Original Article

Arrhythmia and Conduction Disorders in Acute Inferior Myocardial Infarction with Right Ventricular Involvement.

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ABSTRACT

Objectives: To assess the prognostic impact of Right Ventricular (RV) myocardial involvement in patients with inferior MI.

Methods: One hundred seventy patients who were admitted to cardiac care unit of Madani Heart Hospital, Tabriz, Iran with the diagnosis of inferior MI with (group1) or without (group 2) simultaneous involvement of RV were studied from 2005 to 2006. Patients presenting within 12 hours of symptom onset were eligible for inclusion. Those with simultaneous Anterior wall MI, patients undergoing primary percutaneous transluminal coronary angioplasty and those with renal impairment (creatinine >2 mg/dl) were excluded.

Results: Eighty eight percent of the patients with RVMI and 75% with isolated inferior MI had some type of arrhythmia. AV block occurred in 42% of the infarctions with RV involvement and only in 29% of the control group. Intra ventricular conduction disturbance (IVCD) also were more frequent in RVMI (29.4% VS 13.1%, p=0.021), especially the RBBB (20% VS 7.4%, P=0.003). Ventricular fibrillation (VF) was observed in 5.2% and 1.2% and ventricular tachycardia in 26% and 12.2% respectively. In 27% of patients with RVMI it was necessary to implant a pacemaker as compared to 10% in control group. Mortality was higher in the patients with inferior infarction extended to the RV (15.3% vs 3.5%., P= 0.0001). There was not a meaningful difference in incidence of LBBB between group 1 and 2 (3.1% vs 2.9% P=0.9).

Conclusion: Patients with inferior MI who also have RV myocardial involvement are at increased risk of death and arrhythmias.(Rawal Med J 2007;32:135-138).

Key Words: Right ventricle, myocardial infarction, arrythmias, RBBB.

INTRODUCTION

Unlike left ventricular function, right ventricular (RV) function has not been widely studied after a myocardial infarction (MI).[1] There is uncertainty regarding the risk of major complications in patients with inferior MI complicated by RV myocardial involvement. Whether these complications are related to RV myocardial involvement (RVMI) itself or simply to the extent of infarction involving the left ventricle (LV) is also unknown.[2]

There is RV involvement in 19 to 51 percent of patients with acute inferior MI.[3]

RV involvement has been reported to be an independent predictor of major complications and in–hospital mortality after acute inferior MI and serious arrhythmias are significantly more common in patients who had RV myocardial involvement simultaneous with inferior MI.[4] It also showed that RVMI was

associated with increased risk of death, shock, ventricular tachycardia or fibrillation and atrioventricular block(AVB).[4]

But another study showed that only patients with hemodynamic impairment due to RV infarction had a higher mortality rate for the first month post MI than patients with RVMI but without hemodynamic impairment.[5] Our aim in this study was to assess the relationship between presence of RVMI with inferior MI and complications like arrhythmias and conduction disorders.

METHODS

In this prospective observational study 170 patients were enrolled. All had been admitted to cardiac care unit (CCU) of Madani Heart Hospital with the diagnosis of first inferior MI with or without simultaneous involvement of RV from 2005 to 2006. Patients presenting within 12 hours of onset of symptoms were eligible for inclusion. Patients who had simultaneous Anterior wall MI, patients undergoing primary percutaneous transluminal coronary angioplasty and those with renal impairment (creatinine >2 mg/dl) were excluded.

Inferior MI was diagnosed by at least 1- mm ST segment elevation in at least two contiguous inferior leads on the baseline electrocardiogram (ECG): RVMI was present if there was at least 1- mm ST segment elevation in V_{4R} within 12 hours of symptoms onset. The patients were divided to two groups. Group 1 had been diagnosed with inferior MI with involvement of RV at the same time (n=85) and group 2 with inferior MI without RV involvement (n=85).

Table 1. Clinical findings and demographic characteristics of patients

Findings	**Group 1 (RVMI) n=85**	**Group 2 (No RVMI) n=85**
Age(Year)	59 ±16	61 ±18
Male	54 (63.5%)	51(60%)
Hypertension	43 (50.5%)	47(55.3%)
Diabetes mellitus	25(29.4%)	21(21.7%)
Smoking	31(36.47%)	25(29.41%)
Serum chol level > 200 mg/dl	34(40%)	30(35.5%)
Serum TG level > 250 mg/dl	28(33%)	25(29.4%)
Familial history	6(7%)	4(4.7%)
LVEF< 50%	51(60%)	59(69.4%)
BMI ≥ 27	31(36.47%)	26(30.6%)
Medication:		
Beta blockers	47(55.3%)	54(63.5%)
ACE inhibitor	72(84.7%)	68(80%)
Ca Channel blocker	19(22.35)	11(13%)

Values are shown as mean ± SD or number (%)
Chol: Cholestrol **TG**: Triglycerid
ACE: Angiotencin converting enzyme **Ca**: Calcium

RESULTS

There was no significant differences in the baseline characteristics between the two groups (table 1).

Table 2: Comparision of outcomes between "RVMI" and "No RVMI" groups.

Disorder	Group 1 (RVMI) n=85	Group 2 (NO RVMI) n=85	p
Arrhythmia	75(88.2%)	63(74.1%)	0.03
IVCD	25(29.4%)	11(13.1%)	0.007
AVB	36(42.35%)	25(29.4%)	0.045
AVB3	25(29.4%)	9(10.6%)	0.005
AF	28(33%)	19(22.3%)	0.004
VF	4(4.7%)	1(1.2%)	0.03
RBBB	17(20%)	6(7%)	0.002
LBBB	3(3.5%)	2(2.35%)	0.95
PPM	23(27%)	9(10.6%)	0.005
Supra-ventricular arrhythmia	66(77.6%)	58(68.2%)	0.042
VT	23(27%)	11(12.9%)	0.005
In hospital mortality	13(15.3%)	3(3.5%)	0.0001

IVCD: Intra ventricular conduction disturbance Intra ventricular conduction disturbance
AVB: atrioventricular block AF: atrial fibrillation
VF: Ventricular fibrillation VT :Ventricular Tachycardia
RBBB: Right bundle branch block LBBB: Left bundle branch block
PPM: Permanent pace maker AVB3: Complete atrioventricular block

Eighty eight percent of the patients with RVMI and 75% with isolated inferior MI had some type of arrhythmia. AV block occurred in 42.35% of RVMI group and only in 29.4% of the control group. In 27% of patients with RVMI it was necessary to implant a pacemaker as compared to 10.6% in control group. Mortality was higher in the patients with inferior infarction extended to the RV (15.3% vs 3.5%. P= 0.0001). There was not a meaningful difference in incidence of LBBB between group 1 and 2 (table 2).

DISCUSSION

Our data showed that presence of RVMI was associated with higher incidence of arrhythmias and conduction disorders in acute inferior MI. Ventricular and supra ventricular arrhythmia were significantly more common with RV involvement.
Despite the pooled clinical data of previous studies that provide clear evidence that patients with inferior MI who have RVMI are at substantially increased risk of major complications, including death, cardiogenic shock and ventricular arrhythmias, Daubert JC et al.

showed that there were no significant differences between the inferior MI patients with and without RVMI.[6] But other studies studies showed that the adverse prognosis in patients with RVMI is not simply due to more extensive infarction of the LV; rather, it appears to be due directly to involvement of the RV.[7] These finding are consistent with those of a previous study of RV infarction in an elderly cohort, which demonstrated an independent association between RVMI and in-hospital death, even after adjustment for LV ejection fraction.[8]

The worse prognosis in patients with RVMI may be related to the increased risk of life-threatening ventricular arrhythmias in these patients. Although AVB is a widely recognized complication of RVMI,[9-13] we also found clear increases in sustained VT and VF in these patients. This suggests that the RV may be more arrhythmogenic than the LV; a hypothesis that warrants further investigation. RV involvement should be suspected when atrial arrhythmias, AVB and ventricular tachyarrhythmias are found in early acute inferior wall MI. Our study suggests that right-sided precordial leads should be performed in all patients presenting with acute inferior MI, rather than only in those thought to have large infarctions. The routine adoption of this approach will facilitate the early identification of patients with RVMI who are at high risk of life-threatening complications and who may warrant more aggressive treatment.[14-16]

Study limitation:

The diagnosis of RVMI was based on ECG criteria alone, even though RVMI is often considered to be a clinical syndrome in which hypotension and elevated right-sided pressure are required to make the diagnosis. However, ST segment elevation in lead V_{4R} has been shown in previous studies to be highly sensitive as well as specific for RVMI in acute inferior MI.[3,14-17]

References

1. Alam M, Wardell J, Andersson E, Samad BA, Nordlander R. Right ventricular function in patients with first inferior myocardial infarction: assessment by tricuspid annular motion and tricuspid annular velocity. Am Heart J. 2000; 139:710-5.
2. Mehta SR, Eikelboom JW, Natarajan MK, Diaz R, Yi C, Gibbons RJ, et al. Impact of right ventricular involvement on mortality and morbidity in patients with inferior myocardial infarction .J Am Coll Cardiol. 2001;37:37-43.
3. Kinch JW, Ryan TJ. Right ventricular infarction. N Engl J Med 1994;28 :1211-1217.
4. Zehender M, Kasper W, Kauder E, Schonthaler M, Geibel A, Olschewski M, et al.. Right ventricular infarction as on independent predictor of prognosis after acute inferior myocardial infarction. New Engl J Med 1993; 328:981-988.
5. Serrano Jr CV, Ramires JA, Cesar LA, Zweier JL, Rati M, De Luz P, et al. Prognostic significance of right ventricular dysfunction in patients with acute inferior myocardial infarction and right ventricular involvement. Clin Cardiol. 1995;18:199-205.
6. Daubert JC, Langella B, Besson C, Bourdonnec C, Pony JC, Gouffault J. Prospective study of the diagnostic and prognostic criteria of right ventricular involvement in the acute phase of inferoposterior infarction. Arch Mal Coeur Vaiss. 1983;76:991-1003.
7. Mehta SR, Eikelboom JW, Natarajan MK, Diaz R, Yi C, Gibbons RJ, et al. Impact of right ventricular involvement on mortality and morbidity in patients with inferior myocardial infarction. JACC 2001;37:37-43.
8. Bueno H, Lopez-Palop R, Bermejo J, Lopez-Sendon JL, Delcan JL. In-hospital outcome of elderly patients with acute inferior myocardial infarction and right ventricular involvement. Circulation1997;96:436-441.
9. Berger PB, Ryan TJ. Inferior myocardial infarction: high-risk subgroups. Circulation 1990;81:401-411.
10. Goldberg RJ, Gore JM, Alpert JS, Osganian V, de Groot J, Bade J, et al. Cardiogenic shock after acute myocardial infarction: incidence and mortality from a community-wide perspective, 1975 to 2003. N Engl J Med 1991;325:1117-1122.
11. Zehender M, Kasper W, Kauder E, Schonthaler M, Geibel A, Olschewski M, et al. Right ventricular infarction as an independent predictor of prognosis after acute inferior myocardial infarction. N Engl J Med 1993;328: 981-988.
12. HIT- 4 Trial group: U. Zeymer, K.L. Neuhaus, K. Wegscheider, U. Tebbe, P. Molhoek et al. Effects of thrombolytic therapy in inferior myocardial infarction with or without right

ventricular involvement. J Am Coll Cardiol 2000;32:876-881.

13. Bueno H, Lopez-palop R, Garcia J, Lopez-Sendon JL, Delcan JL, Combined effect of age and right ventricular involvement on acute inferior myocardial infarction. Circulation 1998; 98:1714-1420.
14. Bowers TR, O'Neill WW, Grines C, Pica MC, Safian RD, Goldstein JA. Effect of reperfusion on biventricular and survival after right ventricular infarction. N Engl J Med 1998;338: 933-940.
15. Kennedy JW, Martin GV, Davis KB, Maynard C, Stadius M, Sheehan FH, et al. The Western Washington Intravenous streptokinase in acute myocardial infarction randomized trial. Circulation 1998; 77: 345-352. (Erratum, Circulation 1988;77:1037.)
16. Reduto LA, Berger HJ, Cohen LS, Gottschalk A, Zaret BL. Sequential radionuclide assessment of left and right ventricular performance after acute transmural myocardial infarction. Ann Intern Med 1978;89:441-447.
17. Owens CG, McClelland AJ, Walsh SJ, Smith BA, Tomlin A, Riddell JW, et al. 80-LAD mapping: does it add significantly to the diagnosis of acute coronary syndromes? J Electrocardiol. 2004;37:223-32.

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