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STUDY OF HEART BLOCKS IN ACUTE MYOCARDIAL INFARCTION IN DIABETIC AND NON-DIABETIC PATIENTS

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Abstract:

Introduction: This was the study to study Heart Blocks in acute Myocardial infarctions patients specifically in patients with or without diabetes.Material and Methods:The Study included ninety six cases of acute myocardial infarction with and without diabetes. The cases were studied in ICU of a tertiary care urban hospital. Results and Discussion: We observed a ratio of anterior to inferior wall MI 3.1 in non-diabetics while the ratio is 2.1 in diabetics.Female were relatively protected against coronary disease. The frequency of block was less in females of both the groups and even lesser in diabetic group. On the other hand, diabetic males have greater frequency of block than non-diabetic males.Complication rate and mortality is no doubt higher in the diabetic group, but it was not as bad as described by most western authors.Overall complication rate was higher in the diabetic group (39% in non-diabetics and 58% in diabetics). The most important complication was acute LVF (21% in non-diabetics vs 42% in diabetics).Conclusion:All patients with block did not require specific treatment. Clinical status is most important consideration. Pacemaker is like second marriage with its new set of trouble and might needed to be avoided unless indication is absolute.

Keywords: Diabetes, Myocardial Infarction, Heart Block, Pacing

INTRODUCTION

Technological advance have revolutionized the diagnosis and treatment of heart blocks. Just a few decades ago, the knowledge about impulse generation, its pathways and various blocks was limited. Diagnosis depended on clinical examination and ECG findings only. Technological explosion lead to invention of new techniques, continuous monitoring in Intensive Care Units (ICU), Holter technique, Ultrasonography, His Bundle electrograph and electrophysiological studies have tremendously increased our understanding of heart blocks. Pacemaker implantations have revolutionized the treatment of heart blocks. In many cases the damage to heart muscle by infarction is not severe enough to cause fatal outcome but death occurs as a result of failure of conduction of impulses. This defect is sometimes temporary and if the patient is tided over the crisis by a Pacemaker block reverts by natural healing and the patient is saved.

Hence, complete knowledge about the subject of heart block is important for all physicians, both generalists and cardiologists.

Some argue that we cannot practice high-tech medicine here in our setting and so all this knowledge is impractical and unnecessary. Well, the view is incorrect. Most of the high-tech medicine when newly invented is costly and located in a few centers to start with, but gradually it spreads over to other specialist centers and subsequently to all general hospitals all over the world. Then it becomes a common knowledge. CAT Scan, By-pass surgery, cardiac Catheter technique are well known examples. CAT Scan, Ultrasonography and Radionuclide scanning are commonly done today in most of the cities.

Furthermore, our clinical diagnosis improved by retrospective application of knowledge acquired from high-tech investigations. Let us quote a few examples in diagnosis of 1st, 2nd and 3rd degree heart blocks. These findings were missed before the days of high-tech investigations. Example is Barlow's syndrome (Prolapse of Mitral Valve syndrome). This syndrome can now be diagnosed within a matter of seconds by mere clinical auscultation, but the knowledge required for diagnosis has first been obtained by high-tech study. The systolic click and the late systolic murmur were completely missed or went unnoticed before the syndrome was established by improved techniques. It was said by Goethe, the German Philosopher that "one sees

only what one knows."[1] This proves our point that high-tech knowledge is equally essential to all of us and we should keep abreast of the recent advances.

The above consideration has prompted us to select the subject of heart block in myocardial infarction.Secondly, we have selected patients in two groups, with and without diabetes. Diabetes Mellitus is associated with accelerated atherosclerosis and predisposes to macro vascular and micro vascular diseases. Diabetes doubles the risk of C.V. (cardiovascular) stroke and trebles the risk of coronary disease.[2] It wipe out the relative protection of young females against coronary disease. Diabetic males and females are at equal risk of coronary disease. Diabetic males have two to three times the risk of developing coronary disease as compared to non-diabetic males and diabetic females have nearlytwenty times risk of developing coronary disease as compared to non-diabetic females.[3] These are western statistics. In our country in less affluent and poor society the profile of diabetes is low and it is our impression that complications in our diabetic patients (even untreated or insufficiently treated) are fewer and milder than anticipated. So, we have thought of studying this problem at the same time. We have therefore included two separate groups of equal number of patients with and without diabetes.

Our aims of this study areto study the incidence of and types of conduction defects in patients of acute myocardial infarction. We also aimed to study various types of conduction defects in relation to the site of infarction. We studies the role of drug therapy& pacemaker therapy in heart blocks. We also studied clinical findings, ECG findings, mortality, morbidity etc., in various heart blocks in cases with and without diabetes.

MATERIAL AND METHODS

The present study includes ninety six cases of acute myocardial infarction, forty eight with diabetes and forty eightwithout diabetes. The cases were studied in ICCU of Sheth V.S. General Hospital.

All case were examined in detail as per proforma. First, Complete history was obtained. Then a thorough clinical examination was carried out. C.V.S. was specially examined in minute detail. Heart sounds were studied, murmurs noted and gallop was looked for. Special attention was given to varying intensity of first heart sound, neck and pulsations and the examination was repeated at suitable intervals depending upon the clinical condition. The cases under study were investigated as per proforma.ECGs were recorded at intervals according to necessity. All cases were on cardiac monitor for initial two or three days or even longer if necessary. This helped me to study the development of heart blocks and subsequent alterations in the block patterns. Drug therapy was studied on monitors. We could pace two cases of complete heart block. Both were very serious. One patient died in spite of all efforts but what is important, we could save the other one, who made a complete recovery. All the relevant investigations including enzyme studies were done and were repeated when necessary. The cases were treated according to the standard customary regime practiced in the ICCU. Rest and oxygen, sedatives and tranquilizers were given according to need.Coronary dilators (Isosorbide dinitrate) for angina were given as per indication.

RESULTS AND DISCUSSION

In our study, we saw a ratio of anterior to inferior wall MI 3.1 in non-diabetics while the ratio is 2.1 in diabetics.

Table-1: Site of AMI and Diabetes

	AMI without DM	AMI with DM
Anterior Wall MI	33	30
Inferior Wall MI	12	16
Double wall MI	3	2

Incidence of heart block in both the groups is equal in our series, in both the groups 31% had block, roughly on in three cases. In AMI without diabetes, majority of blocks were in Anterior wall MI and in AMI with diabetes majority blocks were in Inferior wall MI.

The observation based on this small series may not necessarily apply to general population but certainly provide useful informations.

On this whole, the incidence of AMI increases as the age advance. In our series non-diabetic males and females have the highest incidence in sixth decade. In diabetic males the incidence is even in fifth, sixth and seventh decades suggesting earlier involvement. In diabetic females the maximum incidence is in the seventh decade. Male to female ratio is 5:1 in non-diabetic group and 3:1 in diabetic group suggesting higher incidence due to diabetes in females.

Table-2:SITE OF INFARCTION IN RELATION TO BLOCKS

TABLE	AMI without DM			AMI with DM		
	Numbers	Block	%	Numbers	Block	%
Anterior wall MI	33	10	66	30	6	40
Inferior wall MI	12	4	27	16	9	60
Double wall MI	3	1	7	2	-	-
Total	**48**	**15**	**100**	**48**	**15**	**100**

The risk of AMI was found to be twice as high among diabetics than among non-diabetic patients (P < 0.001).[4]In diabetics, the risk increases three times for males and twenty times for females and ultimately becomes equal for both genders. Our series suggest increased incidence for females but it is only marginal.

In Framingham study[5], no premenopausal woman in a Cohort of 2873 cases of non-diabetic females developed AMI during twenty-four years follow-up. However, after menopause there was a striking increase in coronary disease in women ant the incidence was equal to that in males.

In Bell's series of autopsies[6], vascular disease in general increased from 24.8% in non-diabetic to 49.3% in diabetics.Many other authors have reported 2.5 times incidence in diabetics.However, not all authors agree on this point. Waller in this necropsy study reported equal incidence in both groups.

In 1968, International Atherosclerosis Project[7] 34,000 autopsies were studied, Diabetic were to have more fat deposits, fibrous plaques, calcification and coronary stenosis.

Kessler reported 21,447 casesseen at Joslin clinic. Significant excess risk of death from coronary disease was noticed in diabetics.[8]

A. K. Maity et al[9]have reported males to females ratio as 7:1 in Non-diabetics and diabetics, but it was probably due to less number of female beds in ICCU and so not comparable.

On the whole, the general opinion is that coronary disease in more common in diabetics than non-diabetics and tends to occur at earlier age in diabetics. Non-diabetic females are protected against coronary disease, while diabetic females are as vulnerable as males.

Macrongiopathy in larger arteries is age related and so the incidence of A.M.I. increases with age in both genders. Diabetic females are more prone to get MI in comparison to non-diabetic females.

Table-3:BLOCKS IN RELATION TO GENDER

AMI without DM			AMI with DM		
Male	Female	Total	Male	Female	Total
13	2	15	14	1	15

In diabetics, abnormal fat and carbohydrate metabolism increases the tendency to atherosclerosis and thus explains increased incidence of coronary disease. In diabetic females the acceleration of macroangiopathy is at a faster rate in comparison to diabetic males. This is the reason why the diabetic females are at almost equal risk in comparison to males. In addition, microangiopathy of small vessels is specific to diabetes and this is additional reason why coronary disease is more common in diabetics.

The question is why non diabetic females are so well protected against coronary disease? Females take less muscular exercise than males and have larger fat content in the body. Even so they have less coronary disease: To explain this on the basis of testosterone and oestrogen is oversimplification. Oestrogen therapy is not known to protect males against coronary disease. There are many diseases which are more common in males, e.g. Gout, Peptic Ulcer and so on. All of them cannot be explained on hormone therapy. It is an unsolved mystery.

In our series, the ratio of Anterior MI to inferior MI is 3:1 in non-diabetics and 2:1 diabetics suggesting more inferior wall involvement in letter group. In contrast, Maity et al[9] report increased inferior wall involvement in non-diabetics.

HEART BLOCK:

The incidence of heart block in our series is equal in both the groups and it is 31% (roughly, one in three). The findings of Maity et al[9] are at variance. Their incidence is one in two cases in diabetics (53%) and one in seven (15%) in non-diabetics. Compared to our study their incidence of block is much lower in non-diabetics and much higher in diabetics.

In Our series majority of blocks were in Anterior wall MI. In non-diabetics and Inferior wall MI in diabetics. Three cases reverted to normal out of fifteen in non-diabetics and eight reverted to normal in diabetic group.

In Our series, AV Nodal blocks were more common in Inferior wall MI. In both the groups and intraventricular blocks are more common in Anterior wall MI in both groups. This is explained on the basis of blood supply. AV node is supplied by posterior descending artery and His-Purkinje system by anterior descending artery.

Overall incidence of intraventricular blocks (bi and tri-fascicular blocks) is 10-20% in AMI.[10] In our series, the overall incidence of bi and tri-fascicular blocks was 24% (23 out of 96) out of which 2/3rd were in non-diabetic group and 1/3rd in diabetic group. Diabetic group had more incidence of AV Nodal involvement.

In our series, two out of eight non-diabetic females had a block and one out of thirteen diabetic females had a block. The frequency of block was less in females of both the groups and even lesser in diabetic group. On the other hand, diabetic males have greater frequency of block than non-diabetic males.

COMPLICATIONS:

Overall complication rate was higher in the diabetic group (39% in non-diabetics and 58% in diabetics). The most important complication was L. V. F. (21% in non-diabetics and 42% in diabetics).

In the non-diabetic group, acute LVF (Left Ventricular Failure) rate was more in patients with block and in diabetic group, acute LVF cases were more in patients without block. This paradox is difficult to explain.

In Maity's[9] series acuteLVF rate was 14.4% in non-diabetic group and 22.5% in diabetic group (Patients with and without blocks have been included as a whole group).Another interesting feature is that LVF was more common in Anterior wall MI in both the groups.

IMMEDIATE MORTALITY:

One patient died in non-diabetic group and three patients died in diabetic group. Two cases who went in DAMA (Discharge against Medical Advice) (without block) were probable deaths judging from their critical conditions. This means, death rate was higher in diabetic group. The three cases, who died in hospital had a heart block (complete heart block).

Maity et al[9] report death rate of 30% in diabetic group and 16.5% in non-diabetic group. Our death rate is much lower compared to his series. Ours is a short follow up even so our results seems creditable. Western authurs report a death rate varying from 6-20% in non-diabetic and 10-25% in diabetics.

MANAGEMENT OF HEART BLOCK:

Out of fifteen cases with heart block in non-diabetic group, twelve cases were not given any specific drug for the blocks, three cases were treated with drugs (Atropine and Orciprinaline). Out of those untreated block cases one cases of LAHB (Left Anterior Hemi-Block) reverted to normal, while out of those treated cases two cases of AV Node lesion reverted to normal. The third with complete AV block persisted.

In diabetic group, 8 blocks out of 15 reverted to normal, out which 6 had AV Node lesion, oneLAHB andonecomplete AV block. Three cases were treated with atropine, orciprinaline or steroids, four patients were not given any drug for the block and one was paced who later reverted to normal. Out of the seven cases which did not revert to normal four were not given any drug, the remaining were treated with atropine, orciprinaline or steroids. One case of complete AV block was paced after a drug trial but did not survive.

Block per se is not an indication for drug therapy. Clinical status has to be taken into consideration.   In our series, both groups had equal number of blocks and the record of reversal is better in diabetic group.

PACING:

Hemodynamic status is most important consideration for pacing. According to Marriott[11] pacemaker is like a second marriage with its new set of troubles.Higher the lesion in the conducting system, lower the indication for pacing and vice versa. Increased AH interval and normal HV indicates higher lesion while increased HV interval and normal AH interval indicates lower lesion. Out of the two cases of complete AV block which were paced, we could save one which was a feather in our cap. He has a long standing severe diabetes poorly controlled in earlier years but later well controlled with Insulin. He developed Inferior wall infarction and complete AV block. He was in shock and suffered hypoxic encephalopathy. Drug therapy failed to revert his blocks. He was paced and he made a complete recovery. His block reverted to normal and went home a complete recovery. His block reverted to normal and went home well without hesitation he owes his life to temporary pacemaker.

TREATMENT OF DIABETES:

In the diabetic group, all cases except three were treated with Insulin. Two cases did not need anti-diabetic treatment and one cases was already stabilized on oral hypoglycemic agent and was continued. The general opinion is that oral hypoglycemic agents are not favored in acute conditions. All author recommend Insulin therapy[4,12] which provides physiological control. During infarction, there is a tendency of diabetes with diabetes have done so well. It is that the spectrum of diabetes in our country is different from that in Western races.

We would like to mention that our patients in ICCU in general have done extremely well with low mortality. Both the groups have done well. Number of factors seem to have played a part in this outcome. Excellent medical care, continuous monitoring and instant appropriate treatment by trained staff is the most important.

CONCLUSIONS:

Female were relatively protected against coronary disease. The protection is lost in diabetic females to a great extent.Complication rate and mortality is no doubt higher in the diabetic group, but it was not as bad as described by most western authors. Our patients with diabetes have done very well and diabetes has not

significantly affected the outcome.All diabetic MI patients needed Insulin.All patients with Block did not require specific treatment. Clinical status is most important consideration.Pacemaker is like second marriage with its new set of trouble and might needed to be avoided unless indication is absolute.

ACKNOWLEDGEMENT:

REFERENCES:

1. Glaser F. 'One sees only what one knows.'The Migration period in textbooks and museums. ARHEOLOSKI VESTNIK 2015;66:235-47.

2. Kannel WB, McGee DL. Diabetes and cardiovascular disease: the Framingham study. JAMA : the journal of the American Medical Association 1979;241:2035-8.

3. Tale S, Sontakke T. Time-Frequency Analysis of Heart Rate Variability Signal in prognosis of Type 2 Diabetic Autonomic Neuropathy. Proceedings of International Conference on Biomedical Engineering and Technology (ICBET 2011); 2011.

4. Rytter L, Troelsen S, Beck-Nielsen H. Prevalence and mortality of acute myocardial infarction in patients with diabetes. Diabetes care 1985;8:230-4.

5. Gordon T, Castelli WP, Hjortland MC, Kannel WB, Dawber TR. High density lipoprotein as a protective factor against coronary heart disease: the Framingham Study. The American journal of medicine 1977;62:707-14.

6. Bell DS. Diabetic Cardiomyopathy: A unique entity or a complication of coronary artery disease? Diabetes care 1995;18:708-14.

7. Robertson W. The international atherosclerosis project. Pathobiology 1967;30:810-6.

8. Kessler II. Mortality experience of diabetic patients: a twenty-six year follow-up study. The American journal of medicine 1971;51:715-24.

9. Maity A, Sen A, Chhetri M. Profile of coronary problems in myocardial infarction in diabetics and non-diabetics. Journal of the Indian Medical Association 1986;84:37.

10. Bonow RO, Mann DL, Zipes DP, Libby P. Braunwald's heart disease: a textbook of cardiovascular medicine: Elsevier Health Sciences; 2011.

11. Wagner GS. Marriott's practical electrocardiography: Lippincott Williams & Wilkins; 2001.

12. Joslin EP, Kahn CR. Joslin's Diabetes Mellitus: Edited by C. Ronald Kahn...[et Al.]: Lippincott Williams & Wilkins; 2005.