In Hospital Risk of Aortic Valve Replacement for Patients With Mild-Moderate Aortic Valve Stenosis Undergoing Coronary Artery Bypass Grafting

Thesis submitted for the partial fulfillment of the MD degree
in cardio-thoracic surgery

By

Mohamed Mohamed Moneer AbdElFatah ElSaegh
M.B.B.Ch., MS (general surgery)-Ain Shams University

Under supervision of

Professor / Mohamed Mohamed Fahmy Bassiouny
Professor and x-head of the cardiothoracic surgery department, faculty of medicine, Ain shams university

Professor / Moghazy Ahmed Tantawy
Professor and head of the cardiothoracic surgery department, faculty of medicine, Ain shams university

Professor/ Ahmed Baheig El kerdany
Professor of cardiothoracic surgery department, faculty of medicine, Ain shams university

Doctor/Hamdy Abed EL Wareth Ahmed Singab
Lecturer of cardiothoracic surgery department, faculty of medicine, Ain shams university

Faculty of medicine
Ain Shams university
2013

بسم الله الرحمن الرحيم

قُلْ إِنَّ صَلاتِي ونُسُكِي ومَحْيَايَ ومَمَاتِي
لِلَّهِ رَبِّ العَالَمِينَ (162) لا شَرِيكَ لَهُ
وبِذَلِكَ أُمِرْتُ وأَنَا أَوَّلُ المُسْلِمِينَ

صدق الله العظيم

سورة (الأنعام – 162، 163)

Acknowledgement

Thanks first & last to ***Allah*** *for helping me to proceed & complete this work.*

I would like to express my deepest gratitude, sincere appreciation and respect to ***Prof. Mohamed Fahmy Bassiouny,*** *Professor of Cardiothoracic Surgery, Ain Shams University, for the continuous encouragement, guidance and support he gave me throughout the whole work. It has been a great honor for me to work under his generous supervision.*

I hereby wish to express my supreme gratitude and respect to ***Prof. Moghazy Ahmed Tantawy,*** *Professor of Cardiothoracic Surgery, Ain Shams University for may he rest in peace.*

I would like to express my deepest thanks and great gratitude to ***Prof. Ahmed Baheig El kerdany,*** *Professor of Cardiothoracic Surgery, Ain Shams University, for his great help.*

I would like to express my deepest thanks and great gratitude to ***A.prof. Hamdy Abed EL Wareth Ahmed Singab****, Associate professor of Cardiothoracic Surgery, Ain Shams University, for his great help, meticulous supervision and precious remarks during all stages of preparation of this work.*

A special tribute and appreciation to ***Prof Ahmed El Kirdany, Prof. Mohamed M ElFikky, Prof Tarek ElSayegh*** *for their help providing the cases*

I would like to thank all my Family, friends & my colleagues of Cardiothoracic Surgery department, Ain Shams University, for there support to finish this work.

The last but not the least, I dedicate this piece of work to dearest people to me , My dad, mum and sister may their souls rest in peace though not physically around but they definitely have a big say in every step I take.

Mohamed ElSaegh

Contents

List of Abbreviations

1st	:	First
2nd	:	Second
99mTc	:	Technetium
ACC	:	American college of cardiology
ACP-ASIM	:	American college of physicians- American society of internal medicine
ACS	:	Acute coronary syndrome
AF	:	Atrial Fibrillation
AHA	:	American Heart Association
AS	:	Aortic stenosis
AVA	:	Aortic valve area
AXC	:	Aortic cross clamp
CA	:	Coronary angiography
CABG	:	Coronary Artery Bypass Grafting
CAD	:	Coronary artery disease
CASS	:	Coronary Artery Surgery Study
CCS	:	Candian Cardiovascular Society
CCT	:	Cross Clamp Time
CE	:	Coronary endarterectomy
CK-MB	:	Creatine kinase – myocardial band
COPD	:	Chronic obstructive pulmonary Disease
CPB	:	Cardiopulmonary Bypass
CPBT	:	Cardiopulmonary Bypass Time
CT	:	Computed tomography
CX	:	Circumflex Coronary Artery
DM	:	Diabetes mellitus
DSA	:	Digital Subtraction Angiography
EBT	:	Electron Beam Tomography
ECG	:	Electrocardiography
ED	:	Emergency Department
EDD	:	End Diastolic Diameter
EDV	:	End systolic volume
EF	:	Ejection Fraction

List of Abbreviations (Cont.)

ESD	:	End Systolic Diameter
ESV	:	End-diastolic volume
FDG	:	Fluorodeoxyglucose
FS	:	Fraction shortening
Hb	:	Hemoglobin
HCT	:	Helical Computed Tomography
Hs	:	Hours
IABP	:	Intra aortic Balloon Pump
ICU	:	Intensive Care Unit
IHD	:	Ischemic heart disease
INR	:	International normalized ratio
ITA	:	Internal thoracic artery
IVC	:	Inferior vena cava
Kcl	:	Potassium chloride
LAD	:	Left Anterior Descending Artery
LAO	:	Left anterior oblique
LCA	:	Left coronary artery
LIMA	:	Left Internal Mammary Artery
LM	:	Left Main
LV	:	Left ventricle
LVF	:	Left Ventricular Function
MI	:	Myocardial Infarction
mmhg	:	Millimeter mercury
MPI	:	Myocardial perfusion Imaging
MRA	:	Magnetic Resonance Angiography
MRI	:	Magnetic Resonance Imaging
NO	:	Number
NSTEMI	:	Non ST elevation myocardial infarction
OM	:	Obtuse Marginal
PAP	:	Pulmonary artery pressure
PDA	:	Posterior Descending Artery
PET	:	Positron Emission Tomography
PPG	:	Peak preasure gradient

List of Abbreviations (Cont.)

PT	:	Prothrombin time
RAO	:	Right anterior oblique
RAP	:	Right atrial pressure
RCA	:	Right coronary artery
RV	:	Right Ventricle
SD	:	Standard Deviation
SLE	:	Systemic lupus erythematosus
SPECT	:	Single Photon Emission Computed Tomography
SV	:	Stroke volume
SVGS	:	Saphenous venous grafts
TEE	:	Trans-esophagial echocardiography
TI	:	Thallium201
TR	:	Tricuspid regurgitant
VF	:	Ventricular Fibrillation
VT	:	Ventricular Tachycardia
WHO	:	World health organization

List of tables

List of Figures

List of Figures (Cont.)

Introduction

The incidence of combined coronary artery disease (CAD) and degenerative valve disease increases as the population ages, with aortic stenosis being the most common of these degenerative conditions. Combined CABG and AVR surgery is the third most commonly witnessed cardiac surgery after isolated CABG and AVR in the western world. **(Gunay et al., 2009)**

As the age at which patients coming to coronary revascularization increases, the question whether to intervene on incidental aortic valve disease presents itself more frequently. While there is little debate about concomitant aortic valve replacement (AVR) when aortic stenosis (AS) is severe (mean gradient 50 mm Hg), the management of patients with mild or moderate AS is controversial. Initial debate over the management of moderate AS focused on the risk of reoperation, with early reports of high operative risk for AVR after prior CABG marshaled as support for an aggressive approach to AVR at initial CABG. More recent studies suggesting that the risk of reoperation for AVR approaches that of primary AVR plus CABG have shifted the debate to the incremental risk of AVR and the likelihood of gradient progression. **(Sareyyupoglu et al., 2009)**

Current American College of Cardiology/American Heart Association (ACC/ AHA) guidelines take a middle ground, stating that AVR is “reasonable” (class IIa indication) for patients undergoing CABG with moderate AS (mean gradient 30 to 50 mm Hg) . For patients with less severe degrees of AS, however, data are scant and the ACC/AHA guidelines give a class IIb indication for concomitant AVR. **(Dewey et al., 2010)**

It is estimated that 1/3 of patients meeting current American College of Cardiology and American Heart Association class I(sever aortic stenosis) indications for aortic valve replacement (AVR) are denied surgery and that the presence of severe left ventricular (LV) dysfunction is one of the primary reasons cited. Most studies have reported high operative mortality in this challenging patient subgroup. **(Chikwe et al., 2009)**

The incidence of inotrope support is proportionally higher in patients undergoing combined coronary artery bypass graft (CABG) and valve surgery as compared to CABG alone. Left ventricular dysfunction often occurs after cardiopulmonary bypass (CPB), requiring the use of inotropic drugs to achieve adequate hemodynamic status. In contrast to patients with chronic ischemic heart disease, left ventricular dysfunction in patients with moderate- to-severe valvular heart disease does not improve immediately after surgery. In patients with normal preoperative ventricular function, contractile dysfunction can occur between 4-6 hours after surgery, and usually resolves around 24 hours postoperatively. **(Ahmed et al., 2009)**

Aim of the Work

To study and compare the critical issues in deciding for or against concomitant AVR at the time of CABG patients with combined ischemic heart disease and aortic stenosis including the following:

the incremental risk of concomitant AVR at the time of primary CABG (which We sought to investigate these risks among patients with coronary artery disease and mild-moderate AS), the likelihood that AS left untreated will progress requiring reoperative AVR and the need for post operative inotropic use and its impact on hospital stay and life style affection. As publications dealing with the same topic come to different conclusions; they still leave open the question of the adequate treatment of a patient with mild (gradient < 30 mmHg, AVA 1.5-2.0 cm2) AS or moderate AS (gradient 30-50 mmHg, AVA 1-1.5 cm2), therefore we will analyze our hospital’s data to answer the question whether we should recommend simultaneous aortic valve replacement to patients with mild-moderate aortic stenosis referred for CABG.

Anatomy of the aortic valve complex

Introduction

It is axiomatic that surgeons operating on the aortic root, if they are to perform at maximal efficiency, need fully to understand the structure of the components of the aortic valve. Equally, they need to be able to relate the valve to the surrounding cardiac structures.

The latter aspect is the more important since, with the aortic root forming the centerpiece of the heart (Figure 1), its components are related to all the other chambers of the heart.

There is still no consensus on the best way to describe the anatomy of the aortic root. (**Antunes, 2005)**

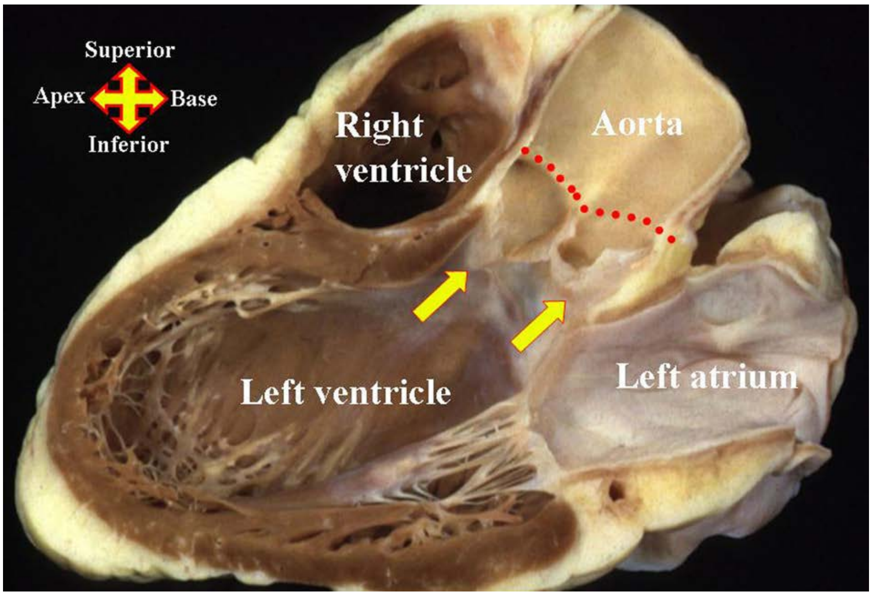

Figure 1. This section through the heart, replicating the parasternal long axis echocardiography cut, shows how the aortic root is the centerpiece of the heart. The root extends from the basal attachments of the valvar leaflets within the ventricle (yellow arrows) to the sinutubular junction (red dotted line). The compass shows the orientation relative to the remaining thoracic organs. **(Antunes, 2005)**

Different surgeons use the term ‘annulus’ to describe different parts of the components of the aortic valve. There is also lack of agreement within the surgical literature with regard to the nature of the ventriculo-aortic junction. **(Pretre, 2006)**

The essence of the valvar complex is the semilunar attachments of the valvar leaflets. These extend from their basal attachments within the left ventricle to their distal attachments at the sinutubular junction. The extent of the leaflets defines the length of the root. Within this length, the semilunar lines of attachments of the leaflets cross the anatomic ventriculo-aortic junction, the latter being the circular line marking the transition from ventricular to arterial walls. The posterior part of this line is made up of fibrous continuity between the leaflets of the aortic and mitral valves.

Because the semilunar lines of attachment cross this anatomic junction, crescents of ventricular wall are incorporated at the base of each arterial valvar sinus, whilst triangles of arterial wall are incorporated between the zones of apposition of the valvar leaflets as they extend to become attached at the sinutubular junction. The overall, three dimensional arrangements of the leaflets takes the form of a crown. It is questionable whether this crown is best described as an ‘annulus’, just as it is questionable whether the leaflets should be described as ‘cusps’, or only the peripheral parts of the zones of apposition between the leaflets as the ‘commissures’. Only time, and usage, will answer these questions. **(Lausberg, Schafers, 2006)**

In this review, I will describe the arrangement of the aortic root as seen by the anatomist, albeit with some illustrations orientated to match the views obtained by