COMPARATIVE STUDY OF AORTIC VALVE COMMISSUROTOMY AND REPLACEMENT IN CARDIO-THORACIC SURGERY DEPARTMENT IN THE LAST TWO YEARS AT AIN SHAMS UNIVERSITY

THESIS

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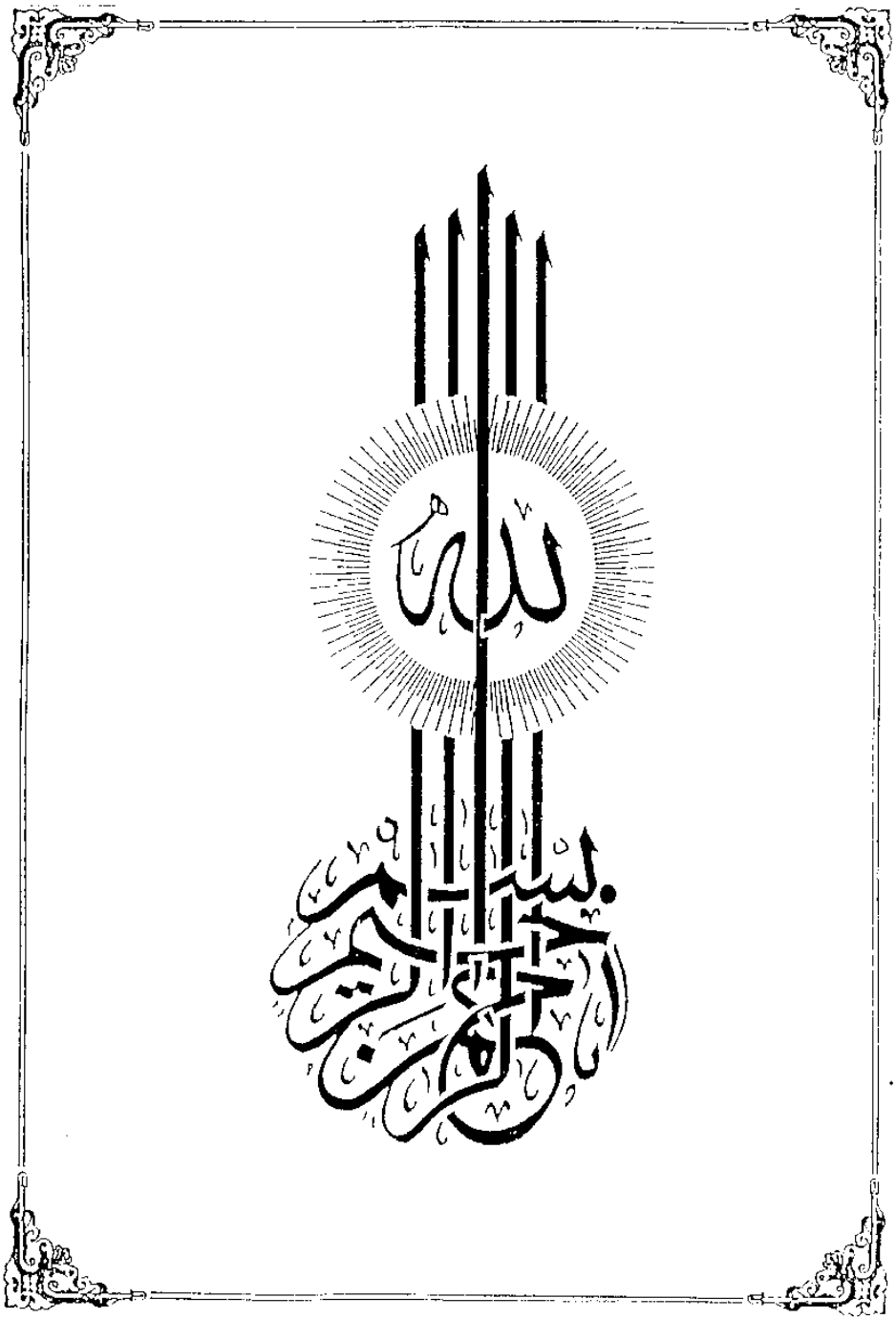

A C K N O W L E D G E M E N T

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C O N T E N T S

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INTRODUCTION

I N T R O D U C T I O N

With the great advance in the methods of diagnosis and treatment of cardiac valvular lesions, aortic valve lesion has the second attention after the mitral valve lesion, and due to the widespread of rheumatic valvular lesions in our community a comparative study of aortic valve commissurotomy and replacement in our center is performed to visualize the extent of the problem of aortic valve replacement, specially the prosthetic one, in our country, which increases by the social factors and economy.

HISTORY OF AORTIC VALVE SURGERY

The recent history of aortic valve surgery started in 1952 when Bailey and his associates devised an operation for the relief of aortic stenosis, using transventricular dilatation with a mechanical dilator to separate the fused valvular commissures.

The following year, Hufnagel (1952) and Harvey inserted a plastic ball-valve in the descending aorta, thereby reducing aortic regurgitation significantly.

The development of pump oxygenator by Gibbon and associates in 1954, started new chapter in the management of aortic valvular disease. This permitted accurate valvulotomy and removal of calcium deposits for the treatment of aortic stenosis, as well reconstructive procedures for the treatment of aortic insufficiency.

It soon became apparent, however, that simple debridement and valvulotomy were inadequate for the management of many patients with aortic valvular stenosis and many valves were not suitable for commissurotomy alone; furtner relief of severe stenosis was achieved by excision of the most severely diseased leaflet and replacement with a prosthetic one.

Bahnson (1960), Harken (1960, 1961) reported successful partial prosthetic ball-valve replacement of the aortic valve in the natural subcoronary position. However, results of partial valvular replacement were still suboptimal in many cases, and in the latter part of 1960 Lillehei and Muller, both replaced the entire aortic valve with a prosthesis (Lillehei et al, 1961 and Muller et al, 1961). Starr's original ball valve prosthesis, developed in 1960, was a significant development in aortic valvular replacement surgery; these initial prostheses have either been abandonedor undergone multiple modifications, and appearance of other valves as :

Magovern-Cromie introduced sutureless valve in 1964 (see Fig. 1).

Smeloff-Cutter introduced their full orifice valve in 196-.

Bjork-Shiley tilting disc valve was introduced in 1969.

also Lillehi - Hastar valve was introduced.

Starr (1969) introduced his valve in an attempt to overcome the problems of thromboembolism by covering the struts with cloth and his new valve also incorporated a hallow, metalic ball of stellite.

In the present time we have different types of aortic valve :

1. Cage type either cloth covered or not, the most commonly used is the Starr-Edwards valve (see Fig. 2).
2. Tilting disc type, the most commonly used is the Bjork-Shiley. (see Fig. 3).

Inspite of multiple modifications of prosthetic valves, there are still many problems present, which are not solved. The most important is the risk of thromboembolism, inspite of the use of effective anti-coagulant therapy. All patients have to continue anti-coagulants for life, which is rather difficult in females during child-bearing period specially in young patients.

Being a foreign body it is liable to infective complications and, that is way rigid precautions have to be adopted to protect against infective endocarditis. Blood haemolysis may occur specially with para-valvular leak. The valve is not ideal for blood flow and that is way a gradient occurs across it, specially during exercise. In undeveloped countries, the cost of the valve is prohibitive, the average price is around 320 Egyptian pounds.

Fig.1 : Magovern sutureless valve
and it's applicator.

Fig.2 : Starr-Edwards aortic valve.

Fig.3 : Bjork-Shiley aortic valve.

Fig.4 : The method of mounting of heterografts on frame.

Many efforts were done to find a better alternative. Tissue valves were developed by :

Lam, Aram and Munnell (1952) inserted aortic valve homografts in the descending aorta of dogs. Subsequently, Murry (1956) put the first aortic homograft in the thoracic aorta.

Ross (1962) and Barrat-Boyes (1962) put the first successful aortic homografts in the subcoronary aortic position.

Senning (1962 - 1967) successfully used autologous unsupported fascia lata to replace the aortic cusps.

Ionescu (1971) used a mounted autogenous fascia lata, however, the follow-up of supported frame mounted fascia lata, showed that it has a tendency to thickening and shrinkage of the leaflets.

Ross (1968) was the first to use the patients own pulmonary valve as an autograft for the aortic position and replaced the donor pulmonary area with an aortic homograft.

Bient (1965) was the first to use pig aortic heterograft in the subcoronary position; the valves were

preserved in formaldehyde, however those valves had a tendency to early deterioration.

Carpentier was the first to advise the use of glutaraldehyde for valve preservation to increase its stability by forming irreversible cross linkages between collagen molecules and it reduced the antigenicity of the valve tissue.

Now heterografts, mounted on frames, preserved in glutaraldehyde, are commercially available , Hancock valve and Carpentier valve (see Fig. 4.) .

The important advantages of aortic homografts are : Their freedom from embolic complication, therefore the potentially dangerous long term anticoagulant therapy is avoided.

The flow characters are ideal and there is no obstructive effects even at high flow rate and in small aortic root, also the risk of haemolysis is advocate.

But there are still disadvantages for homografts namely : The procedure is technically more difficult and is more time consuming than insertion of a prosthesis.

Although the recent improvement in the sterelization and in the use of fresh homograft has improved the long term results and the incidence of late dysfunction is much less than the earlier series of homograft. Still the long term result is still uncertain.

Homografts are difficult to obtain in our country due to special social believes about postmortem examination.

Conclusion :

Autograft valves made from fascia lata or pericardium must be abandoned because of inadequate adaptation of the tissue to valve function.

Homografts are still in use but practical difficulties of obtaining them and the difficult surgical technique and the doubtful long term future.

Glutaraldehyde preserved frame mounted xenografts appear to have the greatest durability to date. The failure rate with glutaraldehyde preserved xenografts at 5 years is 5% mainly due to fatigue induced lesion.