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Case Report

Utilizing Smartphone ECG for Early Detection and Management of Ischemic Heart Disease: A Case Report

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Abstract

Ischemic Heart Disease (IHD) remains a significant cause of morbidity and mortality worldwide. We present a case report of a 54-year-old individual presenting with symptoms suggestive of IHD, including palpitations and chest heaviness. Utilizing a Spandan device at home, the patient detected anteroseptal and lateral wall ischemia, prompting consultation with a cardiologist. Subsequent diagnostic evaluations revealed Left Ventricular Hypertrophy (LVH), concentric LVH, regional wall motion abnormality, and Grade I diastolic dysfunction. Hypertension and dyslipidemia were identified as prominent risk factors, with additional findings of carotid artery disease. Management strategies included antihypertensive medications, lipid-lowering therapy, and lifestyle modifications. This case underscores the complexity of diagnosing and managing IHD, highlighting the importance of comprehensive assessment and multidisciplinary care in optimizing patient outcomes.

More Information

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Keywords: Ischemic heart disease; Early detection; Management; Smartphone ECG

Introduction

Cardiovascular Diseases (CVDs) remain a leading cause of morbidity and mortality worldwide, posing significant challenges to healthcare systems globally [1]. Among the various manifestations of CVDs, Ischemic Heart Disease (IHD) stands as a prevalent and serious condition, often presenting with symptoms such as palpitations and chest discomfort [2]. Timely diagnosis and appropriate management are crucial in mitigating the adverse outcomes associated with IHD [3]. In this context, we present a case report of a 54-year-old individual who sought medical attention due to symptoms suggestive of IHD, including palpitations and chest heaviness. Through a comprehensive diagnostic approach and multidisciplinary management, we aim to elucidate the clinical course, diagnostic findings, and therapeutic interventions in this case, shedding light on the complexities involved in managing ischemic heart disease.

Case presentation

A 54-year-old patient presented on July 12, 2023, the study patient complained of palpitations and chest heaviness. Having previously purchased the Spandan ECG device developed by Sunfox Technologies, a single-channel 12-lead ECG device capable of detecting different types of arrhythmias and STEMI/NSTEMI, he utilized it in an emergency to take his ECG. The ECG detected anteroseptal and lateral wall ischemia (Figure 1). Seeking consultation at the Hospital, the patient's blood pressure was 136/110 mmHg. Subsequent electrocardiogram (ECG) corroborated the initial findings and echocardiogram findings revealed left ventricular hypertrophy (LVH), with normal Troponin I levels. The prescribed medications included Tellzy MT, Ecospirin AV 75/10, and T3 plus.

On July 27, 2023, the patient consulted another cardiologist at the hospital, noting a blood pressure of 146/98 mmHg and a heart rate of 66 bpm. Echocardiogram results confirmed concentric LVH and regional wall motion abnormality. Further diagnostic tests were recommended, including an ultrasound of the abdomen, blood tests, cardiac computed tomography (CD), exercise tolerance test (if suitable), and bilateral carotid Doppler ultrasound (Figure 2).

Subsequent blood tests on July 31, 2023, revealed elevated glycosylated haemoglobin and phosphatase levels, along with altered sodium and globulin levels. Calcium levels were decreased, and Troponin I levels were also lower. Abdominal ultrasound displayed grade I fatty liver. Bilateral carotid Doppler ultrasound indicated thickening of the left common carotid artery and atherosclerotic changes in the left carotid artery, with normal right vertebral artery visualization (Figure 3).

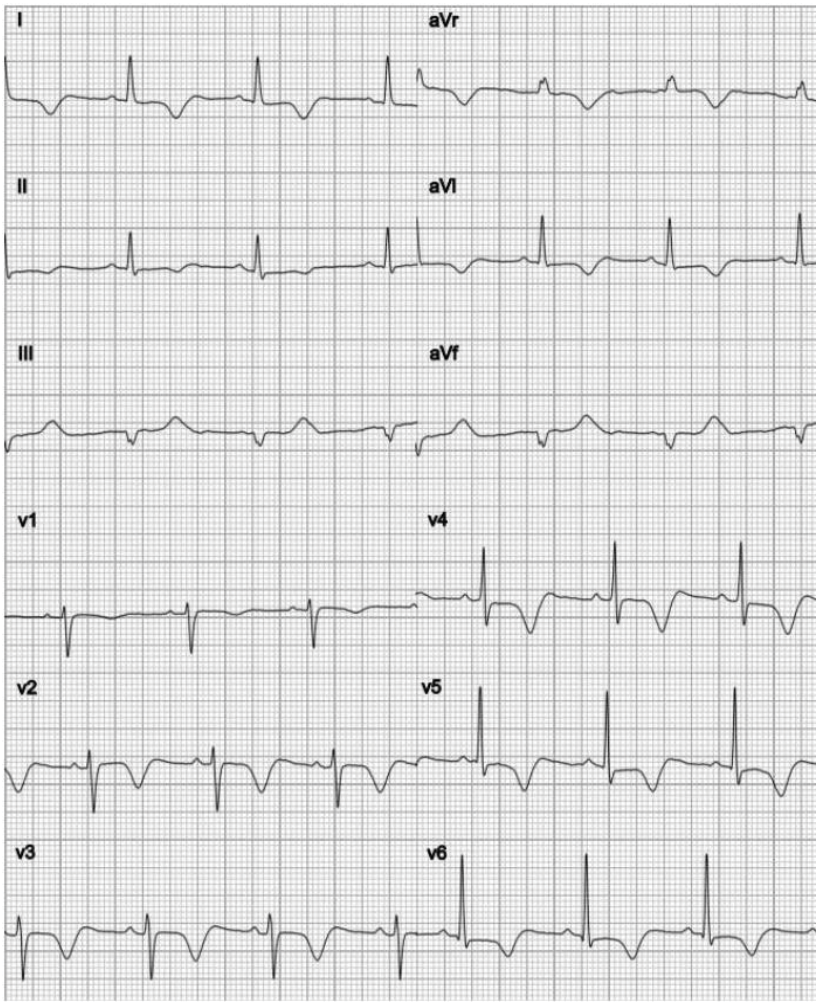


Figure 1: ECG test performed using Spandan Device.

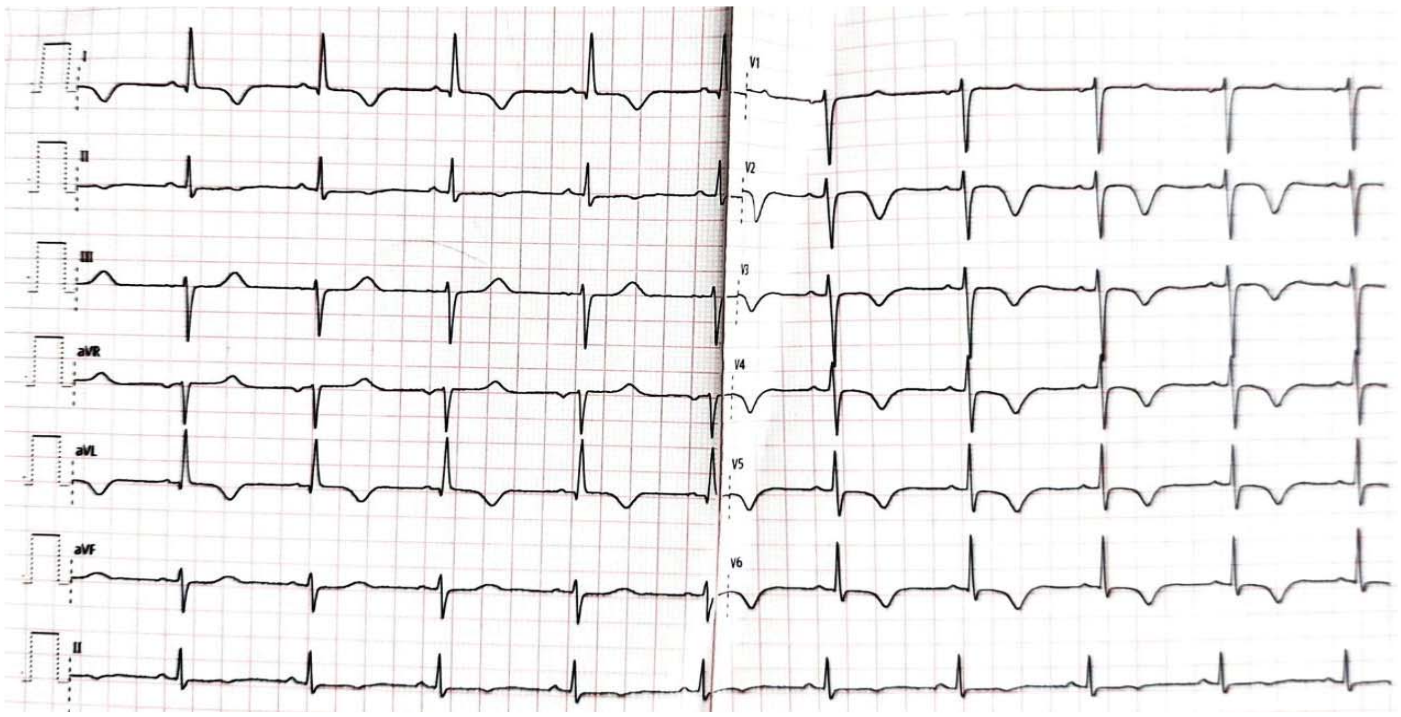


Figure 2: ECG test performed in the hospital.

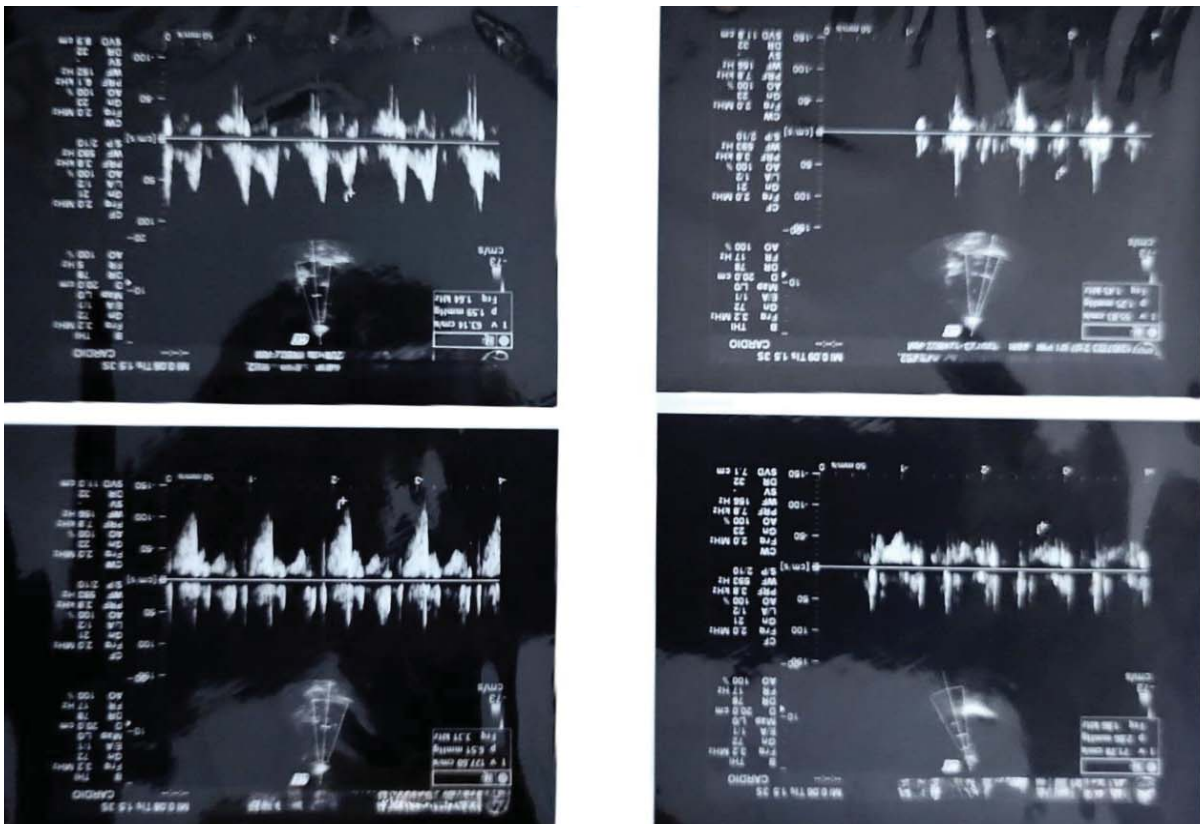


Figure 3: Bilateral Carotid Doppler test report.

On August 1, 2023, an echocardiogram at the Hospital revealed Grade I diastolic dysfunction, RWMA score of 17, RWMI score of 1, and an ejection fraction of 60% (Figure 4).

An ECG conducted on August 3, 2023, detected lateral wall ischemia, prompting the cardiologist to recommend angiography. The patient's ECG showed signs of ischemia, and abnormalities were noted in the cardiac Doppler and Echo report, leading the cardiologist to suggest angiography. However, the patient had not undergone the procedure, and no subsequent follow-up was conducted (Figure 5).

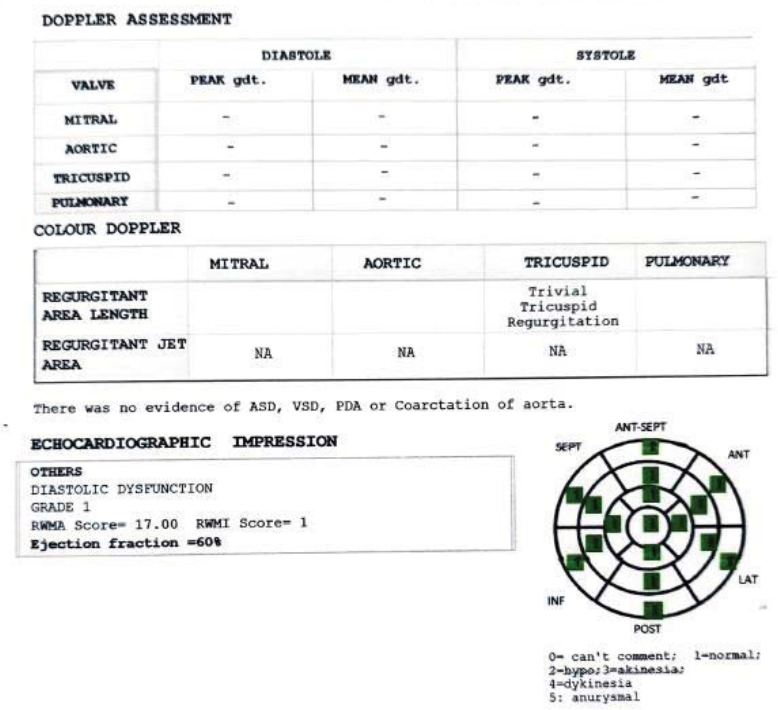
Discussion

The presented case underscores the intricate nature of diagnosing and managing Ischemic Heart Disease (IHD), particularly in individuals with multiple risk factors and comorbidities. The patient's initial symptoms of palpitations and chest heaviness prompted a thorough evaluation, including the utilization of a Spandan device at home, which detected anteroseptal and lateral wall ischemia. This highlights the growing role of remote monitoring devices in the early detection of cardiac abnormalities, enabling prompt medical intervention.

The subsequent diagnostic workup revealed several noteworthy findings. Echocardiography demonstrated Left Ventricular Hypertrophy (LVH), a common manifestation of chronic pressure overload often seen in hypertensive individuals. The presence of concentric LVH and regional wall motion abnormality further underscored the structural and functional changes occurring in the myocardium. Additionally, the identification of Grade I diastolic dysfunction on echocardiogram highlights the early involvement of myocardial relaxation impairment, indicative of underlying cardiac pathology.

The patient's blood pressure recordings consistently showed hypertension, a major risk factor for the development and progression of cardiovascular diseases, including IHD. Hypertension not only contributes to LVH but also exacerbates myocardial ischemia by increasing cardiac workload and oxygen demand. The management of hypertension with antihypertensive medications, including Tellzy MT, is crucial in optimizing blood pressure control and reducing the risk of cardiovascular events.

Furthermore, the presence of abnormal lipid profiles, evidenced by elevated glycosylated hemoglobin and phosphatase levels, underscores the dyslipidemic state often observed in patients with IHD. Dyslipidemia, characterized by elevated levels of low-density lipoprotein cholesterol (LDL-C) and triglycerides, plays a pivotal role in the development of atherosclerosis, the underlying pathology in most cases of IHD. Therefore, aggressive lipid-lowering therapy, in conjunction with lifestyle modifications, is paramount in mitigating the progression of atherosclerotic plaque formation and reducing the risk of coronary events.



DOPPLER ASSESSMENT

VALVE	DIASTOLE		SYSTOLE	
	PEAK gdt.	MEAN gdt.	PEAK gdt.	MEAN gdt
MITRAL	-	-	-	-
AORTIC	-	-	-	-
TRICUSPID	-	-	-	-
PULMONARY	-	-	-	-

COLOUR DOPPLER

	MITRAL	AORTIC	TRICUSPID	PULMONARY
REGURGITANT AREA LENGTH			Trivial Tricuspid Regurgitation	
REGURGITANT JET AREA	NA	NA	NA	NA

There was no evidence of ASD, VSD, PDA or Coarctation of aorta.

ECHOCARDIOGRAPHIC IMPRESSION

OTHERS
DIASTOLIC DYSFUNCTION
GRADE 1
RWMA Score= 17.00 RWMI Score= 1
Ejection fraction =60%

0= can't comment; 1=normal;
2=hypo;3=akinesia;
4=dykinesia
5: anurysmal

Figure 4: Echo test report.

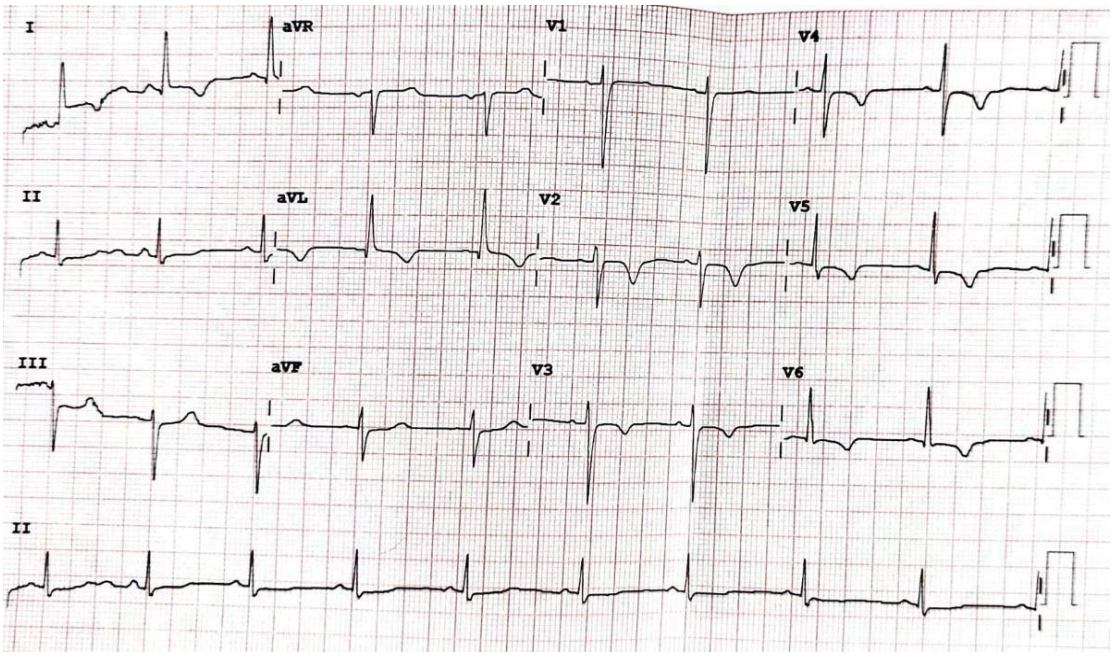


Figure 5: ECG test performed on 3 August 2023.

The findings from the bilateral carotid Doppler ultrasound are also noteworthy, revealing thickening of the left common carotid artery and atherosclerotic changes in the left carotid artery. Carotid atherosclerosis is closely linked to coronary artery disease, sharing similar risk factors and underlying pathophysiology. The identification of carotid artery disease underscores the systemic nature of atherosclerosis and the importance of comprehensive vascular assessment in patients with known or suspected IHD.

Conclusion

This case report underscores the critical importance of early detection and comprehensive management of ischemic heart disease (IHD). Utilizing the Spandan ECG device at home, the patient identified anteroseptal and lateral wall ischemia, prompting timely medical consultation. Subsequent evaluations confirmed left ventricular hypertrophy (LVH) and regional wall motion abnormalities, highlighting the necessity for ongoing cardiac monitoring.

Key management strategies included initiating antihypertensive and lipid-lowering medications to control hypertension and dyslipidemia—significant risk factors for IHD. The detection of carotid artery disease further underscored the systemic nature of atherosclerosis, emphasizing the importance of a holistic approach to vascular health.

The integration of remote monitoring devices like the Spandan ECG facilitates early detection of cardiac abnormalities, enabling prompt medical intervention upon detection. A multidisciplinary management approach is crucial for optimizing outcomes in patients with IHD, addressing both immediate cardiac issues and broader cardiovascular risk factors effectively.

Acknowledgement

We would like to express our sincere gratitude to Sunfox Technologies for providing assistance during the case report analysis.

Ethical considerations

Prior to the procedure, the patient provided written informed consent. No identifiable images have been included in this publication.

Criteria for inclusion in the authors' list

All authors contributed significantly to the conception, design, analysis, and writing of this case report. Dr. Yogendra Singh and Dr. CB Pandey contributed to the clinical data collection and interpretation. Deekhsha Agarwal and Nitin Chandola was involved in the patient management and follow-up. All authors have read and approved the final manuscript.

Statement of approval

All the authors have read and approved the manuscript. The requirements for authorship as stated in the journal's guidelines have been met, and each author believes that the manuscript represents honest work.

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