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Ambulatory Monitoring In Evaluation of Cardiovascular Problems Our Experience At IAM, Bangalore

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This paper presents our experience with ambu latory monitoring in evaluation of CVS pro blems. A total of 115 IAF Officers were studie at IAM with twenty four hours ambulator monitoring using low weight portable card odyne cardio cassette type records Definit diagnosis could be arrived at in 50 cases, an cardiac disorders were excluded in 48 case: Ambulatory monitoring as a procedure fo diagnosis, management and disposal of CV: cases is recommended.

Introduction

A standard 14 lead ECG over 40—45 seconds consisting of 40—80 beats cannot be representative of the changes that may occur during 24 hours. Further exercise tests conducted in laboratory are only physical stresses. 24 hours Ambulatory monitoring caters for psychological stresses as well as the normal daily activities (eg walking, running, sleep, games, meals, smoking etc) which can not be simulated in a laboratory.

Holter (1) in 1961 developed a method of continuously recording the ECG on magnetic tape, for prolonged periods of time, with the help of which about 2,50,000 beats can be recorded and analysed. It is a useful device in evaluating patients with pain chest, ECG-abnormality, post-myocardial infarction cases, arrhythmias, efficacy of antiarrhythmic therapy and a host of symptoms like palpitation, syncope, giddiness and episodic loss of consciousness. We are presenting here our experince with ambulatory monitoring (Holter monitoring) at Institute of Aviation Medicine in evaluating cardiovascular problems.

Materials and Methods

Aircrew and other officers coming for periodic review and patients refered from Command Hospital Air Force Bangalore constituted the subjects of our study. Detailed clinical examination was carried out in all cases. Routine blood, urine, biochemical parameters and ECG (resting and Master's double two step exercise) were done in all cases.

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Ergometery (Monark bicycle), multistage graded treadmill and echocariography was carried out wherever required.

Twenty four hours ambulatory monitoring was done in all cases using low weight portable Cardiodyne Cardiosassette tape records. After abrading the skin prejelled self sticking electrodes were applied in CM_5 position (Fig.* 1) and cables were attached. Patient's particulars, indications for the test and time of day were recorded before connecting patient to the cardiocassette. Patients were instructed to use PTT (Press To Talk) switch to give information about time, activity and symptoms with activity. After each information the cardiocassette recorded an additional sample of programmed duration (to give ECG at that moment) in addition to its preset duration and interval of recording. Next day before disconnecting, another sample of ECG was recorded and the procedure was terminated with words "run ends". Cassette was replayed on ECG machine to obtain permanent record with the help of carniodyne supplied cables. Standardisation was checked by comparing tracings of cardiocassette and directly recorded ones from patients.

ECGs were analysed and compared with other information to confirm, supplement, ruleout or record de novo abnormalties. Standard criteria for ischaemic hear disease were applied for all cases.

Observations

A total of 115 cases were studied. Age ranged from 16—64 yrs with large number of cases falling in 20—40 years age group Sex distribution was 107 males and 8 females (Table-I)

TABLE-I

Age and Sex distribution

	Age in Years					
Sex	16-20	21-30	31-40	41-50	51-64	Total
Male	9	27	42	19	10	107
Female	—	3	4	1	--	8
Total	9	30	46	20	10	115

Initial diagnosis

The diagnosis with which patients were refered for ambulatory monitoring, are summarised as follows :—

Myocardial Infarction	Ischaemic Heart disease	ECG abnormality	Ectopics	Misc.
8	14	31	21	41

Misc : Symptoms like palpitation, painchest, giddiness and episodic loss of consciousness and aircrew for Project Pawan.

Findings on ambvlatory monitoring

1. **Myocardial Infarction :** Infarction was stable in all the cases Ischamic changes (in form of horizontal or downsloping ST-depression by more than 1mm lasting for 0.08 sec. or more upslosing ST-depression of 1.5 mm or more with or without T-wave changes), were observed in 4 casese during climbing stairs, brisk walking and post-prandial period, unaccompained by symptoms. The patients were advised to have light meals, take rest after meals, be-slaw in climibing stairs and modify regular exercises VPBs were observed in three cases, which however were in Lown's grade I, hence left as such.

2. **Ischaemic Heart Disease :** out of 14 patients, five patients showed classical ischaemic changes on ambulatory monitoring and 9 were found to have no abnormality. On stress test all these cases were confirmed to have ischaemic heart disease.

3. **ECG-Abnormality :** 31 cases in this group are further re-arranged as per findings of ambulatory monitoring.

IHD	Ectopics	Sinus changes	MVP	WPW Synd	No abnormality
2	10	4	2	2	16

(Due to overlapping of groups, total number of cases does not equal to 31). IHD changes were attributed to post-viral myocarditis and hence find-

ings were kept as non-specific ECG abnormality. VPBs were in Lown's grade I and hence considered to be physiological and left as such. Sinus change was sinus bradycardia. Clinical diagnosis of mitral valve prolapse (MVP) was associated with T-wave changes in inferior leads on routine ECG but no additional findings were detected on ambulatory monitoring. Intermittent Wolf-Parkinson White syndrome (Pre-excitation Syndrome) was noted in two cases and 16 cases had no abnormality. Thus large majority of patients were concluded to have no/non-specific changes and this helped in their management and disposal.

4. **Ventricular & Supraventricular Ectopics :** 21 cases of this group were found to have VPBs in 15, SVPBs in 3 and no abnormality in 3. We recorded couplets in 4 cases, more than 5 ectopics per minute in 3 cases and bigeminal/trigeminal/mixed pattern in 3 cases from the patients who on clinical examination and routine ECG revealed only infrequent ectopics. 8 cases had shown multiform multifocal ectopics which were unifocal on routine ECG. In all these cases treatment was instituted accordingly to suppress these ectopics (Lown's grade III & IV) as these could be the forerunners of serious ventricular arrhythmias.

Miscellaneous : 41 cases of this group are subdivided, based on ambulatory monitoring, as follows :

Mitral valve pro-lapse	Ectopic	Sick Sinus syndrome	Wenckebach phenomenon	No abnormality	Project pawan
1	4	2	1	16	17

Thus cause of giddiness, syncope and episodic loss of consciousness was found in 3 cases. Two had Sick Sinus Syndrome (SSS) as revealed by brady-tachy rhythm and wandering pacemaker. one of them was sent for permanent pacing. One patient showed intermittent Wenckebach phenomenon.

All the 17 cases in Project Pawan group we found to have no abnormality.

6. **Disposal of aircrew :** Out of 115 cases, cases were aircrews who were referred with t following diagnosis for ambulatory monitoring.

IHD	ECG abnormality	Ectopics	Misc
1	19	9	9

The findings on ambulatotory monitoring were follows :—

IHD	Sick/sinus	Ectopics	NAD
1	19	12	23

Thus large majority of aircrews could be cleare for flying and cases with IHD and sick sinus sy drome were permanently grounded. Among case with ectopics, 2 had couplets, 2 had bigemini, 6 ha multiform multifocal ectopics and 2 were conside ed physiological and their disposal was decide accordingly.

Discussion

Ambulatory monitoring provides ECG record ing during normal daily activities and thus enable us to study correlation of stress and strain of dail life with ECG changes. It is useful in follo up of cases wiih MI, evaluation of pain chest wit or without ECG changes (inclusive) [2,3,4,5], and study of arrhythmias of known or unknown aetio logy (to find out aeticlogy, origin, nature, course and termination). Evaluation of miscellaneous symptoms by ambulatory monitoring saves the patient from exhaustive investigations by internist neurologist, psychiatrist and cardiologist. [1,6,7] our observations in this group amply clarify the use of ambulatory monitoring. Suspected cases of IHD on ECG (R & DMI) are not all ischaemic as we could exclude this diagnosis in 9 out of 14 (64.38 percent) and confirm in 5 cases (35.62 percent) only. Ischaemic changes in post-myocardial infarction cases help us to modify rehabilitation exercises and use of coronary dilators as prophylactic measure. Study of cases with uninterpretable ECG

by ambulatory monitoring is equally rewarding to find or exclude various abnormalities, especially IHD, as in our observations none of the cases showed ischaemic changes.

Extrasystoles could be due to non-ischaemic and extracardiac causes and may have no pathological basis. In present study extrasystoles were confirmed in 21 out of 24 (87.49 percent) cases and excluded in 3 (12.51 percent). Organic heart disease was the underlying aetiology in 10 cases. All of them had ischaemic heart disease.

Thus in all we could provide definite diagnosis in 50 cases (5=IHD, 4=MI, 15=ECG-Ab, 18=VPBs and 8=Misc) and exclude cardiac disorders in 48 case (9=IHD, 4=MI, 16=ECG-Ab, 3=VPBs and 16=misc), thus alleviating anxiety and apprehension in patients and diagnostic dilemma in physicians.

Conclusion

Ambulatory monitorings is a useful investigation in unresolved cardiovascular problems and complimentary to other non-invasive procedures. We feel it should be routinely employed in diagnosis, management and disposal of cardiovascular cases.

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