CHORDAL TRANSFER VERSUS CHORDAL REPLACEMENT IN ANTERIOR MITRAL LEAFLET PROLAPSE

Thesis

Submitted for Complete Fulfillment of
The Doctorate Degree (M.D) in
Cardiothoracic Surgery

By

Mohammad Abdel Rahman Mohammad Hussein
(M.B.; B.Ch; MSc, Cairo University)

Under supervision of

Prof. Dr. Mahmoud El-Batawy
Professor and Head of Cardiothoracic Surgery Department
Faculty of Medicine, Cairo University

Dr. Ahmed Gaafar
Associate Professor of Cardiothoracic Surgery,
Faculty of Medicine, Cairo University

Dr. Amr Rouchdy
Associate Professor of Cardiothoracic Surgery,
Faculty of Medicine, Cairo University

Faculty of Medicine
Cairo University
2010

بسم الله الرحمن الرحيم

ACKNOWLEDGEMENT

*First and foremost, thanks are due to **ALLAH** the most gracious and merciful, to whom I relate my success in achieving any work in my life.*

*I would like to express my sincere gratitude and deepest appreciation to **Prof. Dr. Mahmoud Ahmed El-Batawy,** Professor and Head of Cardiothoracic Surgery, Faculty of Medicine, Cairo University, for his kindness, continuous encouragement and guidance throughout the preparation of this work.*

*I am deeply grateful to Dr. **Ahmed Hussein Gaafar,** Assistant Professor of Cardiothoracic Surgery, Faculty of Medicine, Cairo University, for his guidance, help and precious comments that enlightened my way throughout this work.*

*I would like also to thank Dr. **Amr Rouchdy**, Assistant Professor of Cardiothoracic Surgery, Faculty of Medicine, Cairo University; for his patience, suggestions and cooperation to achieve this work.*

I wish to express my appreciation to all who shared their thoughts and comments with me to get this work done.

Finally, I would like to extend my deepest thanks to my family for their kind help and continuous support.

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ABBREVIATIONS

ACC	: American College of Cardiology
AHA	: American heart association
AF	: Atrial fibrillation
AL	: anterior leaflet
AML	: Anterior mitral leaflet
AMLP	: Anterior mitral leaflet prolapse
AR	: Aortic regurgitation
ASD	: Atrial septal defect
AV	: Block atrioventricular block
AVR	: Aortic valve replacement
CPB	: Cardiopulmonary bypass
ERO	: Effective regurgitant orifice
ESC	: European Society of Cardiology
FMR	: Functional mitral regurgitation
ICU	: Intensive Care Unit
IE	: Infective endocarditis
IMR	: Ischemic mitral regurgitation
LA	: Left atrium
LV	: Left ventricle
LVESD	: Left ventricular endsystolic dimension
LVESV	: Left ventricular endsystolic volume
LVESVI	: Left ventricular endsystolic volume index
LVOTO	: Left ventricular outflow tract obstruction
MR	: Mitral regurgitation
MS	: Mitral stenosis
MV	: Mitral valve
MVP	: Mitral valve prolapse
NYHA	: New York Heart Association
PFO	: Patent foramen ovale
PML	: Posterior mitral leaflet
PTFE	: Polytetraflouroethylene (Gore-Tex)
RHD	: Rheumatic heart disease
RV	: Right ventricle
STS	: Society of thoracic surgeons
TE	: Thromboembolism
TEE	: Transesophageal echocardiography
TV	: Tricuspid valve
TTE	: Transthoracic echocardiography

ABSTRACT

Objective: The aim of the study is to compare the effectiveness of chordal transfer (transposition) and chordal replacement (substitution) using artificial PTFE chordae to treat pure mitral valve insufficiency due to anterior mitral leaflet (AML) prolapse.

Patients and Methods: In a prospective, comparative, non-randomized, non- blinded study, 40 patients who were diagnosed of having mitral valve regurgitation due to anterior mitral leaflet prolapse. The patients were divided into two groups well-matched for age, sex and preoperative risk factors. Group A: (20 patients) who underwent mitral valve repair by chordal transfer; and Group B: (20 patients) who underwent mitral valve repair by artificial (PTFE) chordae replacement.

Results: Regarding intraoperative comparison, there was no statistically significant differences regarding the total cardiopulmonary bypass time, the aortic cross clamp time, intraoperative inotropics, and other weaning procedures. Neither mortality nor conversion to mitral valve replacement occurred intraoperatively. In both groups, there was a matchable obvious improvement in the patient's symptomatology during postoperative follow-up by clinical examination and echocardiography. Despite no statistical significance between both groups, there was a favorable step-up in the postoperative NYHA's clinical condition. After 2 years of follow up in both groups, there was no recurrence of severe MR, no reoperation, and no mortality. There were no morbidity complications, thromboembolic episodes nor anticoagulant related hemorrhage and there appears to be preserved and improving LV function.

Conclusion: Both surgical procedures were performed with no mortality, acceptable low morbidity and reasonable technical ease. We hence considered both techniques to be soundly-safe, easy to perform, under TEE guidance, and are hence reproducible.

Keywords:

Mitral valve – repair-insufficiency – anterior leaflet-leaflet prolapse - chordae Tendinae-chordal transfer - artificial chordoplasty

INTRODUCTION

INTRODUCTION

Over the last 50 years, an exponential increase has occurred in our understanding of the structure and function of the mitral valve in both health and disease **(Lawrie, 2006)**.

Mitral valve repair is the treatment of choice in patients with pure mitral valve insufficiency. Compared to native valves, prosthetic valves, even when properly-functioning, have less efficient haemo-dynamics. Moreover, they cause higher morbidity due to thrombo-embolism, anticoagulant-related hemorrhage and endocarditis. **(Tsai et al., 2003)**.

Due to these hazards, data from different long-term studies have confirmed the durability of mitral valve repair which is now considered the gold standard for treating mitral insufficiency **(Tsai et al., 2003)**.

Mitral repair affords superior long-term survival, with permanence comparable with mechanical valve replacement **(Fig. 1)**. In all categories of mitral leaflet prolapse, durability of valve repair has improved over the past decade in addition to better LV function, avoidance of lifelong anticoagulation with its potential morbidities with mechanical valves (thromboembolism and anticoagulant related hemorrhage) and also avoiding replacement by bioprosthesis with its limited durability **(Rakesh et al., 2006).**

The number of patients undergoing MV repair for MR has increased steadily over the past decade in the United States and Canada in relation to the number undergoing MV replacement. However, among isolated MV procedures reported in the STS National Cardiac Database from 1999 to 2000, the frequency of repair

was only 35.7% (3027 of a total of 8486 procedures), which suggests that MV repair is underutilized **(Savage et al., 2003)**.

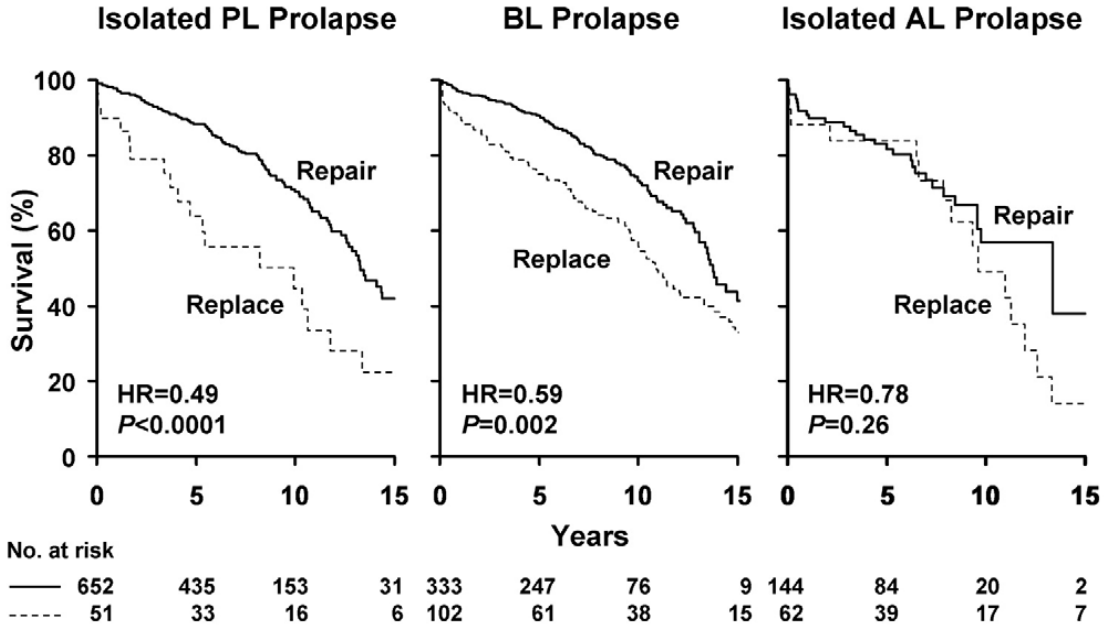

Fig. (1): Probability of survival (death from any cause) among patients having mitral valve repair versus replacement divided into leaflet prolapse groups. Zero time on abscissa represents time of surgery and numbers at the bottom indicate patients at risk. (solid line _ repair; broken line _ replacement; AL _ anterior leaflet; BL _ bileaflet; HR _ hazard ratio for survival of replacement group compared with repair group; PL _ posterior leaflet.)

However, this percentage is higher in more recent studies because of well established benefits of repair over replacement, and also due to more understanding of mitral valve apparatus and novel repair techniques which widened the scope of repair as a whole **(Antonio M. Calafiore**, **2006**). With a range between 64% **(Lawrie, 2006)** 81% (**Rakesh et al., 2006**).

Recent surgical concepts and techniques have widened the scope for repairing diseased mitral valves (especially for rheumatic cases); of these is the aggressive excision of the diseased leaflet tissue and of the supporting fused subvalvular apparatus to remove all valvular

tissue that is affected by rheumatic disease. All affected tissues should be excised or shaved as left diseased tissues is responsible for recurrent disease and 2%/year reoperation rate. This excision is followed by reconstruction with pericardial patch, artificial chordae, as well as the use of tricuspid valve autograft (removed posterior tricuspid leaflet then doing bicuspidization in the setting of accompanying TV repair) or mitral homograft in selected situations **(El Oumeiri et al., 2009).**

Mitral-valve prolapse is defined as the displacement of some portion of one or both leaflets of the mitral valve into the left atrium during systole. In developed countries, it is the most common cause of chronic mitral regurgitation the prevalence of mitral-valve prolapse is 2.5%. More than 150 million people worldwide may be affected. The disorder has both genetic and acquired forms, and several chromosomal loci for autosomal dominant mitral-valve prolapse have been identified**.** The mortality rate of persons who have mitral-valve prolapse with severe mitral regurgitation is approximately 6 to 7% per year **(Verma S and Mesana TG, 2009).**

Patients with mild-to-moderate mitral regurgitation from mitral-valve prolapse may remain asymptomatic and without clinical deterioration for many years. However, increasing severity of mitral regurgitation, even among asymptomatic patients, imposes a volume load on the left ventricle, which, if sustained over time, results in ventricular dilatation, hypertrophy, neurohumoral activation, and heart failure. In addition, elevation in the mean left atrial pressure leads to left atrial enlargement, atrial fibrillation, pulmonary congestion and pulmonary hypertension **(Verma and Mesana, 2009)**.

Anterior mitral leaflet (AML) prolapse is still considered a surgical challenge, especially in the patient subset having the rheumatic etiology. Many techniques have been used to repair mitral

regurge due to (AML) prolapse such as: chordal shortening, chordal transfer (transposition) and chordal replacement (substitution) using artificial chordae **(Tsai et al., 2003).**

Some surgeons prefer chordal transfer, claiming that it is technically-easier requiring moderate experience but allowing sound leaflets coaptation with no-need for complex measurements **(Tsai et al., 2003)**. While some debated the durability of chordal transfer **(Gillinov & Cosgrove, 2004),** others found it a soundly-durable technique as chordal replacement **(Gerald et al., 2006)**.

Mitral valve repair is becoming the procedure of choice for correcting severe mitral regurgitation. The goals of valve repair include preservation of leaflet mobility, restoration of a large surface of coaptation, and stabilization of the results with a remodeling annuloplasty. Current surgical techniques allow surgeons to perform reconstructive surgery in almost all patients with mitral regurgitation, provided there is an adequate amount of pliable and mobile leaflet tissue. A systematic approach to reconstructive surgery include the determination of the exact mechanism of mitral regurgitation by intraoperative inspection and valve analysis; meticulous application of standard techniques of repair, including remodeling annuloplasty, and evaluation of the quality of repair by saline test and transesophageal echocardiography **(David H. Adams and Farzan Filsoufi**, **2007)**.

AIM OF THE WORK