SUDAN UNIVERSITY OF SCIENCES AND TECHNOLOGY

COLLEGE OF GRADUATE STUDIES

Characterize of Mitral Valve Diseases by Using Echocardiography

توصيف امراض الصمام المترالي باستخدام الموجات فوق الصوتية للقلب

A thesis submitted for partial fulfillment of the requirement of MSc degree in medical diagnostic ultrasound

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الآيـه

قال تعالى :

(قالوا سبحانك لا علم لنا الا ما علمتنا انك

انت العليم الحكيم)

صدق الله العظيم

سورة البقر الآيه (32)

Dedication

To my mother، father whose both reason of my creation and first whose teach me، to my teachers and my colleagues I present this moderate effort.

Acknowledgement

Would like first to thank Allah، then Everyone who assist me by anything.

Abstract

This study has done in Military and Ribat Hospital in ultra sound department.

The main objective of this study is to evaluate the mitral valve disease using echocardiography.

The data of the study were collected from 50 patient attended to the ultra sound department.

The sample ages were ranged between 17 up to 80 years old .Both genders were included males are smokers، patient were affected by diabetes ، hypertension and rheumatoid were diagnose to have valve stenosis (14%) and (86%) regurgiation

Echocardiographic parameters including left atrium، left ventricle ، Inter ventricular Septum diastole ، left ventricle diameter in diastole ، left ventricle diameter in systole ، ejection fraction were evaluated .

Using ultra sound machine fitted with sector ، 5 MHZ high frequency probe . Doppler technique was used

The result showed that the gender has effect on the echocardiographic parameters significantly at P value 0.05 .

Hypertension has no effect on the selected parameters while the diabetes and rheumatoid have an effect on the left ventricle posterior wall in diastole significantly.

The Doppler showed the degree of severity in most of cases (43 Regurgiation) and (7 stenosis) .

Echocardiography and Doppler technique have great value in diagnosis of mitral valve diseases.

خلاصة البحث

تم جمع بيانات هذه الدراسة من 50 حالة من المرضى بقسم الموجات الصوتية للقلب بمستشفي السلاح الطبي والرباط الوطني وتتراوح اعمارهم ما بين 17 الى 80 سنة من الذكور المدخنين والإناث وذلك باستخدام استبيان يحوى التشخيص الطبى والبيانات الشخصية بالإضافة الى نتائج الموجات فوق الصوتية التى اظهرت ضيق الصمام بنسبة (14%) وارتجاع الصمام . بنسبة (86%)

تم استخدام مجس مقطعى عالى التردد 5 ميقاهيرز وتقنية دوبلر فى تقييم قياسات الاذين الايسر، العضلة الخلفية للبطين الايسر، قطر البطين الايسر فى حالة الانبساط والانقباض وسرعة عضلة القلب.

اوضحت النتائج ان الذكور والإناث متأثرين بدرجة عالية بقياسات الموجات فوق الصوتية قيمة البى 0.05، فى حين ان الضغط لم يكن له تأثير فى القياسات المختارة وان السكرى والروماتزم لهما تأثير على العضلة الخلفية للبطين الايسر.

وعند استخدام موجات الأوعية الدموي وجد اغلب الحالات عبارة عن ارتجاع الصمام (43) حالة و (7) حالات ضيق الصمام.

الموجات فوق الصوتية للقلب وموجات الاوعية الدموية لهما دور فعال فى تشخيص امراض الصمام المترالى .

List of Abbreviations

Abbreviation	Words
U/s	Ultrasound
Av	Atrioventricular
Ao	Aorta
PA	Pulmonary Artery
IHD	Islamic heart disease
CVD	Cardiovasculardisease
MR	Mitral Regurgitation
MVP	Mitral Value Prolapse
RV	Right Ventricle
SV	Stroke Volume
ESV	End Systole Volume
TEE	Trans Esophageal echocardiography
SBP	Systole blood pressure
DBP	Diastole blood pressure
MVS	Mitral Valve stenesis
Rh	Rheumatiod fever

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CHAPTER ONE

Introduction

CHAPTER ONE

1.1 Introduction:

The mitral valve connects the left atrium (LA) and the left ventricle (LV). The mitral valve opens during diastole to allow the blood flow from the LA to the LV. During ventricular systole, the mitral valve closes and prevents backflow to the LA.systemic disease related and rheumatoid fever related to various organs problems one of them in mitral valve in case of chronic diabetes mellitus and chronic hypertension lead to mitral regurgitation occur when the valve do not close properly,in chronic rheumatoid fever affect the valve by stenosis in valve does not open fully. (sween ,2002)

The mitral valve was the first structure to be identified by echocardiography. Technical advances have enabled echocardiography to identify almost any anatomic or functional abnormality of the mitral valve. Echocardiography has become the most important tool of the cardiologist for diagnosing significant structural or functional abnormalities of the heart, anatomic details are accurately portrayed, cardiac structures can be measured and their movement traced throughout the cardiac cycle. (sween ,2002)

Echocardiograph thus adds a significant challenge for the investigator compared to ordinary two-dimensional u/s imaging of other organs, since the motion of the heart and cardiac segments along the temporal axis yields important functional information. (Matthias, 2005)

Besides two-dimensional echocardiography, various methods are available for evaluating the heart and its function and demonstrate the value of echocardiography based on several classic pathologic conditions. Echocardiography has much use in diagnose cheep available and comfortable machine to patient. (sween ,2002)

1.3 Problem of study:

Systemic disease [diabetes-hypertension] and rheumatoid fever effect on mitral valve structure and function .

1.3 Objective :

1.3.1 General objective:

Charactrize of mitral valve diseases by using echocardiography.

1.3.2 Specific objective :

To evaluate the mitral valve left atrium، left ventricle ، Inter ventricular Septum diastolie ، left ventricle diameter in diastolie ، left ventricle diameter in systolie ، ejection fraction in diabetes , hypertension, and rheumatoid .

To correlate the finding with genders and diseases (diabetes , hypertension, and rheumatoid)

To evaluation the Doppler in diagnosis of diseases severity .

1.4 Over view of study:

This study contains five chapters ,chapter one introduction. chapter two literature review and previous studies. chapter three material and methods. chapter four the results. chapter five discussion, conclusion, recommendations, reference and appendix.

CHAPTER TWO

Literature review

CHAPTER TWO

2.1 Anatomy :

It is the first major system start to function in the body. The primordial heart and vascular system appear in middle of third week . The heart starts to function in the beginning of fourth week (22-23day) of development. This because of the rapid growing embryo can no longer satisfy its nutritional and oxygen requirement by diffusion alone, so there is need for additional efficient way of acquiring oxygen and nutrient from maternal blood and disposing carbon dioxide and waste products. Center of the cardiovascular system, theheart.Conneects with blood vessels that transport blood between the heart and other body tissues.Arteries carry blood away from the heart veins carry blood back to the heart Arteries carry blood high in oxygen. (Except for the pulmonary arteries) Veins carry blood low in oxygen. (Except for the pulmonary veins)Arteries and veins entering and leaving the heart are called the great vessels. Develops blood pressure through alternate cycles of heart wall contraction and relaxation. Minimum blood pressure is essential to push blood through blood vessels to the body tissues for nutrient and waste exchange. Relatively small, conical organ approximately the size of a person’s clenched fist.it weighs about 250 to 350 grams Located left of the body midline posterior to the sternum in the middle mediastinum. Rotated such that its right side or border (right atrium and ventricle) is located more anteriorly, while its left side or border (left atrium and ventricle) is located more posteriorly .(sween ,2002)

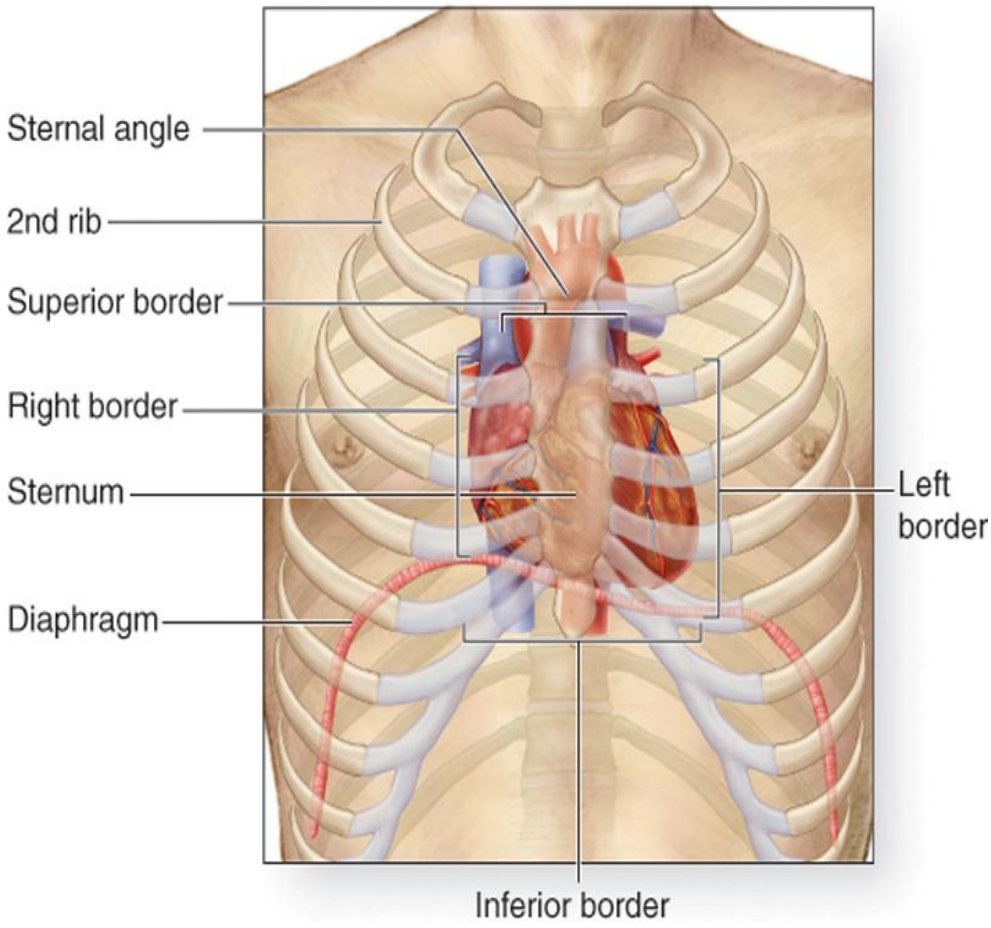


Figure (2-1): anterior view of the heart

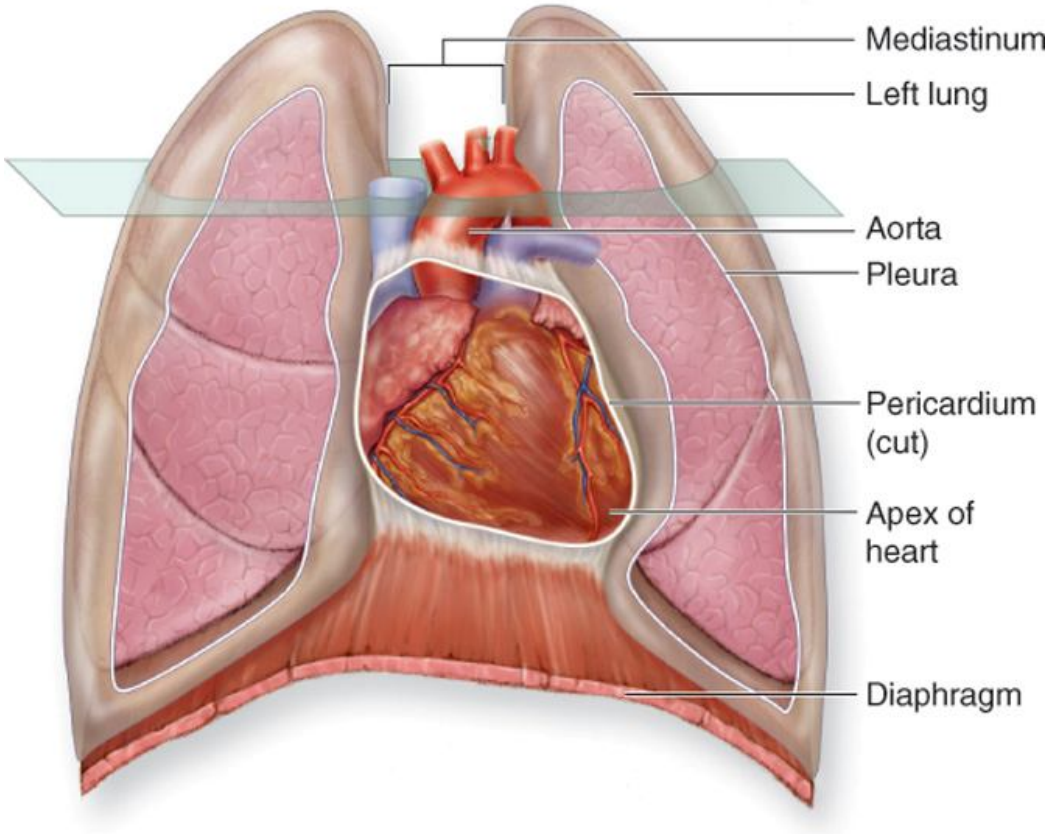


Figure (2-2): Serous membranes of the heart and lungs

2.1.1Pericardium:

Fibrous, serous saccontains the hea t in the mediastinum held in place by connective tissues .The external wall of the great vessels' superior to the heartdiaphragm inferior. Restricts heart movements Prevents the heart from overfilling with blood

1.Outer portion

Tough, dense connective tissuecalled the fibrous pericardium. Attached to both the sternum and the diaphragm

2.Inner portion

Thin, double-layered serous membranecalled the serous pericardium.

1.parietal layer

2.visceral layer .(sween ,2002)

2.1.1Function of pericardium:

Stabilization of the heart within the thoracic cavity by virtue of its ligamentous attachments. limiting the heart's motion Protection of the heart from mechanical trauma and infection from adjoining structures. The pericardial fluid functions as a lubricant and decreases friction of cardiac surface during systole and diastole.Prevention of excessive dilation of heart especially during sudden rise in intra-cardiac volume .(sween ,2002

2.1.2Hard wall structure :

Three distinctive layers:

1.Externalepicedium

2.Middle myocardium

3.Internal endocardium

2.1.1.1Epicedium:

Outermost heart layers also known as the visceral layer of serous pericardium. Simple squamous epithelium underlined by fat as we age, more fat is deposited in the epicedium this layer becomes thicker and more fatty. (sween ,2002)

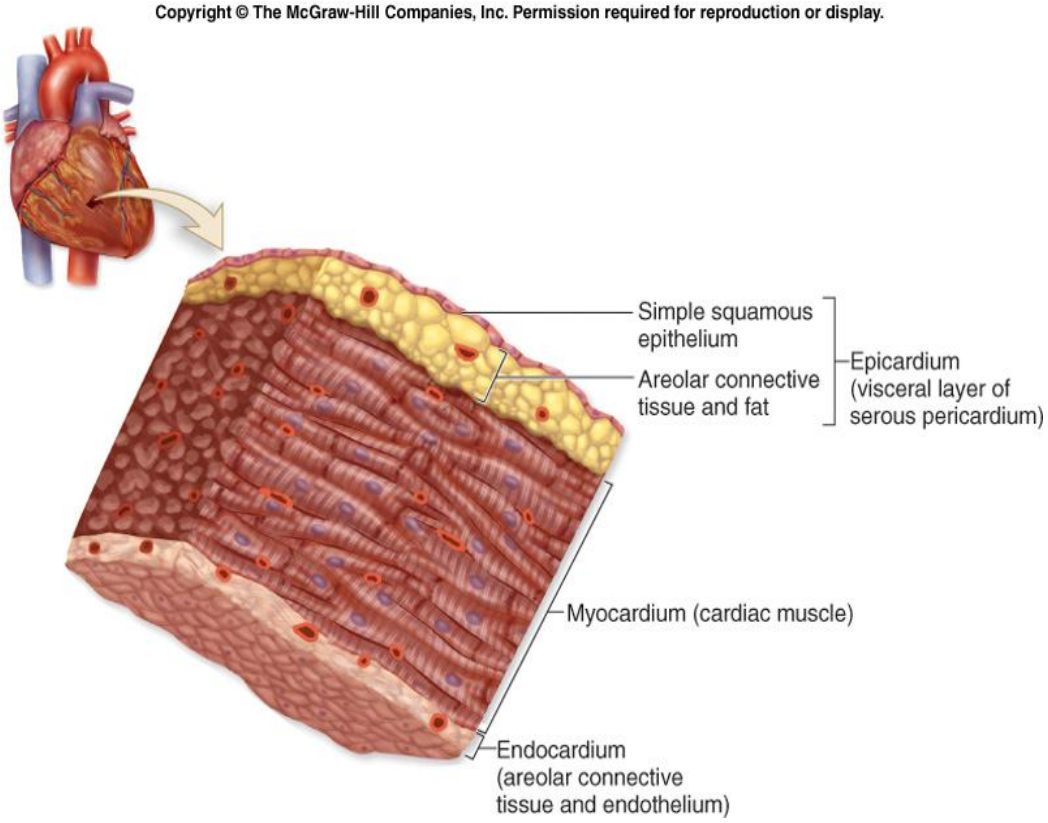


Figure (2-3): Heart wall structure

2.1.1.1 Myocardium:

Middle layer of the heart wall composed chiefly of cardiac muscle tissue. Thickest of the three heart wall layers.Lies deep to the epicedium and superficial to the endocardium..(sween ,2002)

2.1.1.2 Endocardium:

Covers internal surface of the heart and the external surfaces of the heart valves thin endothelium areolar CT under the endothelium.

2.1.2 Extern al anatomy of the heart :

There are four hollow chambers ,two smaller atria and two larger ventricles.

Atria is thin-walled, located superiorly, anterior part of each atrium is a wrinkled, flap like extension called an auricle. Atria receive blood through both circulatory circuits,right atrium receives blood from the systemic circuit,and left atrium receives blood from the pulmonary circuit. Blood that enters an atrium is passed to the ventricle on the same side of the heart.(sween ,2002)

Ventricles are the inferior chambers.Two large arteries, the pulmonary trunk and the aorta exit the heart at the basal surface. The pulmonary trunk carries blood from the right ventricle into the pulmonary circuit. The aorta conducts blood from the left ventricle into the systemic circuit.Atria are separated from the ventricles externally by coronary sulcus (or atrioventricular sulcus)extends around the circumference of the heart. On both the anterior and posterior surfaces of the heart, the anterior interventricular sulcus and the posterior interventricular sulcus are located between the left and right ventricles. These sulci extend inferiorly from the coronary sulcus toward the heart apex.(sween ,2002)

2.1.2.1 Properties of cardiac muscle:

1.The histology & functional syncytium

2.Extract higher amount of O2

- 3.Rhythmicity

4.Conductivity

5.Elasticity

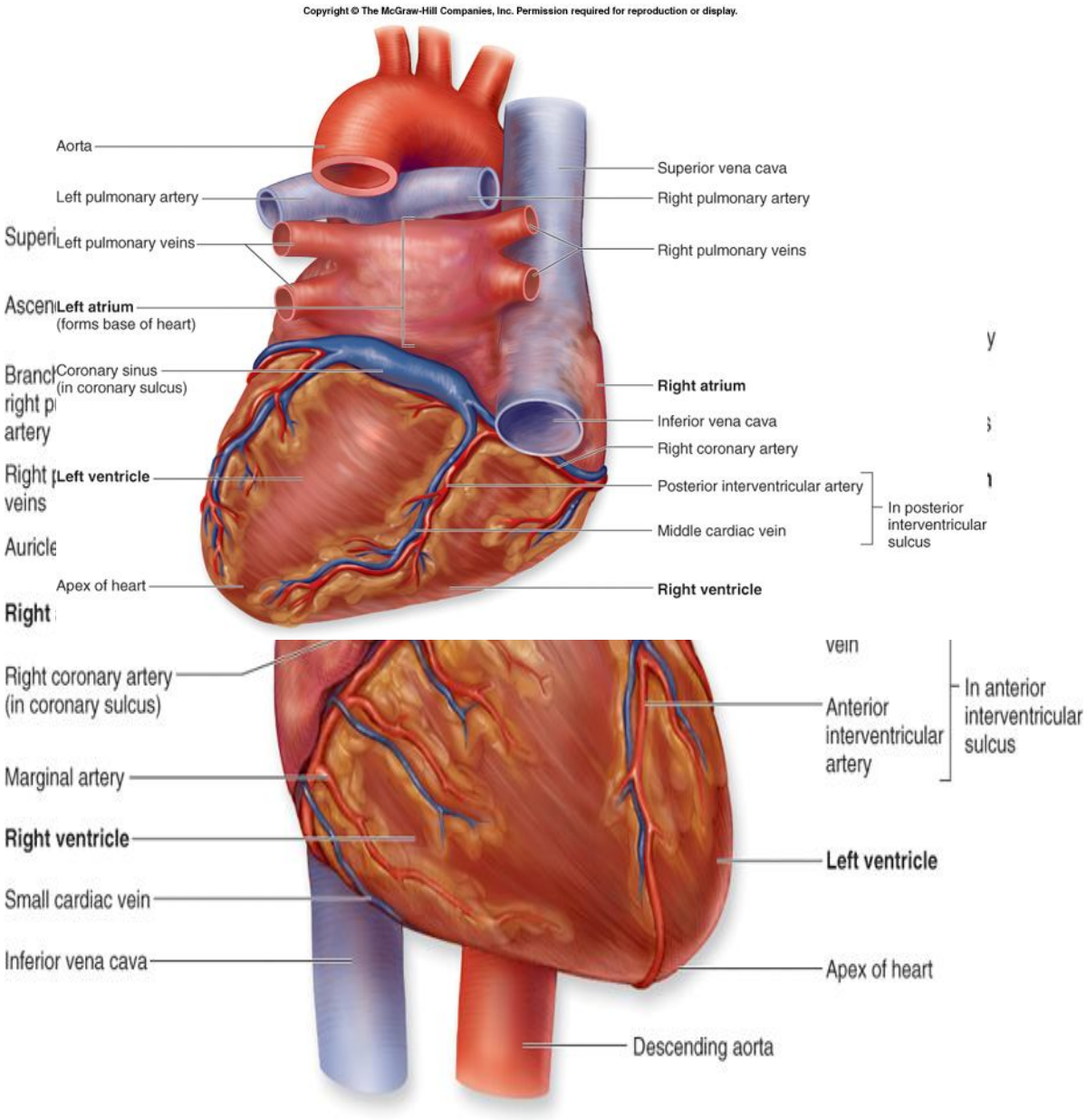


Figure (2-4): External Anatomy of heart

Figure (2-4): External Anatomy of heart

2.1.3 Internal anatomy of the heart :

There are four heart chambers:

Right atrium

Right ventricle

Left atrium

Left ventricle

Each plays a role in the continuous process of blood circulation.

Valves permit the passage of blood in one direction and prevent its backflow.(sween, 2002)

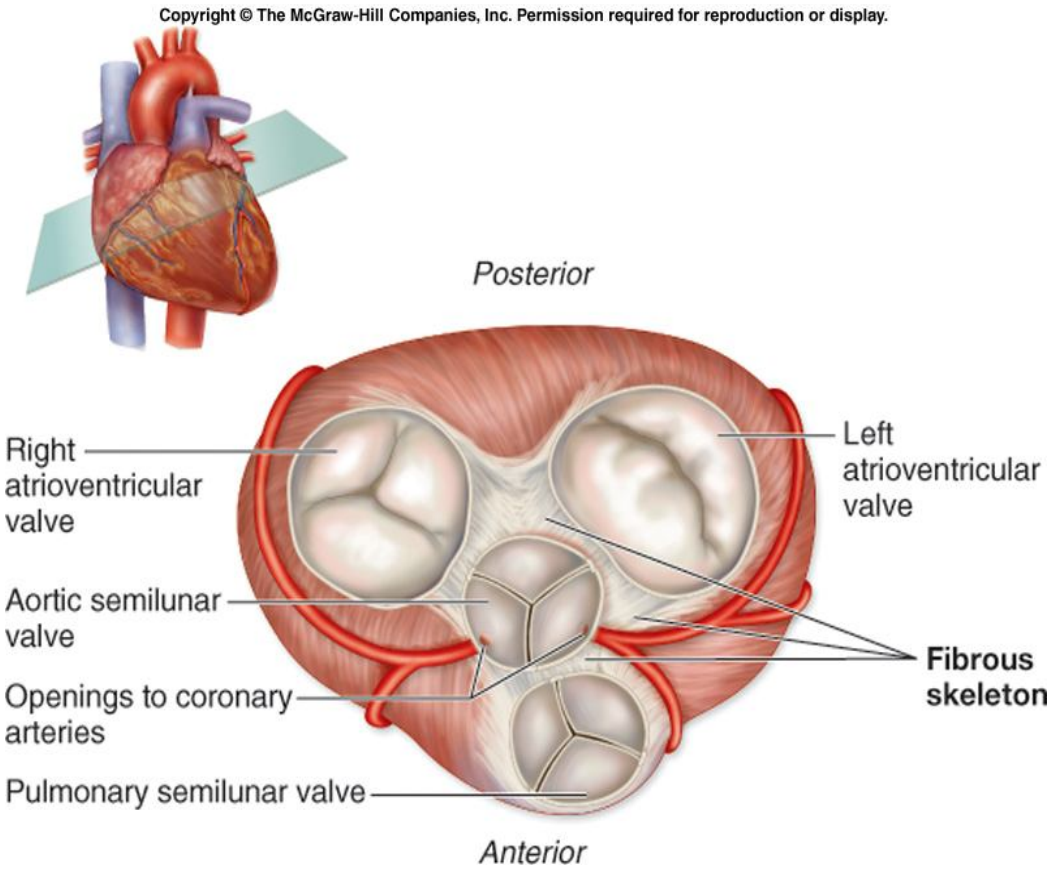


Figure (2-5): Valves of the heart

2.1.3.1 Right atrium:

Receives venous blood, from the systemic circuit, from the heart muscle itself.

Three major vessels empty into the right atrium:

Superior vena cava (SVC) drains blood from the head, upper limbs, and superior regions of the trunk , Inferior vena cava (IVC) drains blood from the lower limbs and trunk,coronary sinus drains blood from the heart wall .The intertribal septum forms a wall between the right and left atria.(sween ,2002)

2.1.3.2 Right atrio-ventricular valve :

Separates the right atrium from the right ventricle.also called the tricuspid valve, has three triangular flaps ,venous blood flows from the right atrium, through the valve into the right ventricle,is forced closed when the right ventricle begins to contract preventing blood backflow into the right atrium.(sween ,2002)

2.1.3.3 Right ventricle :

Receives deoxygenated venous blood from the right atrium. An interventricular septum forms a wall between the right and left ventricles. Papillary muscles on the internal wall surface ,cone-shaped, muscular projections anchor chordae tendineae attach to the cusp of the right AV valve and prevent everting and flipping into the atrium when contracting . (sween ,2002)

2.1.3.4 Pulmonary trunk :

At its superior end it narrows into a smooth-walled, conical region called the conusarteriosus. The pulmonary semilunar valve marks the end of the right ventricle

and the entrance into the pulmonary trunk. Pulmonary trunk divides shortly into right and left pulmonary arteries.Carry deoxygenated blood to the lungs. .(sween ,2002)

2.1.3.5 Semilunar valves :

Located within the walls of both ventricles,immediately before the connection of the ventricle to the pulmonary trunk and aorta. Composed of three thin, pocketlike semilunar cusps.As blood is pumped into the arterial trunks, it pushes against the cusps forcig the valves open. when ventricular contraction ceases blood is prevented from flowing back into the ventricles,causes the cusps to “inflate” and meet at the artery center, effectively blocking blood backflow .(sween ,2002)

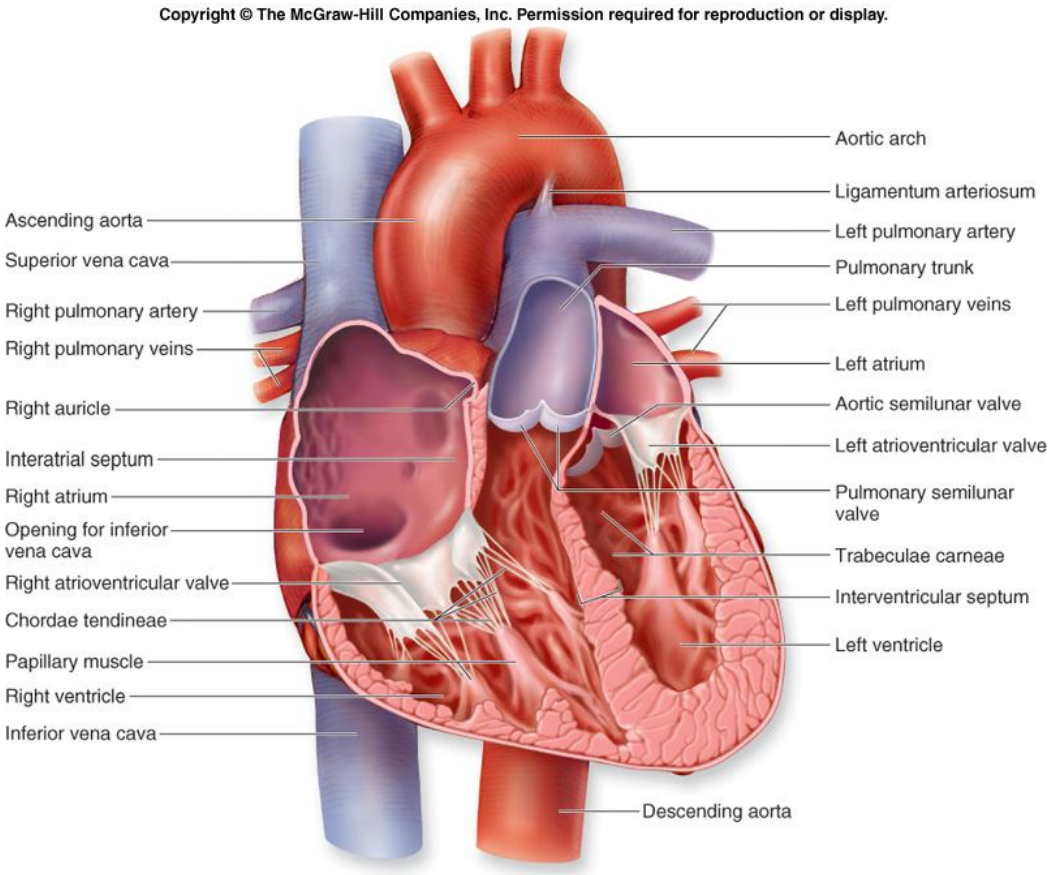


Figure (2-6): internal Anatomy of heart

2.1.3.6 Left atrium :

Once gas exchange occurs in the lungs, the oxygenated blood travels through the pulmonary veins to the left atrium. Smooth posterior wall of the left atrium contains openings for approximately four pulmonary veins , two left pulmonary veins

two right pulmonary veins have pectinate muscles along its anterior wall as well as an auricle.(sween ,2002)

2.1.3.7 Left atrio-ventricular valve:

Separates the left atrium from the left ventricle.Also called the bicuspid valve or the mitral valve.left AV valve has chordae tendineae similar to those of the right AV valve. Oxygenated blood flows from the left atrium into the left ventricle. is forced closed when the left ventricle begins to contract prevents blood backflow into the left atrium .(sween ,2002)

2.1.3.8 Left ventricle :

Largest of the four heart chambers.Wall is typically three times thicker than the right ventricular wall.Requires thick walls in order to generate enough pressure to force the oxygenated blood from the lungs into the aorta and then through the entire systemic circuit.Right ventricle only has to pump blood to the nearby lungs. Trabeculae carneae in the left ventricle are more prominent. Two large papillary muscles attach to the chordae tendineae that help support the left AV valve. At the superior end of the ventricular cavity, the aortic semilunar valve marks the end of the left ventricle and the entrance into the aorta.(sween ,2002)

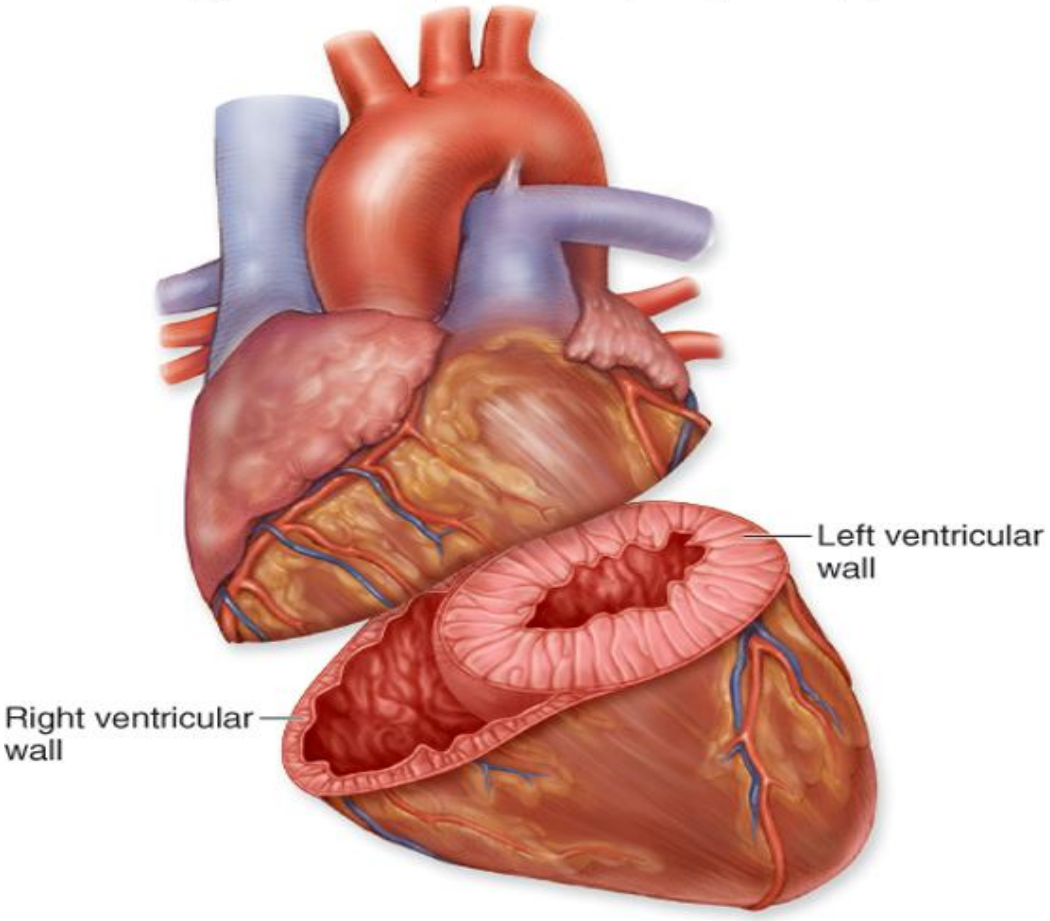


Figure (2-7): Papillary Muscle

2.1.4 Pulmonary and systemic circuits:

The pulmonary circuit consists of the chambers on the right side of the heart (right atrium and ventricle) as well as the pulmonary arteries and veins, conveys blood to the lungs via pulmonary arteries to reduce carbon dioxide and replenish oxygen levels in the blood. Blood returns to the heart in pulmonary veins. Blood returns to the left side of the heart, where it then enters the systemic circuit. The systemic circuit consists of the chambers on the left side of the heart (left atrium and ventricle), along with all the other named blood vessels. Carries blood to all the peripheral organs and

tissues of the body, oxygenated blood from the left side of the heart is pumped into the aorta the largest systemic artery in the body then into smaller systemic arteries.

Gas exchange in tissues occurs from capillaries. Systemic veins then carry deoxygenated blood (high in carbon dioxide) and waste products. Most veins merge and drain into the superior and inferior venae cava drain blood into the right atrium. There, the blood enters the pulmonary circuit, and the cycle repeats.(sween ,2002)

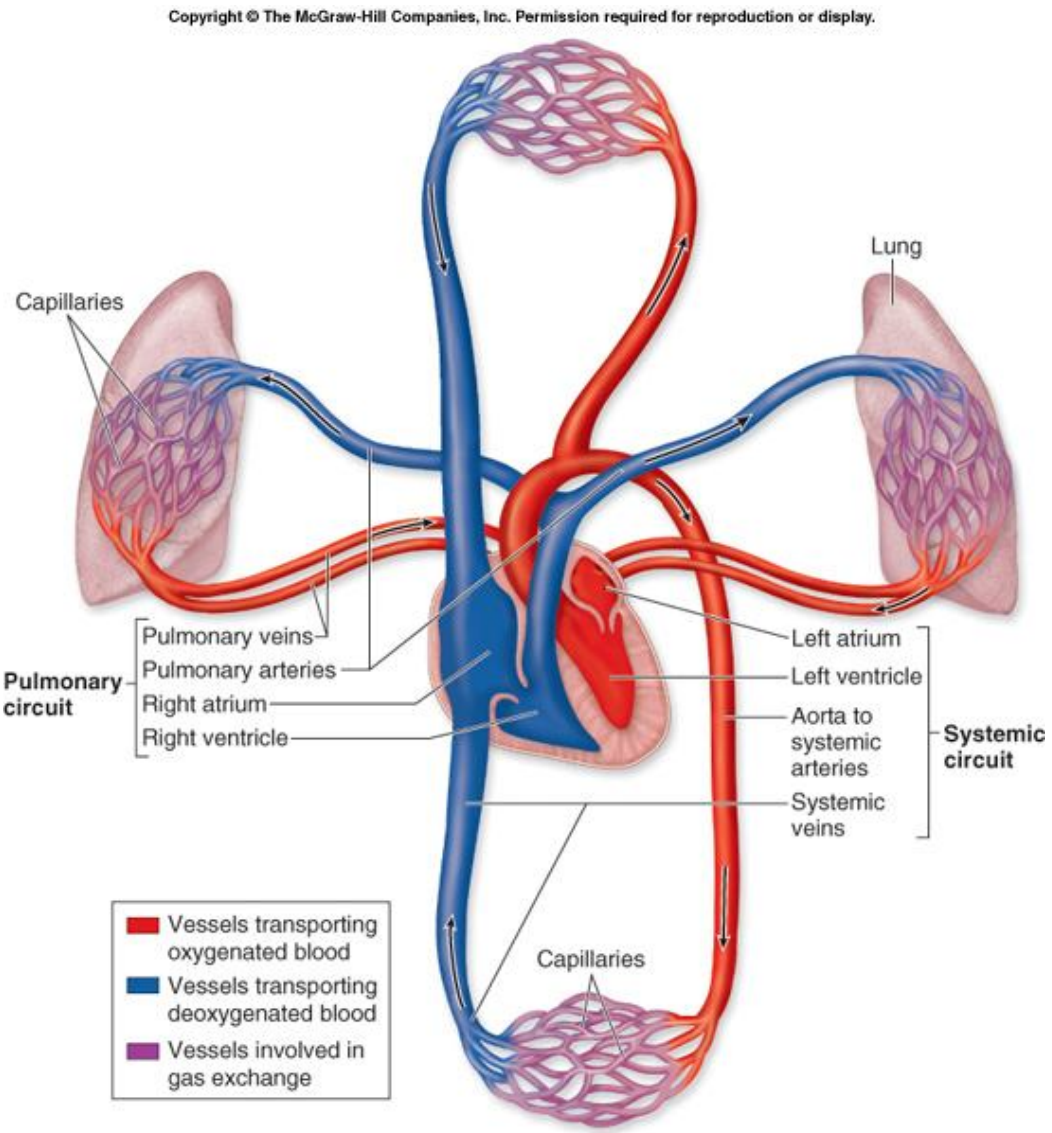


Figure (2-8): Pulmonary and systemic circuits

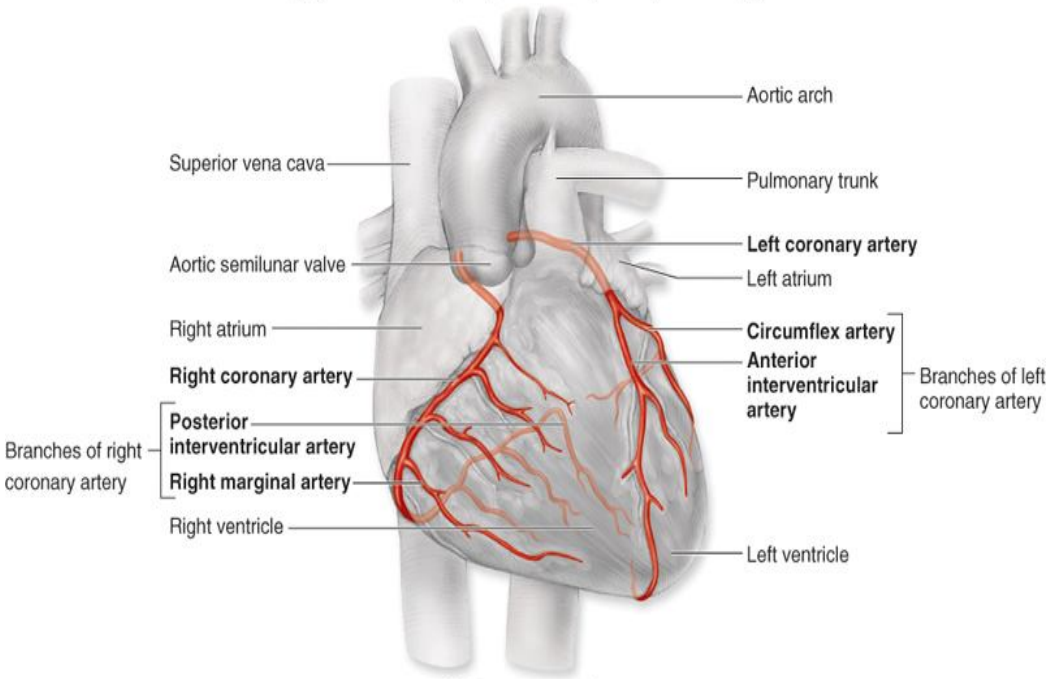
2.1.4.1 Cardiac cycle:

The inclusive period of time from the start of one heart beat to the initiation of the next. All chambers within the heart experience alternate periods of contraction and relaxation. Contraction of a heart chamber is called systole.(sween ,2002)

Forces blood into another chamber (from atrium to ventricle) forces blood into a blood vessel (from a ventricle into the attached large artery) .Relaxation phase of a heart chamber is termed diastole. myocardium of each chamber relaxes between contraction phases and the chamber fills with blood .(sween ,2002).

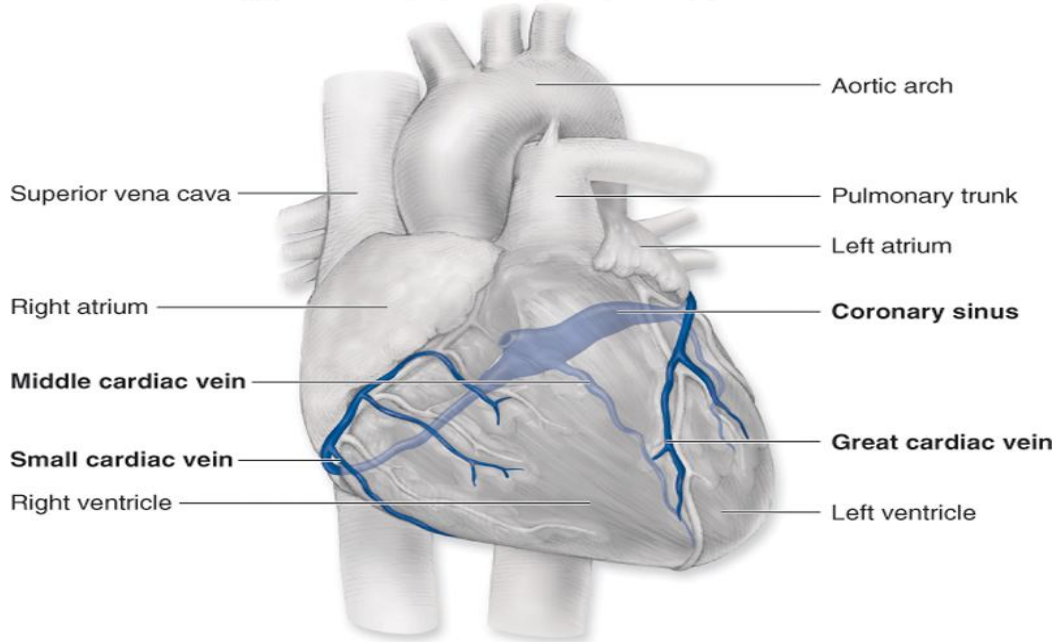
2.1.4.2 Coronary circulation :

Left and right coronary arteries travel in the coronary sulcus (atrioventricular groove) of the heart to supply the heart wall. the only branches of the ascending aorta located immediately superior to the aortic semilunar valve. The right coronary artery typically branches into the marginal artery supplies the right border of the heart. Posterior interventricular artery supplies both the left and right ven\tricles, left coronary artery typically branches into the anterior interventricular artery. Also called the left anterior descending artery supplies the anterior surface of both ventricles and most of the interventricular septum .Circumflex artery. supplies the left atrium and ventricle .Arterial pattern can vary greatly among individuals.(sween ,2002).



(a) Coronary arteries

Figure (2-9): a-coronary arteries b- Coronary veins



(b) Coronary veins

Cardiac innervation the heart receives extrinsic nerve supply from both sympathetic and parasympathetic divisions of the autonomic nervous system Tthe preganglionic neurons of the cardiac sympathetic nerves originate from the lateral horn cells of the upper thoracic segments.they relay in the sympathetic chainTthe postganglionic nerves run in the cardiac sympathetic nerve and innervate the AS node,the atrial myocardium ,the AV node and the ventricular myocardium. The parasympathetic supply to the heart originates in the neurons of the nucleus ambiguous of the medulla oblongata,also known as the cardio inhibitory area .the nerve fibers reach the heart in the vagus nerve.Preganglionic fibers synapse in parasympathetic ganglia near the heart .the postganglionic fibers are short and supply the SA node in the atrial muscle and the AV node. (sween ,2002).

2.2. Physiology of the heart :

The inclusive period of time from the start of one heartbeat to the initiation of the next.

2.2.1 Conduction system of the heart :

Exhibits autorhythmicity the heart itself (not external nerves) is responsible for initiating the heartbeat, certain cardiac muscle fibers are specialized to conduct muscle impulses to the contractile muscle cells of the myocardium, specialized cells are part of the heart's conduction system.. (Sukkar ,etal 2006)

2.2.2 Conduction system of the heart Sino atrial node :

Heartbeat is initiated by the cardiac muscle fibers of the Sinoatrial (SA) node. Located in the posterior wall of the right atrium, adjacent to the entrance of the superior vena cava,act as the pacemaker. rhythmic center that establishes the pace for cardiac activity.Initiates impulses 70 - 80 times per minute. (Sukkar ,etal 2006)

2.2.3 Conduction system of the heart atrio-ventricular node:

Impulse travels to both atria, stimulating atrial systole,and via an internodal conduction pathway through an opening in the fibrous skeleton to the atrio-ventricular (AV) node. Located in the floor of the right atrium between the right AV valve and the coronary sinus. (Sukkar ,etal 2006)

2.2.4 Conduction system of the heart atrio-ventricular bundle:

Cardiac impulse then travels from the AV node to the atrio-ventricular (AV) bundle(bundle of His),extends into the interventricular septum and then divides into one right and two left bundle branches. conduct the impulse to conduction fibers

called Purkinje fibers in the heart apex. Purkinje fibers are larger than other cardiac muscle fibers. muscle impulse conduction along the Purkinje fibers is extremely rapid.The impulse spreads immediately throughout the ventricular myocardium . (Sukkar ,etal 2006)

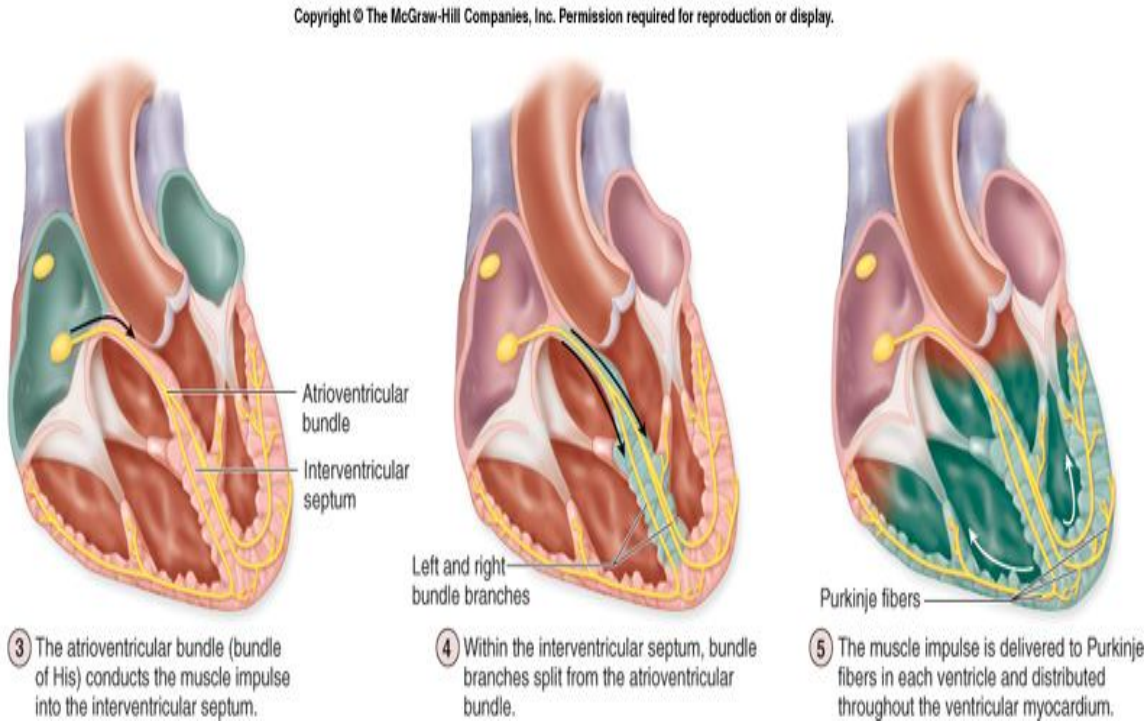


Figure (2-10): Conduction system of the heart

2.2.5 Electrocardiogram :

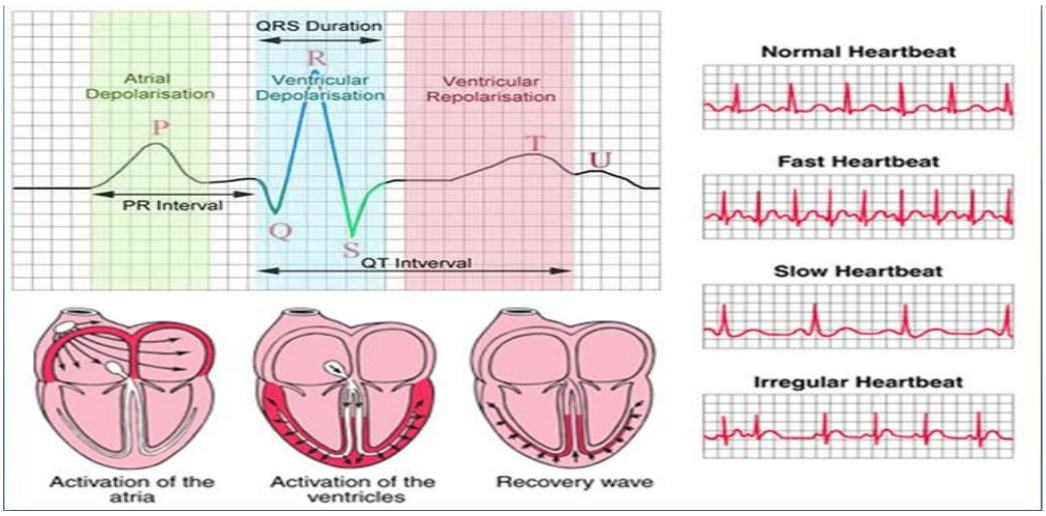


Figure (2-11) normal and abnormal electrocardiogram

The normal heart rate is about 75 beats /min ,Each beat regarded as one cardiac cycle (each cycle takes about 0.8 s It involve phases of contraction & relaxation for both atria & ventricles

The cardiac cycle is usually studied in 3 phases

1. Atrial systole takes 0.1 s

2. Ventricular systole takes 0.3 s

3. Atrial & ventricular diastole takes 0.7 & 0.3 s respectively

2.2.5.1 Atrial systole :

The atria contract to complete filling of the ventricles about 70% of ventricular filling occurs due to passive passage of blood from atria to ventricle & 30% by atrial systole.

Ventricular systole . (Sukkar ,etal 2006)

2.2.5.3 Ventricular systole :

Occur immediately after atrial systole When the ventricle start to contract , the pressure inside them start to rise .When the ventricular pressure exceeds atrial pressure ,the Av valves close .This result in the first heart sound (s1) .Then the ventricle continue to contract & their pressures continue to rise ,while all valves are closed : this is the isovolumetric contraction phase,when the pressure in the left ventricle reaches 80 mmHg & in the right ventricle reaches 10 mmHg , the semilunar valves open & blood starts to be ejected.The ventricles continue to contract & the pressure continue to rise to maintain ejection which starts rapidly at first & then slow down ,the maximum pressure reached in the LV is 120 mmHg & in the RV 25 mmHg. About 70 ml of blood are ejected from each ventricle = (stroke volume SV) .About 50 ml remain in each ventricle = (end systolic volume ESV).This means that,about 120 ml are there in each ventricle before ejection = (end diastolic volume EDV). (Sukkar ,etal 2006)

2.2.5.3 Atrial and ventricular diastole :

Atrial diastole:

1- Precedes ventricular diastole

2- Continues throughout most of the cycle (0.7s)

3- During this phase blood enters the atria (venous return)

2.2.5.4 Ventricular diastole :

The ventricles start to relax & the pressure inside them start to decrease ,when the ventricular pressures become lower than the arterial pressures (in AO & PA) the

semilunar valves are closed this results in the second heart sound S2. Then the ventricles continue to relax & the pressure inside them continues to decrease, while all valves are closed. This is the isovolumetric relaxation phaseWhen the pressures inside the ventricles become lower than the pressure in atria the AV valves open this allows passive filling of ventricles,then the atria contract to complete ventricular filling & start a new cycle**.** (Sukkar ,etal 2006)

2.2.6 Abnormal heart sound :

Abnormal musical sounds heard over the heart are known as murmurs .They are associated with turbulence of blood flow within the heart :

1- Atrioventricular valves:- stenosis causes diastolic murmur & regurgitation causes systolic murmur

2- Semilunarvalves: stenosis causes systolic murmur & regurgitation causes diastolic murmur. (Sukkar ,etal 2006)

2.3 Pathology of the heart :

Cardiovascular disease is a class of diseases that involve the heart or blood vessels. Common cardiovascular diseases include: ischemic heart disease (IHD), stroke, hypertensive heart disease, rheumatic heart disease, aortic aneurysms, cardiomyopathy, atrial fibrillation, congenital heart disease, endocarditis, and peripheral vascular disease, among others. (Kirstentolstrb, etal ,2006)

The underlying mechanism varies depending on the disease in question. Ischemic heart disease, stroke, and peripheral vascular disease involve atherosclerosis. This may be caused by tobacco smoking, lack of exercise, hypertension, poor diet, high blood cholesterol, high blood sugar such as in diabetes mellitus, excessive alcohol, and obesity, among others. Others such as rheumatic heart disease may follow an untreated *streptococcal* infection of the throat. (Kirstentolstrb,etale,2006)

Prevention of atherosclerosis is by decreasing risk factors through healthy eating, exercise, and avoidance of tobacco smoke and limiting alcohol intake.Cardiovascular diseases are the leading cause of deaths globally. Together they result in 17.3 million deaths (31.5%) in 2013 up from 12.3 million (25.8%) in 1990. IHD and stroke account for 80% of CVD deaths in males and 75% of CVD deaths in females. Cardiovascular mortality has been declining in many high-income countries for people of a given age since the 1970s at the same time; cardiovascular deaths and disease have increased in low- and middle-income countries. Although cardiovascular disease usually affects older adults, the antecedents of cardiovascular disease, notably atherosclerosis, begin in early life, making primary prevention efforts necessary from childhood . (Kirstentolstrb,etale,2006)

Coronary artery disease (also known as coronary heart disease and ischemic heart disease). cardiomyopathy – diseases of cardiac muscle .Hypertensive heart disease – diseases of the heart secondary to high blood pressure or hypertension . Heart failure Pulmonary heart disease – a failure at the right side of the heart with respiratory system involvement .Cardiac dysrhythmias – abnormalities of heart rhythm ,

Inflammatory heart disease , endocarditis – inflammation of the inner layer of the heart, the endocardium. The structures most commonly involved are the heart valves.

Inflammatory cardiomegaly ,myocarditis – inflammation of the myocardium, the muscular part of the heart. Valvular heart disease.

Cerebrovascular disease is disease of blood vessels that supply blood to the brain (includes stroke) . Peripheral arterial disease is disease of blood vessels that supply blood to the arms and legs . Congenital heart disease is heart structure malformations existing at birth . Rheumatic heart disease is heart muscles and valves damage due to rheumatic fever caused by *Streptococcus progenies*group a streptococcal infection. (Kirstentolstrb,etale,2006)

2.3.1 Heart valve disease :

Heart valve disease occurs when one or more of the valves are damaged.

Causes: Degenerative valve disease This is a common cause of valvular degeneration. Most commonly affecting the mitral valve, it is a progressive process that represents slow degeneration from mitral valve prolapse (improper leaflet movement), a condition that affects 4-5 percent of the general population. Over time,

the attachments of the valve thin out or rupture and the leaflets become floppy and redundant. This leads to leakage through the valve. Calcification due to aging -- Calcification is the process that refers to the accumulation of calcium on the heart's valves. The aortic valve is the most frequently affected. This build-up hardens and thickens the valve and can cause aortic stenosis, or narrowing of the aortic valve. As a result, the valve cannot open completely as the valve function is limited and blood flow is hindered. This blockage forces the heart to work harder causing limited physical capacities. Calcification comes with age as the calcium amasses in the heart over the course of a lifetime. (Kirstentolstrb,etale,2006)

Coronary artery disease ; Coronary artery disease affects the blood flow between the heart and its systems due to an accumulation of plaque in the arteries. This build up causes hardening of the coronary arteries also known as atherosclerosis and restricts maximum blood flow to the heart muscle. Without an ample supply of oxygen-rich blood, the heart suffers. This may be evidenced by chest pain or shortness of breath in the patient. If the arteries become completely blocked, the blood will not flow and will clot, leading to a heart attack. If a patient is exhibiting symptoms of coronary artery disease, a physician will run a series of tests including, but not limited to, an electrocardiogram or EKG/ECG, cardiac catheterization, blood work, and/or chest x-ray. (Kirstentolstrb,etale,2006)

Rheumatic fever ; Rheumatic fever is caused by an infection of the Group A Streptococcus bacteria and can detrimentally affect the heart and cardiovascular system, especially the leaflet tissue of the valves. Rheumatic fever is most common in children ages 5 - 15, but can develop in adults. Rheumatic heart disease is common in developing countries. (Kirstentolstrb,etale,2006)

Congenital abnormalities ; Generally, congenital heart defects affect the flow of blood through the cardiovascular system. Blood can flow in the wrong direction, in abnormal patterns, and can even be blocked, partially or completely, depending on the type of heart defect present. Ranging from mild defects such as a malformed valve to the more severe such as an absent heart valve, congenital heart abnormalities require different treatments. In some cases, medicine can be used to treat the condition; in others, surgery may be necessary. (Kirstentolstrb,etale,2006)

Bacterial endocarditis ; Bacterial endocarditis is a bacterial infection that can affect the valves of the heart causing deformity and damage to the leaflets of the valves. Hypertension increase blood pressure in the blood vessels and cause hypertensive heart disease the disease produced by the secondary effects on the heart,of prolonged,sustained systemic hypertension.Sustained pressure loud on left ventricular myocardium leads to hypertrophy.myocardium becomes stiff and ventricular compliance is decreased this diagnosis left ventricular hypertrophy. (Kirstentolstrb,etale,2006)

Diabetes mellitus; diabetes or even just an abnormal glucose tolerance test is strongly associated with vascular disease.Also cause left ventricular hypertrophy as a result of diastolic dysfunction .(Kirstentolstrb,etale,2006)

2.3.1.1 Mitral valve regurgitation:

Mitral regurgitation is a disorder in which the heart valve that separates the upper and lower chambers on the left side of the heart does not close properly,regurgitation means leaking from a valve that does not close all the way. Mitral regurgitation is the most common type of heart valve disorder. Blood that flows between different

chambers of your heart must flow through a valve. The valve between the two chambers on the left side of your heart is called the mitral valve. When the mitral valve doesn't close all the way, blood flows backward into the upper heart chamber (atrium) from the lower chamber as it contracts. This leads to a decrease in blood flow to the rest of the body. As a result, the heart may try to pump harder. This may lead to congestive heart failure. Mitral regurgitation may begin suddenly, most often after a heart attack. When the regurgitation does not go away, it becomes long-term (chronic). Many other diseases or problems can weaken or damage the valve or the heart tissue around the valve and cause mitral regurgitation like coronary heart disease and high blood pressure ,Infection of the heart valves and mitral valve prolapse(MVP). Rare causes, such as untreated syphilis or marfan syndrome ,rheumatic heart disease, a complication of untreated strep throat (which is becoming less common because of effective treatment) and Swelling of the left lower heart chamber .(Kirstentolstrb,etale,2006).

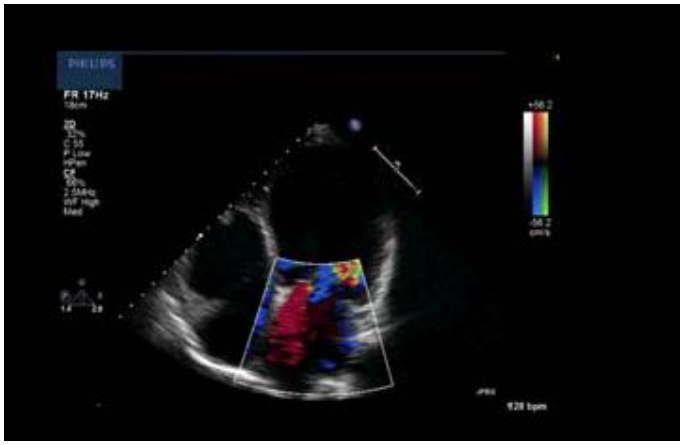


Figure (2.12) : Mitral valve regurgitation .

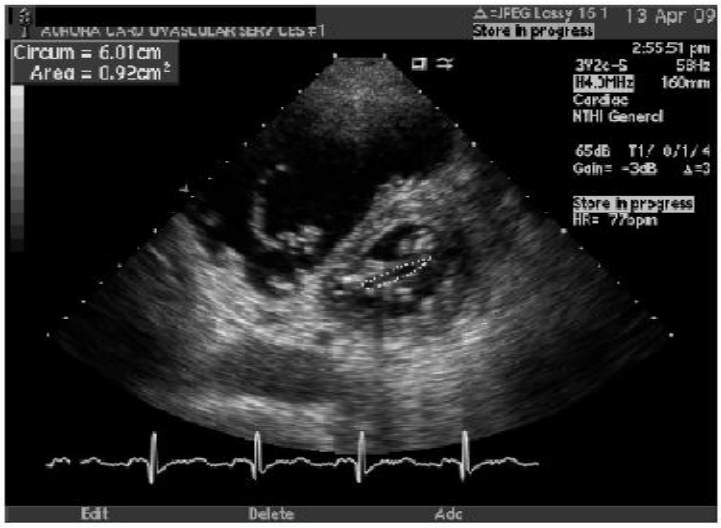
2.3.1.2 Mitral valve prolapse :

The mitral valve is a valve that lets blood flow from one chamber of the heart, the left atrium, to another called the left ventricle. In mitral valve prolapse, part of the mitral valve slips backward loosely into the chamber called the left atrium. This happens when the main heart muscle, called the left ventricle, squeezes during each heartbeat. Mitral valve prolapse differs from mitral valve stenosis. In mitral valve stenosis, the mitral valve is stiff and constricted. In mitral valve prolapse, the valve slips backward due to the abnormal size of or damage to the mitral valve tissues. For most people with mitral valve prolapse, the cause is unknown. Mitral valve prolapse can run in families. It can also be caused by conditions in which cartilage is abnormal (connective tissue disease). Between one in every 100 and one in every 200 people have mitral valve prolapse. (Kirstentolstrb,etale,2006).

2.3.1.3 Mitral valve stenosis :

The mitral valve separates the upper and lower chambers on the left side of the heart. Stenosis is a condition in which the valve does not open fully, restricting blood flow. Mitral stenosis is a disorder in which the mitral valve does not open fully. Blood that flows between different chambers of your heart must flow through a valve. The valve between the two chambers on the left side of your heart is called the mitral valve. It opens up enough so that blood can flow from the upper chamber of your heart (left atria) to the lower chamber (left ventricle). It then closes, keeping blood from flowing backwards. Mitral stenosis means that the valve cannot open enough. As a result, less blood flows to the body. The upper heart chamber swells as pressure builds up. Blood and fluid may then collect in the lung tissue (pulmonary edema), making it hard to breathe. In adults, mitral stenosis occurs most often in those who have had rheumatic

fever (a condition that may develop after untreated or poorly treated strep throat or scarlet fever). The valve problems develop 5 - 10 years or more after the episode of rheumatic fever, and symptoms may not show up for even longer. Rheumatic fever is becoming rare in the United States due to treatment of strep infections, so mitral stenosis is also less common. Only rarely do other factors cause mitral stenosis in adults. These include: Calcium deposits forming around the mitral valve, radiation treatment to the chest and Some medications .Children may be born with mitral stenosis (congenital) or other birth defects involving the heart that cause mitral stenosis. Often, there are other heart defects present with the mitral stenosis.Mitral stenosis may run in families. . (Kirstentolstrb,etale,2006).



Figure(2.13) : Mitral valve stenosis

2.4Echocardiography Technique:

2.4.1 Sites of transducer placement:

Air being a poor conductor of ultrasound, the transducer should be placed at points without lung interference .Such sites are:-

- left parasternal space (standardpoint)
- apex of the heart
- suprasternal notch (to study aorta & major branches)
- xiphisternum – useful in patients emphysematous lung
- right parasternal space in dextroposition&dextrocardia
- esophagus ,using a trans—esophageal transducer

Standard imaging: If the transducer is placed on the fourth left intercostal space near the sternal edge, various sections may be made. (Matthias, 2005)

2.4.2 Three planes commonly used to the heart:

- long axis plane .
- short axis plane .
- apex four chamber plane and Parasternal Long-Axis View .

Transducer position: left sternal edge; 2^{nd} – 4^{th} intercostal space. Marker dot direction: points towards right shoulder .Most echo studies begin with this view

It sets the stage for subsequent echo views .Many structures seen from this view. (Matthias, 2005)

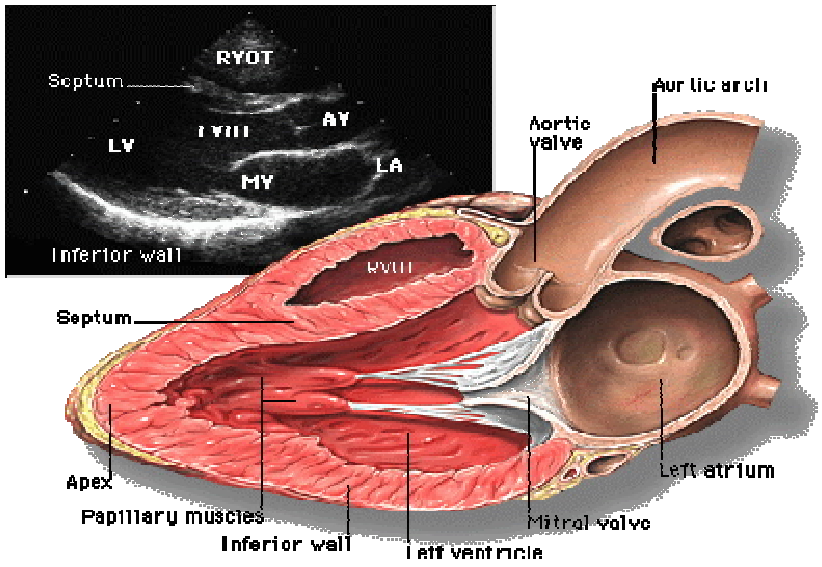


Figure (3-1): Parasternal Long-Axis

Papillary Muscle (PM)level :

The level of the papillary muscles showing how the respective LV segments are identified, usually for the purposes of describing abnormal LV wall motion and LVwall thickness can also be assessed.(Matthias, 2005)

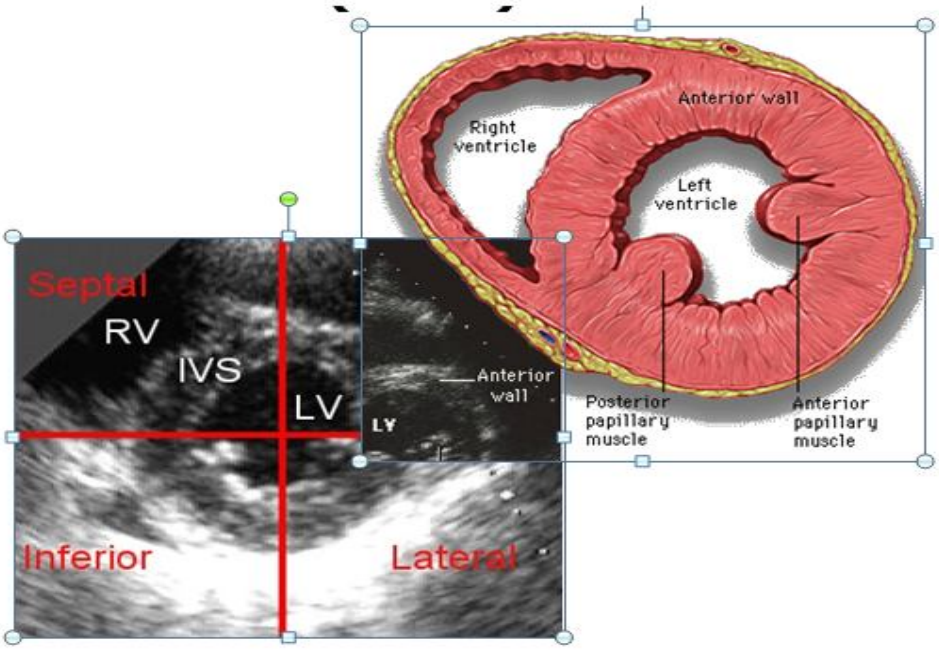


Figure (3-2): Papillary Muscle

Parasternal short axis view:

Transducer position: left sternal edge; 2^{nd} – 4^{th} intercostal space .Marker dot direction: points towards left shoulder(90^0 clockwise from PLAX view) **.**By tilting transducer on an axis between the left hip and right shoulder, short axis views are obtained at different levels, from the aorta to the LV apex.Many structures seen. (Matthias,2005)

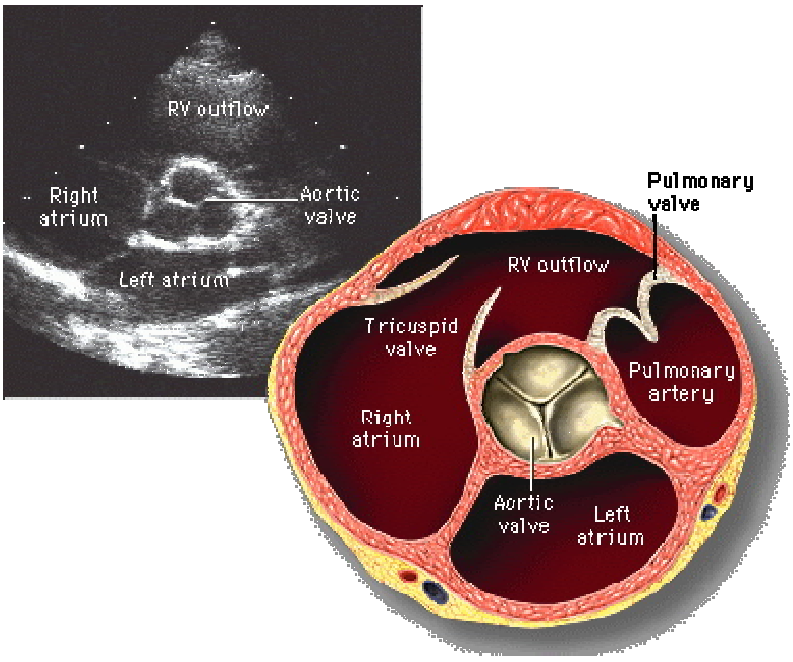


Figure (3-3): Parasternal short axis

Apex 4- chamber view:

This is perpendicular to the other planes. The transducer is shifted to the apex of heart The plane runs parallel to the sternum and the chest wall towards the right shoulder . This plane cuts all the 4- chambers (LA, LV,RA,RV) & AV, MV & TV of the heart(Matthias,2005)

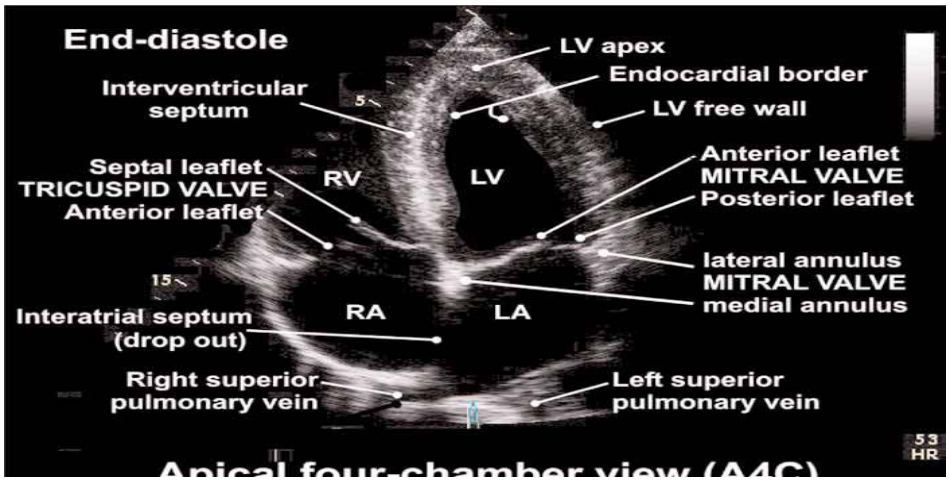


Figure (3-4):Apex 4- chamber

Apical 2-Chamber View (AP2CH):

Transducer position: apex of the heart . Marker dot direction: points towards left side of neck (45^0 anticlockwise from AP4CH view) .Good for assessment of LV anterior wall , LV inferior wall . (Matthias,2005)

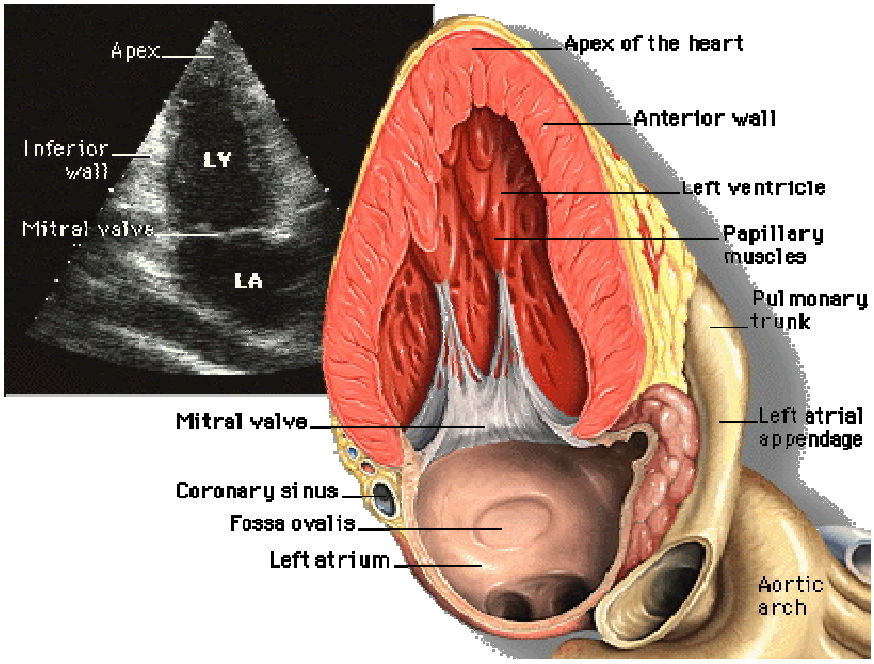


Figure (3-5): Apical 2-Chamber

Sub–Costal 4 Chamber View(SC4CH):

Transducer position: under the xiphisternum .Marker dot position: points towards left shoulder .The subject lies supine with head slightly low (no pillow). With feet on the bed, the knees are slightly elevated .Better images are obtained with the abdomen relaxed and during inspiration .Interatrial septum, pericardial effusion, desc abdominal aorta. (Matthias,2005)

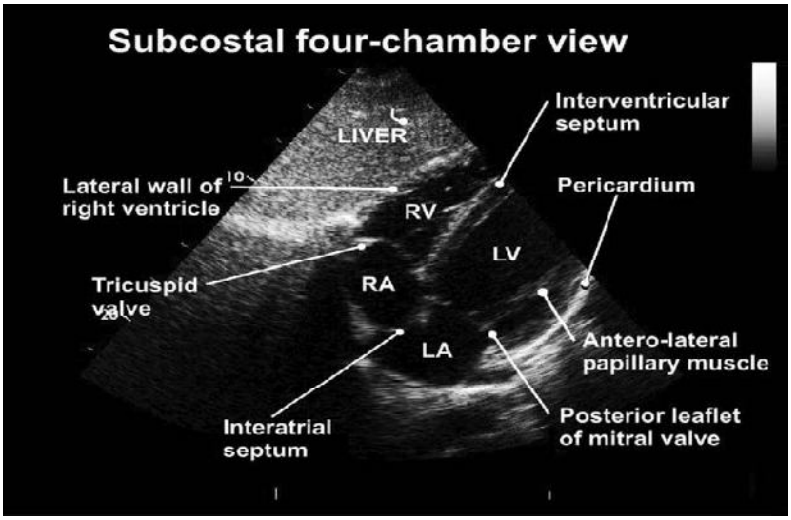


Figure (3-6):Sub–Costal 4 Chamber

Suprasternal View:

Transducer position: suprasternal notch .Marker dot direction: points towards left jaw

The subject lies supine with the neck hyperexrended. The head is rotated slightly towards the left .The position of arms or legs and the phase of respiration have no bearing on this echo window arch of aorta. (Matthias,2005)

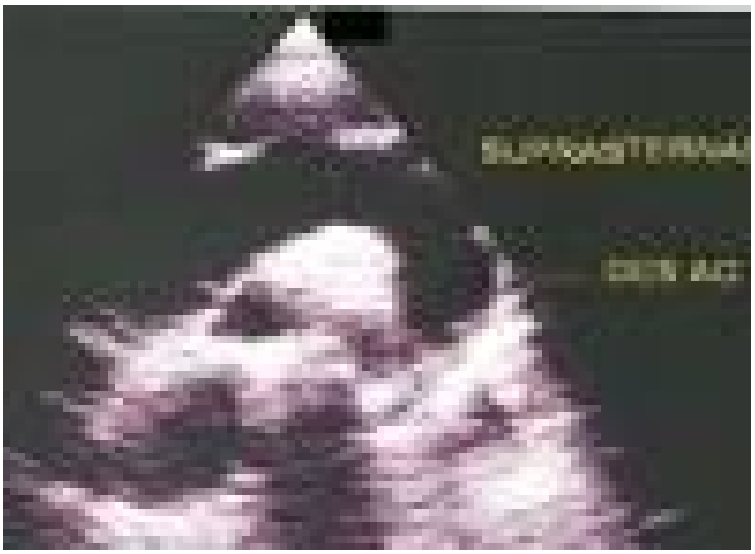


Figure (3-7):Suprasternal view

M- Mode echocardiography:

Current technique of M –mode study during 2-D study, the cursor line is placed on the valve or the point of heart whose motion has to be recorded for analysis. Or dimensions for calculation or contractility for analysis the display mode is then switched to M-mode to obtain the desired recording all measurements are to be made from leading edge to leading edge. (Matthias,2005)

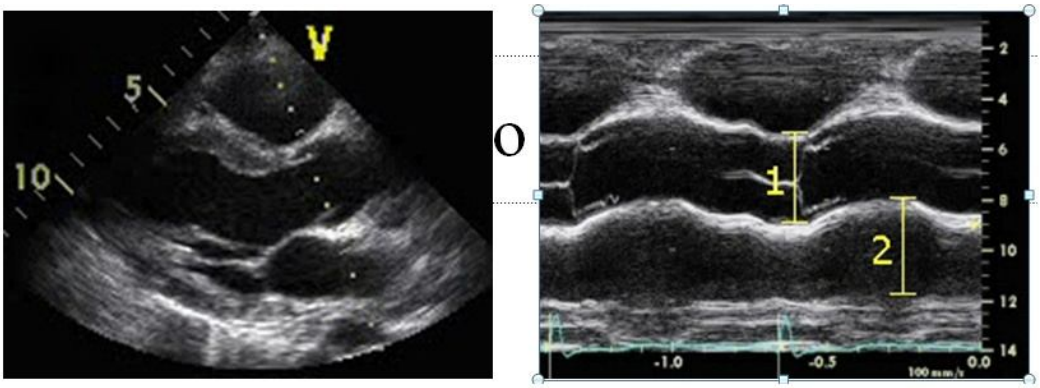


Figure (3-8): M- Mode echocardiography

2.5 Previous studies :

Many echocardiographic signs of severe MR are clearly demonstrated, particularly when both TEE and TTE are used. When these signs are assiduously sought, the recognition of severe MR should pose little problem. Part of the confusion concerning MR and the grading of its severity comes from the fact that the hemodynamic consequences of a given degree of MR vary widely from one individual to another. A regurgitant volume of 50 mL might prove incapacitating to one patient while seeming inconsequential in a second patient. A regurgitant fraction of 50% is poorly tolerated in some patients and asymptomatic in others. Similarly, a regurgitant orifice 0.5 cm2 has unpredictable consequences to the organism, and, in fact, this orifice may vary considerably in size depending on hemodynamic conditions. Thus, a universal definition of the severity of MR is lacking, and there is no agreement on the units with which to quantitate it. The net effect of this confusion is not an inability to recognize severe MR but frustration in differentiating moderate MR from severe MR. We believes that precise quantitation of MR will occur when comprehensive pharmacologic interventions with either TEE or surface echocardiographic monitoring are performed to define the severity of MR by its range of responses to these agents. We have had some success with Doppler measurement of the responseof pulmonary artery pressure to dynamic exercise. Patients with normal pulmonary artery pressure at rest tend to show exaggerated rises in pulmonary pressure when MR is clinically important and has resulted in left ventricular dysfunction. Anticipated progress notwithstanding, competently performed TEE is the method of choice for recognizing severe MR. [Schiller 1993]

Ann said[Echocardiographic early diastolic abnormalities have been shown recently in 50% of men with ankylosing spondylitis. Similar techniques were used to investigate subjects with rheumatoid arthritis and psoriatic arthritis with or without spondylitis. These subjects had no clinical, radiographic, or electrocardiographic evidence of cardiac or respiratory disease. Echocardiographic abnormalities seen resembled those of ankylosing spondylitis in that the interval between minimum left ventricular dimension and mitral valve opening was prolonged in 12 of 22 subjects with rheumatoid arthritis and in seven of 11 subjects with psoriatic arthritis. Isovolumic relaxation time was significantly prolonged in four subjects with rheumatoid arthritis and one with psoriatic arthritis. Unlike ankylosing spondylitis, however, there was consistent reduction in peak rate of left ventricular dimension increase in subjects with rheumatoid arthritis and psoriatic arthritis. In addition, the dimension increase during atrial systole was greater than normal in nine subjects with rheumatoid arthritis and two with psoriatic arthritis. The most likely cause of these abnormalities is increased connective tissue deposition in the myocardium [.Ann rheum 2008]

Reading echocardiography findings in coronary artery disease women belonging the age interval 50-59,increased aortic root diameter was reported; aortic root calcifications were noticed especially 45-59age intrvail.valvular degenerative lesions and calcifications of mitral annulus increased progressively with aging.denerative lesions were predominant [45,38%] in women with plurivascular pathology,aortic root calcifications[20,8%] were as frequent as those present in coronary artery disease patients. In the same time the aortic root exceeded 30mm in diameter in4% of patients with plurivascular pathology , and it was less frequent than in isolated coronary artery disease women. Incidence of diabetes mellitus increased with ageing.

Blood pressure was increased in all groups and it had two frequency peaks, SBP in70-74 year's group and both SBP and DBP in45-54 years group[RodicaAvram etal2007]

CHAPTER THREE

Method and material

CHAPTER THREE

3. Methodology :

3.1 The type of the study :

This is a descriptive study deals with the patients who were come to the echocardiography department by mitral valve diseases.

3.2 Area of study:

- Military Hospital .
- Ribat University Hospital.

3.3 Duration of study :

This study start from August 2014 up to .March2015.

3.4 Population of study :

Patients with mitral valve diseases.

3.5 Sampling of the study :

There were 50 patients of mitral valve diseases ,were selected randomly .Inclusion criteria patients from 17 to80 years.

Exclusion criteria all patient under 17 year.

3.6 Variable of the study:

- patient age
- echocardiography parameter.
- risk factors.

3.7 Data collection:

The data had been collected with clinical data sheet and ultra sound image.

3.8 Data analysis:

Data had been analyzed by tables.

3.9 Instrumentation:

- Semins(acuson cv70) with probe 5MHz.
- esaote MYlab with probe5MHz.

3.10 Technique:

No patients preparation ,the patient is placed in left lateral decubitus position with the upper body slightly elevated. A couple gel is applied to the patient for better resolution .Parasternal long-axis view, parasternal short-axis view, apical four-chamber view and M-mode to obtain the measurements that calculate by the machine.

CHAPTER FOUR

The results

CHAPTER FOUR :

RESULTS:

Table 4-1 a frequency table show the distribution of gender

Gender	Frequency	Percent
Male	26	52.0
Female	24	48.0
Total	50	100.0

Table 4-2 a frequency table show the distribution of risk factor

Risk factor	Frequency	Percent
Hypertension	30	60.0
Diabetic	7	14.0
Rheumatoid	13	26.0
Total	50	100.0

Table 4-3 the mean± the standard deviation, the maximum and values of the numeric variables

variables	Mean±SD	max-min
age(in years)	50.7±18.5	80-17
Left Atrium	3.8±0.7	5.0-2.3
Inter Ventricular SeptumDiastolie	1.2±1.3	9.0-0.4
Left Ventricle Posterior Wall in Diastolie	1.6±1.9	8.0-0.3
Left Ventricle Diameter in Diastolie	5.1±1.1	8.1-3.1
Left Ventricle Diameter in Systolie	3.8±1.1	7.4-1.7
Ejection fraction %	52.5±13.5	68-20

Table 4-4 a frequency table show distribution of Mitral Valve Lesions

Condition	Frequency	Percent
Stenosis	7	14.0
Regurgitation	43	86.0
Total	50	100.0

Table 4-5 Independent Samples Test Gender

Group Statistics				**p-value = 0.05**
Gender		**Mean**	**Std. Deviation**	**Sig. (2-tailed)**
Left Atrium	Male	4.01	.62	.03
	Female	3.61	.68	
Inter Ventricular SeptumDiastolie	Male	1.44	1.76	.14
	Female	.89	.28	
Left Ventricle Posterior Wall in Diastolie	Male	1.76	1.99	.55
	Female	1.43	1.83	
Left Ventricle Diameter in Diastolie	Male	5.50	1.27	.01
	Female	4.77	.56	
Left Ventricle Diameter in Systolie	Male	4.25	1.37	.00
	Female	3.33	.51	
Ejection fraction %	Male	47.15	15.47	.00
	Female	58.46	7.52	

Table 4-6 Independent Samples Test of Hypertension Condition

Group Statistics				P-value = 0.05
Hyper		**Mean**	**Std. Deviation**	**Sig. (2-tailed)**
Left Atrium	No	4.01	.64	.11
	Yes	3.70	.68	
Inter Ventricular Septum Diastolie	No	1.40	1.80	.34
	Yes	1.03	.84	
Left Ventricle Posterior Wall in Diastolie	No	2.12	2.06	.12
	Yes	1.26	1.74	
Left Ventricle Diameter in Diastolie	No	4.98	1.08	.37
	Yes	5.26	1.04	
Left Ventricle Diameter in Systolie	No	3.61	1.01	.31
	Yes	3.95	1.21	
Ejection fraction %	No	56.65	8.38	.08
	Yes	49.87	15.53	

Table 4-7 Independent Samples Test of Diabetic

Group Statistics				P-value = 0.05
	Diabetic	Mean	Std. Deviation	Sig. (2-tailed)
Left Atrium	No	3.81	.70	.84
	Yes	3.87	.55	
Inter Ventricular Septum Diastolic	No	1.21	1.40	.64
	Yes	.96	.22	
Left Ventricle Posterior Wall in Diastolie	No	1.73	2.03	.01
	Yes	.86	.23	
Left Ventricle Diameter in Diastolie	No	5.13	1.02	.77
	Yes	5.26	1.30	
Left Ventricle Diameter in Systolie	No	3.80	1.12	.83
	Yes	3.90	1.34	
Ejection fraction %	No	52.70	13.92	.88
	Yes	51.86	11.08	

Table 4-8 Independent Samples Test of Rheumatoid

Group Statistics				P-value = 0.05
	Rheumatoid	Mean	Std. Deviation	Sig. (2-tailed)
Left Atrium	No	3.73	.65	.10
	Yes	4.09	.70	
Inter Ventricular Septum Diastolie	No	1.02	.76	.15
	Yes	1.63	2.22	
Left Ventricle Posterior Wall in Diastolie	No	1.18	1.57	.00
	Yes	2.80	2.29	
Left Ventricle Diameter in Diastolie	No	5.26	1.07	.21
	Yes	4.83	.96	
Left Ventricle Diameter in Systolie	No	3.94	1.22	.19
	Yes	3.45	.80	
Ejection fraction %	No	50.24	14.68	.04
	Yes	59.23	5.39	

Table 4-9 Independent Samples Test of Stenosis

Group Statistics				P-value = 0.05
	condition	Mean	Std. Deviation	Sig. (2-tailed)
Left Atrium	Stenosis	4.43	.53	.01
	Regurgitation	3.72	.65	
Inter Ventricular Septum Diastolie	Stenosis	1.00	.08	.71
	Regurgitation	1.21	1.41	
Left Ventricle Posterior Wall in Diastolie	Stenosis	2.59	2.27	.14
	Regurgitation	1.44	1.82	
Left Ventricle Diameter in Diastolie	Stenosis	5.17	1.01	.95
	Regurgitation	5.14	1.07	
Left Ventricle Diameter in Systolie	Stenosis	3.83	.69	.97
	Regurgitation	3.81	1.20	
Ejection fraction %	Stenosis	59.29	3.99	.01
	Regurgitation	51.49	14.16	

Table 4-10 Test for comparison the difference between groups for echocardiography variables.

ANOVA				
		Sum of Squares	**F**	**Sig. (2-tailed)**
Left Atrium	Between Groups	2.18	2.541	.09
	Within Groups	20.18		
	Total	22.37		
Inter Ventricular Septum Diastolie	Between Groups	.92	.263	.77
	Within Groups	82.51		
	Total	83.43		
Left Ventricle Posterior Wall in Diastolie	Between Groups	2.72	.366	.70
	Within Groups	174.40		
	Total	177.12		
Left Ventricle Diameter in Diastolie	Between Groups	2.80	1.278	.29
	Within Groups	51.49		
	Total	54.28		
Left Ventricle Diameter in Systolie	Between Groups	9.29	4.048	.02
	Within Groups	53.94		
	Total	63.23		
Ejection fraction %	Between Groups	3602.12	16.038	.00
	Within Groups	5278.06		
	Total	8880.18		

Table 4-11 severity condition CrosstabulationCondition

Severity	Condition		Total
	Stenosis	Regurgitation	
Mild	7	28	35
Moderate	0	11	11
Severe	0	4	4
Total	7	43	50

CHAPTER FIVE

Discussion

Conclusion

Recommendations

5.1 Discussion:

This distributive study was carried out to determine the echocardiography measurement to the variables values.

In this study we had50 patient males26 (52%) and females 24(48%).table(4.1)

The age of the patients from maximum to minimum 80-17 years. table(4.2)

The most types of risk factors appeared in this sample,and the percentage of the different types were aarranged between 60% for hypertension ,diabetic 14% and 26% for rheumatoid fever in whole patients of the sample.table (4.3)

Thestudy found that the mitral valve regurgitation appeard as highest group of risk factors complications it shows 86% and mitral valve stenosis act as 14%.table(4.4)agree with Schiller 1993.

To find the correlation between variables were assessed with t-test was obtained at p.value 0.05.

In correlation between gender and echocardiograpy measuring the study were found significant difference between males and females in left atrium,left ventricle diameter

diastole ,left ventricle diameter systole and ejection fraction% increase in males than in females, because the males were smokers.table(4.5) agree withRodica Avaram 2007.

Hypertension has no effect in parameters of echocardiography due to correct control . table (4.6) agree with Rodica Avaram 2007.

In our study diabetic analysis show increase in left ventricle postrial wall in diastolic because diabetic cause left ventricle hypertrophy as the result of diastolic dysfunction .table (4.7) agree with Rowe IF etal 2008.

Analysis of rheumatoid data were found difference in left postrial wall and ejection fraction because rheumatoid cause stenosis in valve. Table (4.8) agree with RoweIF etal 2008.

The most type of lesion appeared in this study , mitral stenosis and regurgitation . the correlation show difference in left atrium and ejection fraction they were increase in stenosis because it cause left atrium dilation and increase ejection fraction . table (4.9) agree with Rowe IF etal 2008.

Otherwise ANOVA study the difference between affected groups(hypertension-diabetes-rheumatoid) recognize that significant difference in left atrium and ejection fraction table (4.10) agree with Rodica Avaram 2007.

In this study the stenosis and regurgitation is the common mitral valve diseases and can classification according to severity of disease by using Doppler ultrasound in cases of regurgitation . and by amount of classification of mitral valve stenosis table(4.11) agree with Schiller 1993.

5.2 Conclusion :

Gender increase the variability in echocardiography parameter .

Hypertension has no effect in parameter because we did not include the disease duration .

Diabetic was consider a major parameter of left ventricle postural wall of other risk factor .

Rheumatoid shows variable in left atrium and ejection fraction .

The most common parameters have difference significant in the left atrium and ejection fraction they were affect by gender and rheumatoid .

Also left atrium and ejection fraction affect by mitral diseases and between groups and with group .

Doppler ultrasound very important to detect severity of the disease .

5.3 Recommendation :

Increase the sample size.

In subsequent study I suggest include duration of disease and treatment control .

Take other risk factors in study (cholesterol –degenerative –etc) .

Use more perfect techniques like trans-oesphgel it more perfect in mitral regurgitation

.

Take other parameter in study the right side of heart or aortic root .

References:

Amant Carole,Holm P. Xu Shu-Hua, Tritman M. , keaney M. Losardo DW. Estrogen receplor-mediated nitric oxide-dependent modulation of the immunologic barrier, function of the endothelium ,Circulation ;2001 ;104-2576-2581

Austin Melissa A. Epidemiology og hypertriglyceridemia and cardiovscular disease Am J Cardiol 1999; 83;13F-16F .

Bickel C, Rupprecht HJ ,Blankenberg S, Espiniola-klein C, Schitt A, Roppin G, Hafner G, Treude R, Oshman H, Hoffman KP ,MayerJ. Relation of maker of inflammation (C-protein ,fibinogen ,von Willebrand factor and leukocyte count) and statin therapy to long-term morality patients with angiographically proven coronary artery disease Am J Cardiol ; 2002;89;901-908.

Inam Danish- Short textbook of phathology - 4th edition 2009.
M. Prives , N. Lysen Kov ,V. bushkovich Human anotomy 3th edition 1989.

M. Y. Sukkar ,H. A. El munshid , M. S.M. Ardawi Concise human physiology 2nd edition 2006.

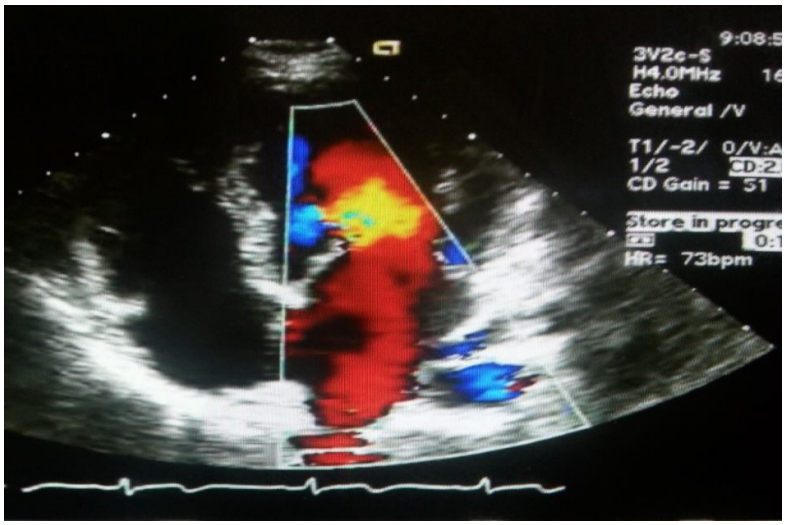
Matthias Hofer, G. Antoch , M. Pieper etal Teaching manual of color dupplux sonography 3th edition 2005.

Pearson TA New Tool for Coronary risk assessment-what are their advantages and limitations -circulum 2002-105-886-892

Rader Daniel J. Pathophysiology and management of low high-density lipoprotein cholestrol Am J Cardiol ; 1999 ;83;22F-24F .

R. N. M. Mac Sween and Kwaly Muri's textbook of pathology 13th edition 1999.
Tolbert Todd,Thompson A, Bouchred P, Operal S. Estrogen induced vasoprotection is independent of inducible nitric oxide synthesis expression ,circulation 2002 -104-2740-2745.

Appendix 1:



Image(5.1) : color Doppler image showed mitral valve regurgitation for 33 years old male.

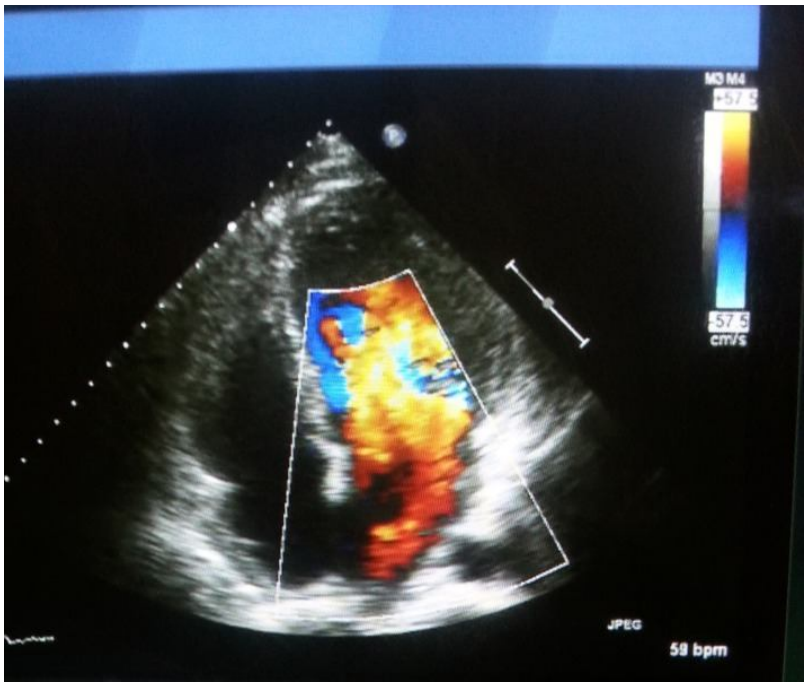


Image (5.2): color Doppler image showed mitral valve regurgitation for 48 years old male.

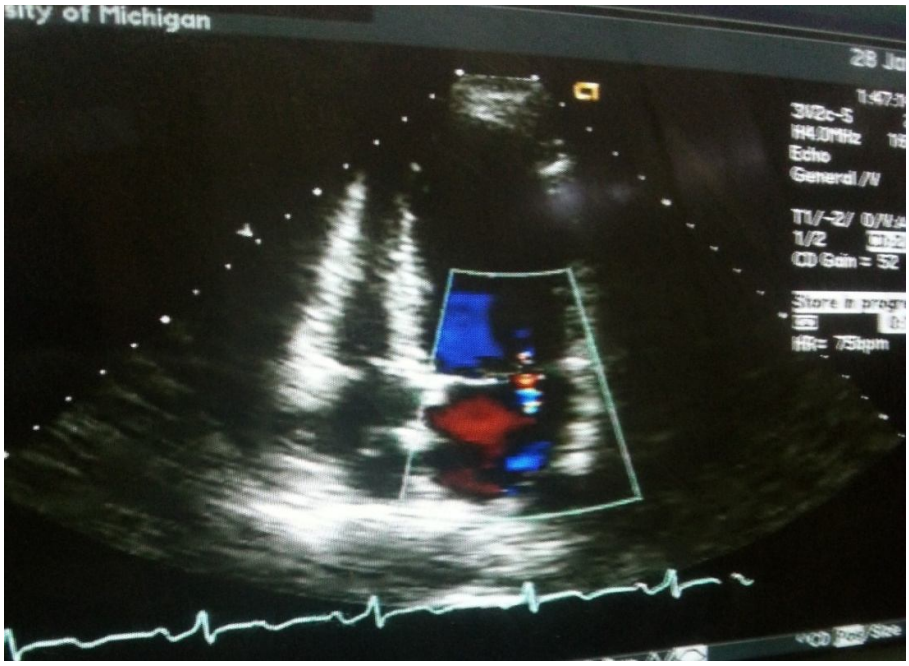


Image (5.3): color Doppler image showed mitral valve regurgitation for 70 years old male.

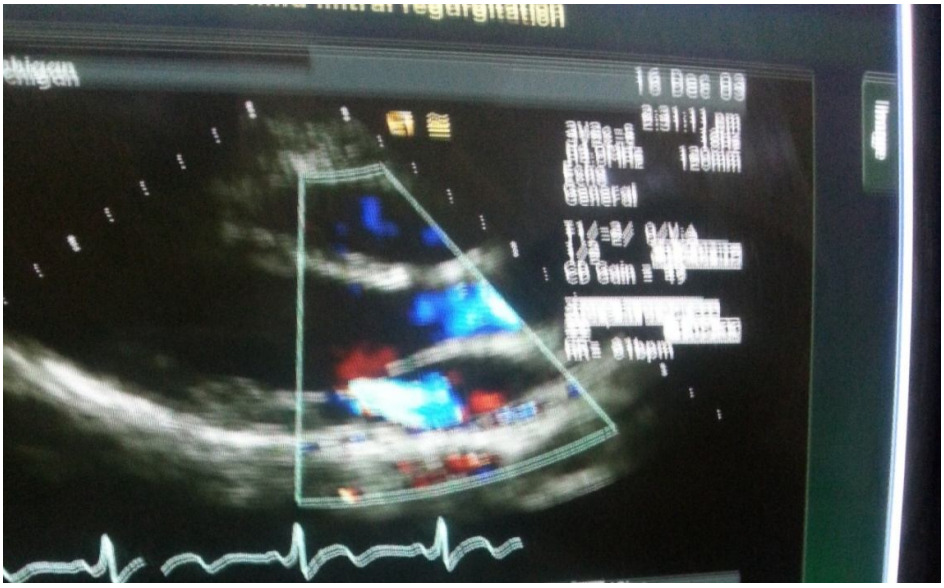


Image (5.4): color Doppler image showed mitral valve regurgitation for 48 years old male.

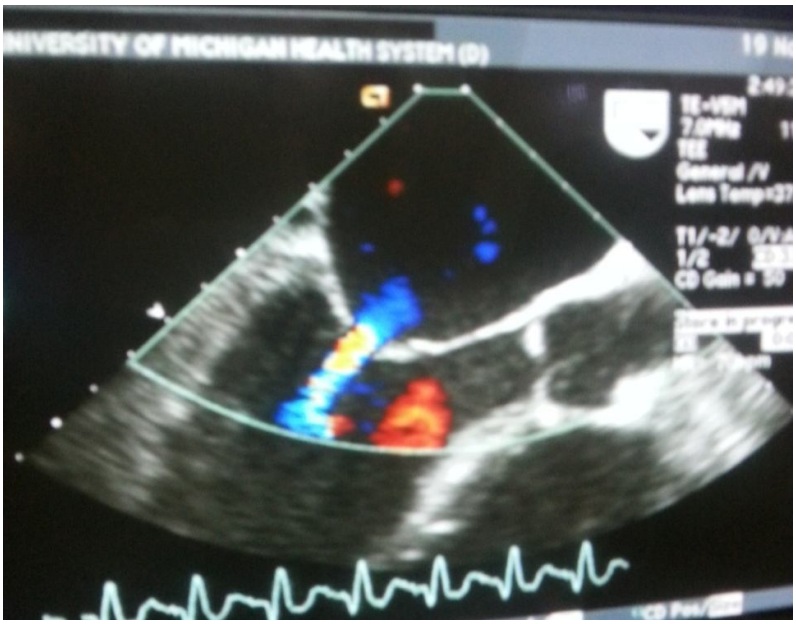


Image (5.5): color Doppler image showed mitral valve regurgitation for 60 years old male.

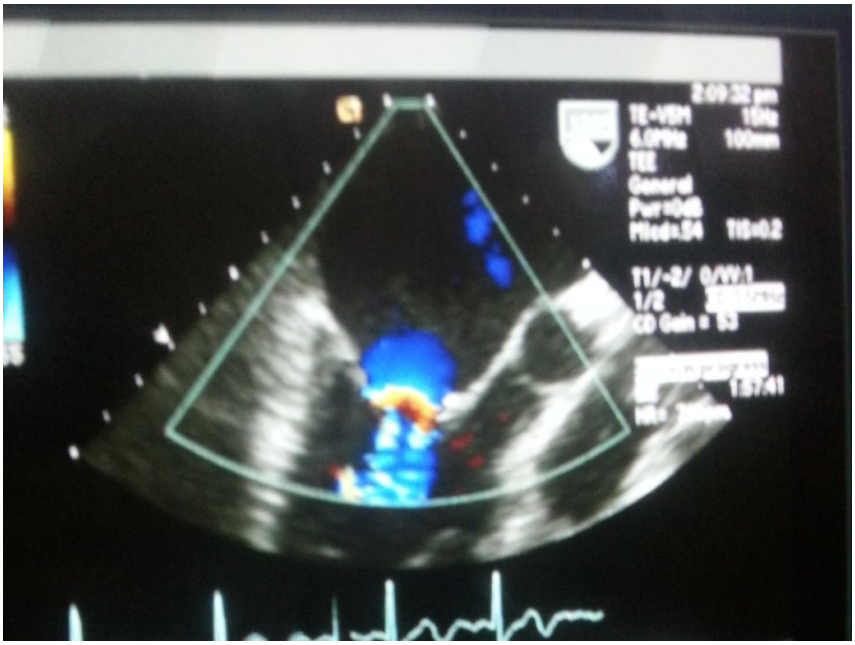
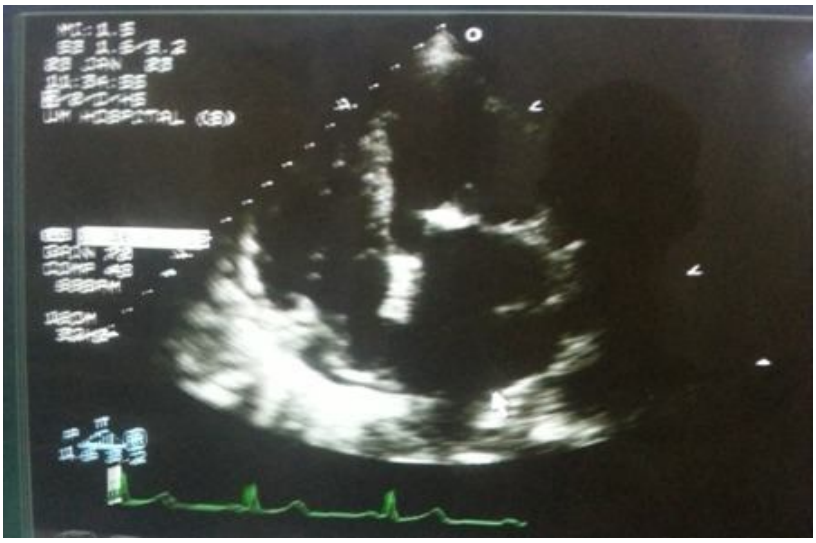
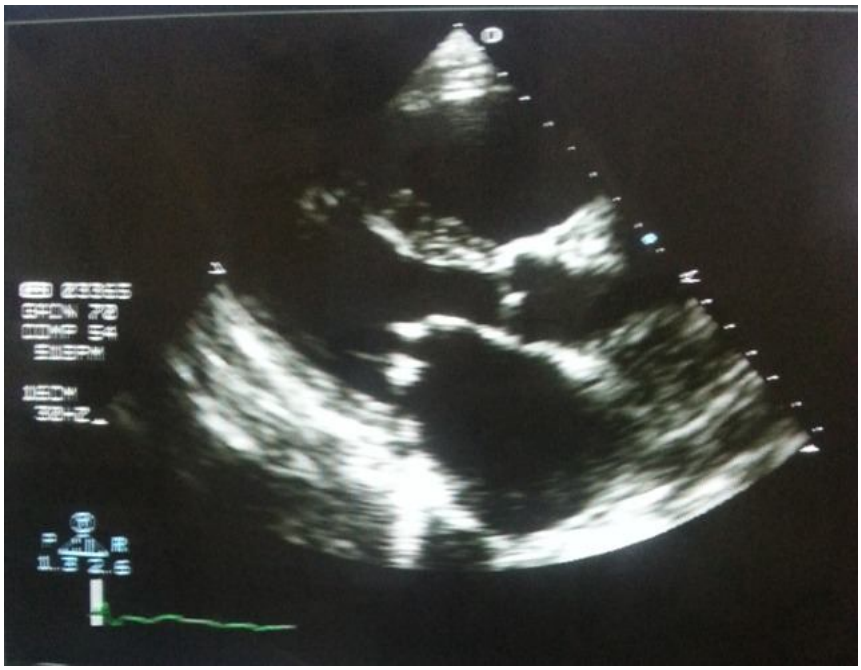


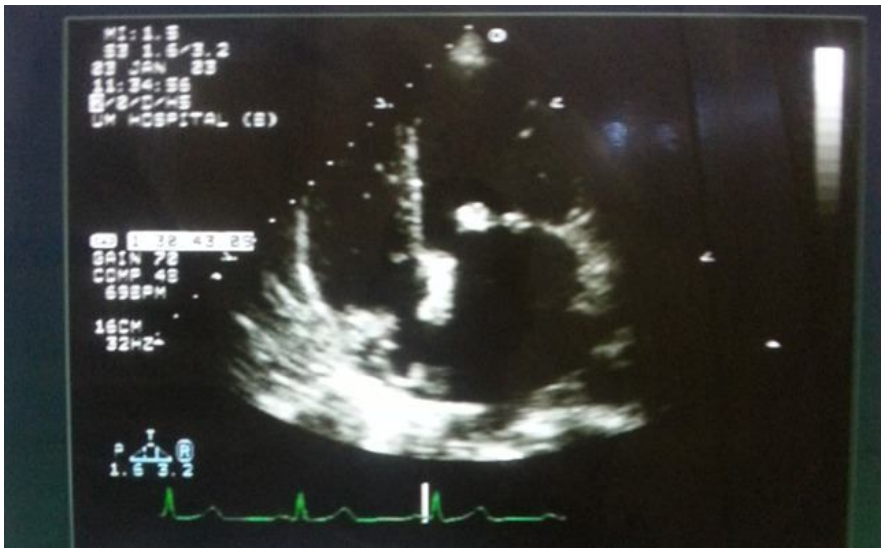
Image (5.6): color Doppler image showed mitral valve regurgitation for 66 years old female.



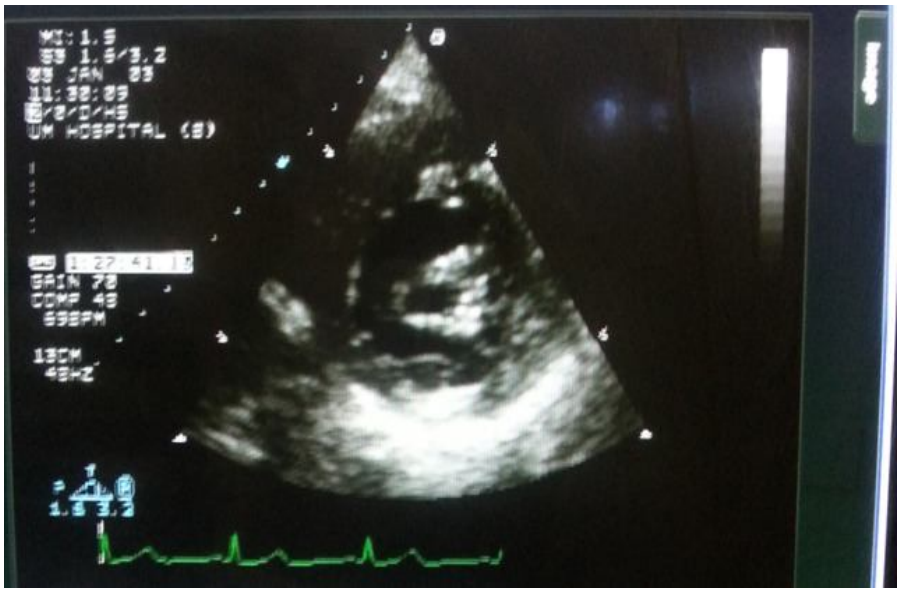
Image(5.7): ultra sound image showed mitral valve stenosis for 35 years old male.



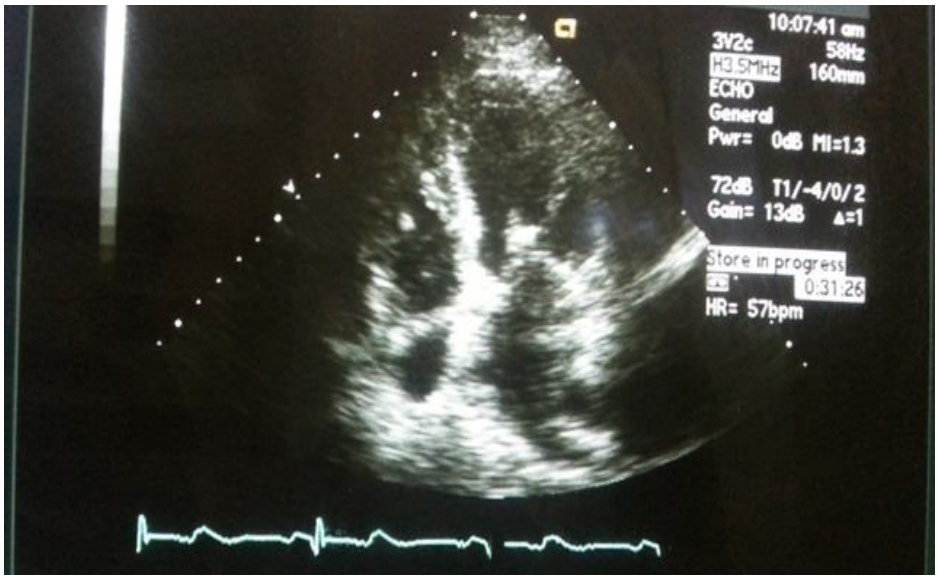
Image(5.8): ultra sound image showed mitral valve stenosis for 30 years old male.



Image(5.9): ultra sound image showed mitral valve stenosis for 38 years old male.



Image(5.10): ultra sound image showed mitral valve stenosis for 25 years old male.



Image(5.11): ultra sound image showed mitral valve stenosis for 55 years old female.

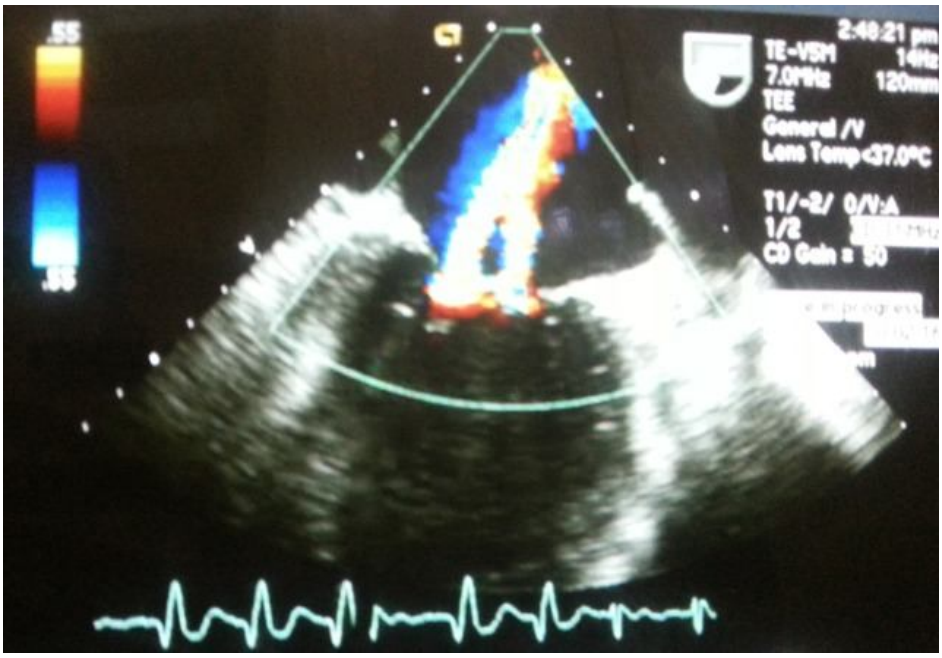


Image (5.12): color Doppler image showed mitral valve regurgitation for 37 years old female.

Appendix 2:

number	age	Gender	Hyper	Diabetic	Rom.	condition.	severity	LA	IVSd	LVPWd	LVDd	LVDs	Efpercent
1	17	2	0	0	1	1	1	3.6	1	1.1	4.5	3.1	57
2	17	2	0	0	1	2	1	3.6	1	1.1	4.5	3.1	57
3	34	1	1	0	0	2	1	4.7	1.7	1	6	4.1	30
4	61	1	0	0	1	2	1	3.3	9	4.9	5.4	3.7	57
5	38	1	0	0	1	1	1	4.2	1.1	1.1	6.1	4.4	52
6	80	2	1	0	0	2	1	3.8	1.8	7.2	4.8	3.8	42
7	80	1	1	0	0	2	2	3	5.2	8	5.2	3.5	60
8	33	1	1	0	0	2	3	4.7	0.7	0.7	8.1	7.4	20
9	40	1	0	0	1	2	1	4.4	1.4	6	3.1	1.7	66
10	24	2	0	0	1	1	1	5	1.1	6	6.5	4.6	61
11	23	2	0	0	1	2	1	2.6	1.1	5	4.4	3.4	47
12	65	1	1	0	0	2	1	3.5	0.9	0.8	3.5	2.2	67
13	65	2	1	0	0	2	1	3.2	0.8	1	5.1	3.9	46
14	55	2	0	0	1	1	1	4.4	0.9	0.7	4.2	2.7	65
15	55	2	0	0	1	2	2	4.4	0.9	0.7	4.2	2.7	65
16	70	1	1	0	0	2	1	3	0.9	0.6	3.5	2.2	60
17	59	1	1	0	0	2	3	4.4	0.8	1.1	5	4.1	36
18	70	1	1	0		2	1	3.8	0.9	1	6.2	5	43
19	60	2	0	0	1	1	1	4	0.9	0.8	4.9	4	60
20	65	1	1	0	0	2	1	4.4	0.9	0.6	7.1	6.3	24
21	61	1	1	0	0	2	2	3.3	0.9	1.2	5.4	3.7	57
22	20	1	0	0	1	1	1	5	1	5.4	6	4.1	60
23	47	2	1	0	0	2	1	2.6	1	0.5	5.1	3.2	67
24	37	2	1	0	0	2	1	3.2	0.8	0.5	4.6	2.9	67
25	53	1	1	0	0	2	1	4	1.1	0.6	5.4	4	50
26	62	1	0	1	0	2	1	4.1	0.9	0.9	7.3	5.9	38
27	73	1	0	1	0	2	1	3.2	1	0.5	7	5.8	35
28	75	2	0	1	0	2	1	4.2	0.7	0.7	4.4	2.9	64
29	25	2	1	0	0	2	1	3.1	0.4	0.3	4.5	2.7	68
30	35	2	1	0	0	2	1	2.8	0.7	0.7	4.7	2.9	68
31	66	2	1	0	0	2	1	3.8	0.6	0.8	5.5	4.1	48
32	70	2	1	0	0	2	2	4.6	0.7	0.5	5.7	3.9	58
33	20	2	1	0	0	2	1	2.3	0.6	0.7	3.9	2.9	50
34	27	2	1	0	0	2	2	3.4	0.7	0.7	5.3	3.3	67
35	43	1	1	0	0	2	1	4.6	0.8	1	7.9	6.9	26
36	33	2	1	0	0	2	1	3.5	0.9	0.8	4.6	3.4	60
37	58	1	1	0	0	2	1	3.7	0.9	1.1	5.3	3.7	56
38	65	2	1	0	0	2	2	4.2	1.1	0.9	5	3.5	56
39	40	2	0	1	0	2	2	3.8	0.8	1	4.5	3	60
40	75	1	1	0	0	2	2	4.2	1.2	1.1	5.4	3.6	61
41	75	2	0	1	0	2	2	3.1	0.8	0.7	4.6	3.3	54
42	70	2	0	1	0	2	2	4.1	1.3	1.1	4.4	3.1	58
43	65	1	1	0	0	2	3	4.5	0.6	0.6	5.6	5	25
44	45	1	0	1	0	2	1	4.6	1.2	1.1	4.6	3.3	54
45	60	1	1	0	0	2	1	3	0.8	0.9	4.8	3.6	60
46	52	1	1	0	0	2	1	3.8	0.9	0.9	5	4.9	46
47	30	1	0	0	1	1	1	4.8	1	3	4	3.9	60
48	37	1	1	0	0	2	3	4.5	0.9	1.1	5	4.1	20
49	48	1	0	0	1	2	2	3.8	0.8	0.6	5	3.5	63
50	55	2	1	0	0	2	1	3.3	0.7	0.9	4.5	3.6	58