EXPERIENCE WITH

OPEN RHEUMATIC MITRAL VALVE SURGERY

AT MAADI ARMED FORCES HOSPITAL

DURING THE LAST 5 YEARS FROM 1979 TO 1983

◆

THESIS SUBMITTED IN PARTIAL FULFILMENT FOR THE DEGREE OF **M. S.** GENERAL SURGERY

BY

MOHAMED ELAMEER SHAZLY MAHMOUD

M.B.B.Ch., CARDIOTHORACIC SURGERY DEPARTMENT

MAADI ARMED FORCES HOSPITAL

★ ★ ★

UNDER THE SUPERVISION OF

PROFESSOR DOCTOR

ABDEL-KHALIK SARWAT

PROFESSOR OF CARDIOTHORACIC SURGERY

FACULTY OF MEDICINE EIN-SHAMS UNIVERSITY

PROFESSOR DOCTOR

AHMED ELKOSHAIRY

HEAD OF CARDIOTHORACIC SURGERY DEPARTMENT

MAADI ARMED FORCES HOSPITAL

DOCTOR

MOHAMED MAGDY MOUSTAFA

LECTURER OF CARDIOTHORACIC SURGERY

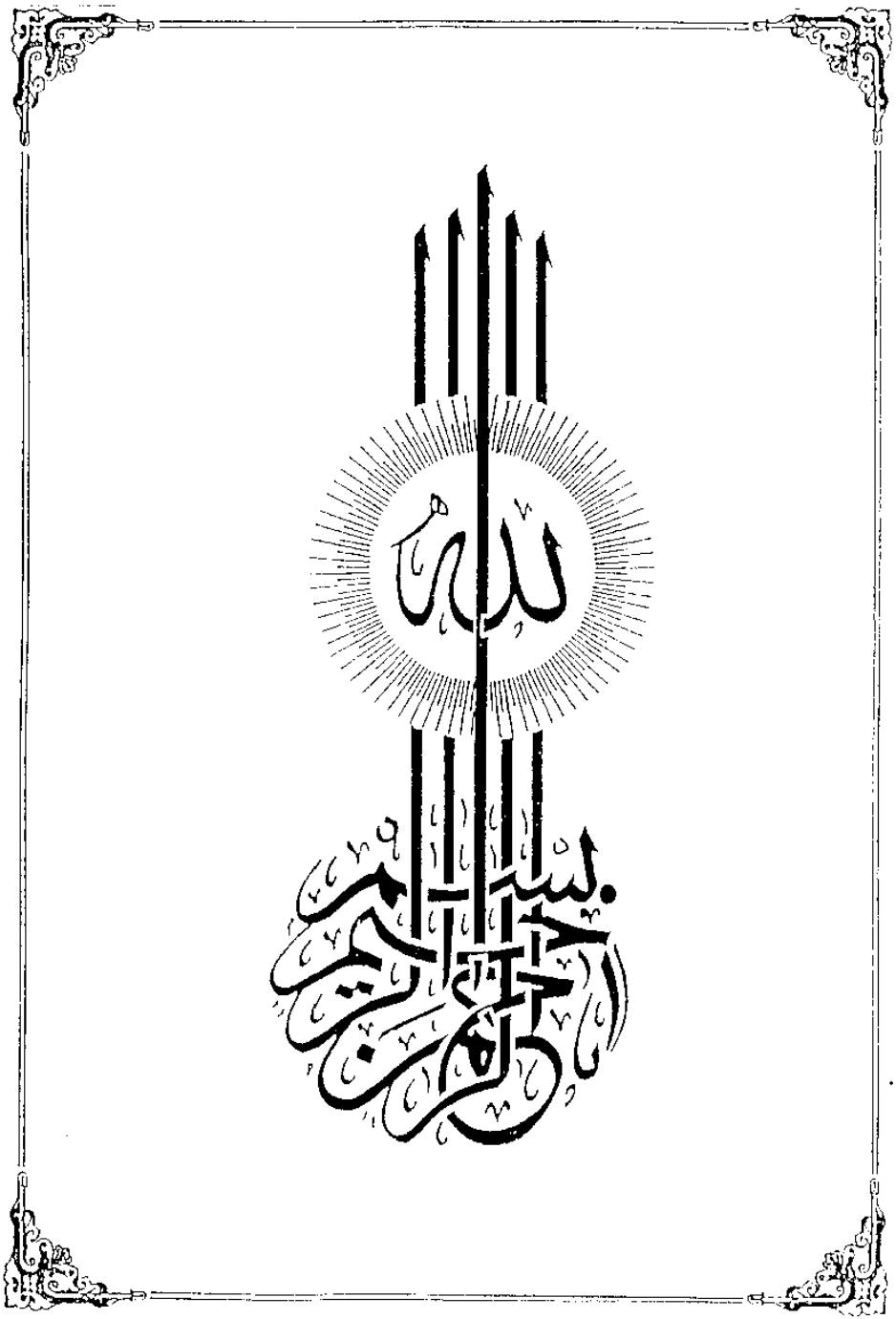
FACULTY OF MEDICINE EIN-SHAMS UNIVERSTY

FACULTY OF MEDICINE

EIN-SHAMS UNIVERSITY

1985

To my parents



ACKNOWLEDGEMENT

To the kind hearts, without whose assistance and guidance this work would not have been produced, I would like to express my greatest gratitude and thanks.

First and foremost stands Professor Abdel-khalik Sarwat professor of cardio-thoracic surgery, Ain Shams University Hospitals, whose guidance, supervision, and arrangement of this work was a great help for me and to him, I express my greatest gratitude.

Then comes professor Ahmed Elkoshairy head of cardio-thoracic surgery at Maadi Armed Forces Hospital, whose paternal attitude and guidance can not be praised enough with words. Whose constructive criticism and his time and patience which I have taxed with great freedom were more than exemplary. To him I owe a special word of tribute and thanks for his fine art in drawing tables, diagrams, graphs, and slides all of which are originals & the operative pictures were taken in our theaters.

I am grately indebeted to Doctor Mohamed Magdy Moustafa lecturer of cardio-thoracic surgery , Ain Shams University Hospitals for revising the whole text and helping in producing it in this distinguished form.

Of the many others who have been most helpful in their contributions I must make special mention of the following: Doctor Ahmed Magdy and Doctor Hazem Hagrus consultants of

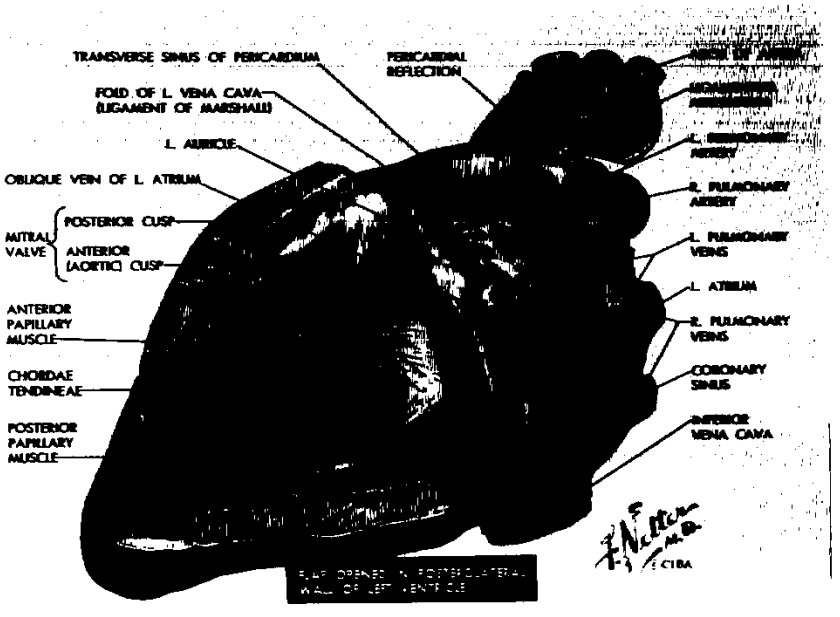
cardio-thoracic surgery at Maadi Armed Forces Hospital, Doctor Fahmy Abo-Ahmed who supplied the C.T. scan, Doctor Mohamed El-Deeb who supplied the Echo, Doctor Reda EL-Essway who helped by revising the text and supplying the E.C.G., my collaegues, Doctor Mohamed Salah, Doctor Abdel-Aziz, and Doctor El-Hussini. My thanks are due to the secretaries of the 7th floor who typed the manuscript.

Lastly I would like to thank all who assisted and my memory may have failed me to mention in name.

And may God guide our steps.

Dr. Mohamed El-Ameer Shazly

M.B., B.Ch.



(After Frank.H.Netter, M.D., from the Ciba collection of medical illustration, 3rd print, 1974. Volume 5, P.9)

CONTENTS

Introduction

INTRODUCTION & AIM OF THE WORK

As early as I923 Cutler and Levine tried unsuccessfully to treat rheumatic mitral stenosis by excising a portion of the mitral valve. The first successful attempt to treat mitral stenosis surgically was reported by Souttar in I925, after that, surgical approach then lay dormant for over two decades until Harken and associates in I948 and Bailey in I949, independently demonstrated the value of digital commissurotomy (Isom et al., I983). In the following decade a mitral valve dilator was developed in England by Tubbs (Spencer, I983).

Open heart surgery then became feasible with the first successful operation by Gibbon in I953. In I956 Lillehei performed open annuloplasty operation for severe mitral regurgitation and open mitral commissurotomy for mitral stenosis (Spencer, I983).

Since the first mitral valve replacement was performed by Starr in I960, substantial improvement has been achieved in terms of decreased operative mortality as well as diminished late complications secondary to improvement in valve durability and haemodynamics (Macmanus et al., I980).

The aim of this work is to review the experience of Maadi Armed Forces Hospital in open rheumatic mitral valve surgery during the last 5 years.

Review of Literature

ANATOMY

The mitral valve is a complex structure consisting of four major components: leaflets, chordae tendineae, papillary muscles and annulus (Perloff and Roberts, I972).

The mitral valve consists of only 2 leaflets: the anterior one has a much longer basal to margin length than does the posterior leaflet, but the length of the annular attachment of the posterior leaflet"about 6 cm" is about twice that of the anterior leaflet"about 3 cm" however the surface area of each leaflet is virtually identical. The posterior leaflet has a true bundle of fibrous tissue "the annulus" seperating the myocardium of the left atrium from the myocardium of the left ventricle. The posterior leaflet in a large sense is simply an extension of mural endocardium from the free walls of the left atrium. The anterior leaflet does not have a true annulus but is continuous with the wall of the ascending aorta, aortic valve, membranous ventricular septum and atrial septum. The mitral leaflets are continuous with each other,being connected at the commissures (Roberts, I983a).

The anterior mitral leaflet is a semicircular or triangular structure. The distal third of the leaflet's ventricular surface is rough and receives the chordae tendineae, proximal to this rough zone the leaflet surface is membranous and clear. There is a ridge along the superior margin

of the rough zone,being the line of the leaflet closure. The anterior leaflet forms a boundary dividing the inflow and outflow tract of the left ventricle (Ranganathan et al., I970).

The posterior leaflet often has a number of indentations along its free margin. In the majority of the normal hearts studied "92 %" this leaflet was triscalloped structure with a large middle scallop and two equal sized commissural scallops on either side of it (Ranganathan et al., I970).

Three zones can be identified on the leaflet surface: (I) A rough zone forming the distal portion of the leaflet and has chordal insertion on its ventricular surface and comes into close contact with the anterior leaflet during valve closure. (2) A clear zone proximal to the rough zone. (3) The basal zone between the clear zone and the annulus receives the insertion of the basal chordae tendineae. It is most obvious on the middle scallop because the majority of the basal chordae tend to insert into this region (Ranganathan et al., I970).

The rough zones of both the anterior and posterior leaflets and basal zone of the posterior leaflet receive insertion of the chordae tendineae (Lam et al., I970). Each rough zone chorda splits into three cords soon after its origin from the papillary muscle,one inserts into the free margin of the leaflet and one inserts beyond the free margin to the line of closure,and an intermediate cord inserts between the two (Ranganathan et al., I976). The chordae subdivide as they progress from papillary muscle to leaflet, the subdivisions may be viewed as primary "first order" , secondary "second order" and

tertiary "third order" chordae. The spaces between the chordae serve as secondary orifices between left atrium and left ventricle, therefore fusion of chordae tendineae may narrow the mitral orifice (Roberts, I983a).

Among the anterior leaflet rough zone chordae,two are by far the thickest and largest. These are the strut chordae tendineae. They often originate from the tips of the anterolateral and posteromedial papillary muscle, inserting between four and five O'clock postion on the posteromedial side and the seven and eight O'clock postion on the anterolateral side, but the rough zone chordae tendineae of the posterior leaflet are in general shorter and thinner than those of the anterior leaflet. The posterior leaflet does not have strut chordae among its rough zone chordae tendineae (Ranganathan et al., (I976).

The chordae tendineae inserting into the basal region of the posterior leaflet were found in 3I of the 50 hearts examined. In I2 hearts they were only attached to the middle scallop region (Lam et al., I970).

The chordae tendineae passing to the anterolateral commissure and the adjoining halves of the anterior and posterior leaflets arise from the anterolateral papillary muscle group. The chordae tendineae passing to the posteromedial commissure and the adjoining halves of the anterior and posterior leaflets originate from the posteromedial group of papillary muscles (Ranganathan et al., I976).

On an average, 24 chordae tendineae are attached to the papillary muscles "I2 to each", and I20 chordae are attached to the leaflets (Roberts and Cohen, I972).

There are two groups of the left ventricular papillary muscles: the anterolateral and posteromedial groups. each supplies chordae tendineae to one half of both leaflets. There are three morphological types: (I) Tethered type: i.e a papillary muscle fully adherent to the subjacent ventricular myocardium and protruding very little into the ventricular cavity, with few trabecular attachments. (2) Free and finger like type: i.e one third of the papillary muscle protruding freely into the ventricular cavity with a very few or no trabecular attachments.. (3) Mixed type: part of the body free, but also with considerable trabecular attachment and tethering in some other parts (Ranganathan et al ., I976).

The arterial supply of the left ventricular papillary muscles was described by Ranganathan et al., (I976) as follows: the anterolateral papillary muscle receives branches from the anterior descending coronary artery, and either the diagonal left ventricular arteries or the marginal branches of the left circumflex artery. The posteromedial papillary muscle receives a variable supply from the left circumflex artery and/or branches of the right coronary artery. The epicardial branches of the coronary arteries course from base to the apex of the heart giving penetrating intra-myocardial

branches (Ranganathan et al., I976).

The mitral annulus serves two important functions: it is essential part of the basal attachment or fulcrum of the posterior leaflet, and it acts as a sphincter decreasing its circumference by as much as 40 % from diastole to the end of systole (Perloff, I976). The annulus in relation to the anterior leaflet is greatly thickened at each commissure to form the left and right fibrous trigones. The area of the valve orifice and septum related to the right fibrous trigone and central body is most vulnerable in terms of conduction tissue, because here lies the atrioventricular node and the penetrating bundle. The area of mitral valve orifice between the trigones "more or less the mid portion of the anterior leaflet" is directly related to the commissure between the non coronary and left coronary cusps of the aortic valve. Encircling the mural leaflet of the mitral valve ,are the circumflex coronary artery from below and to the left, and the coronary sinus from below and to the right. Also in 45 % of cases the atrioventricular nodal artery will run in close proximity to the right side of the mitral orifice, arising either from the circumflex or right coronary artery. (Wilcox and Anderson, I982).