmental RV free wall asynergy was detected in 20 patients (48%), and in all patients (100%) TAM ≤ 19.5 and/or $MPI_R \geq 0.36$ indicated RVI. In group IIA, despite the absence of ECG evidence of RVI, segmental RV free wall asynergy was revealed in 5 patients (25%) and in 13 patients (65%) values of TAM ≤ 19.5 and/or $MPI_R \geq 0.36$ were noted. Considering the fact that in 70% of RVIs the proximal segment of RCA is an IRA [5], our results suggest the greater sensitivity of the echocardiographic method over the ECG method in detecting RV ischaemia.

The interesting observation is that among patients with the proximal segment of RCA as IRA (group IIA) in 7 patients (17%) our non-invasive evaluation did not reveal RVI. In a similar group of patients Bowers et al. [5] revealed RV free wall asynergy in 14 patients (27%). Such a phenomenon can be explained by the spontaneous reperfusion (lack of coronary occlusion), early reperfusion therapy or well developed collateral circulation from the left coronary artery.

Echocardiography is also diagnostic for RVI in patients with a localisation of IRA elsewhere than in the proximal segment of RCA.

Limitations of the study

ST-segment elevation in the right precordial lead v4 was defined as a good indicator of RV involvement when compared with other diagnostic tests (sensitivity 88%, specificity 78%, diagnostic accuracy 83%) [1]. Menown et al. [36] achieved a further improvement in the classification of patients with RVI with ECG body surface mapping. It has been observed that in half of patients typical ECG changes withdraw within the initial 10 hours of infarction [37]. In our study group recordings of the right precordial leads were not available in 14 patients (12%), and RVI diagnosis was concluded on limb lead criteria. That is why comparing patients between the groups with or without RVI may not be ideal.

Apart from the inherent limitations of echocardiography [21] it is not a perfectly specific method for the diagnosis of RVI. Right ventricular dysfunction revealed on echocardiography may be unrelated to ischaemia or infarction but arise from chronic obstructive pulmonary disease, pulmonary embolisation or congenital or valvular heart disease. In these cases MPI_R and TAM might be useful in RVI diagnosis only in serial studies. Another limitation in applying MPI_R in the diagnosis of RVI is the required regular sinus rhythm. Therefore the high sensitivity and specificity of $MPI_R \geq 0.36$ and TAM ≤ 19.5 mm (91% and 81%, 94% and 82%, respectively) revealed in our study apply only to those patients that do not meet the exclusion criteria.

Serial studies performed on patients treated conventionally for IMI showed that the values of MPI_R assessed at days 1 and 5 following IMI did not differ significantly [25]. However, in patients treated with pPCI RV segmental contractility improves as early as the first hour after intervention [4]. The values of MPI_R and TAM determined in our group of patients may differ from those assessed by other authors, as the therapeutic strategy and the interval from the onset of RVI to echocardiographic examination are not the same. Future investigations with complex evaluation of RV function, including new echocardiographic techniques and serial examination, are warranted to enhance the echocardiographic diagnostic and prognostic accuracy in RVI.

Conclusions

1. In patients with IMI the echocardiographic parameters of MPI_R and TAM supplement clinical and ECG data and are useful, easily obtainable indicators of RVI.
2. In patients with IMI RV dysfunction is related to the localisation of IRA.

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