Various Approaches For Mitral Valve Surgery Techniques, Indications, Advantages and Disadvantages.

An essay
Submitted for the Partial Fulfillment Of
The Master Degree in General Surgery

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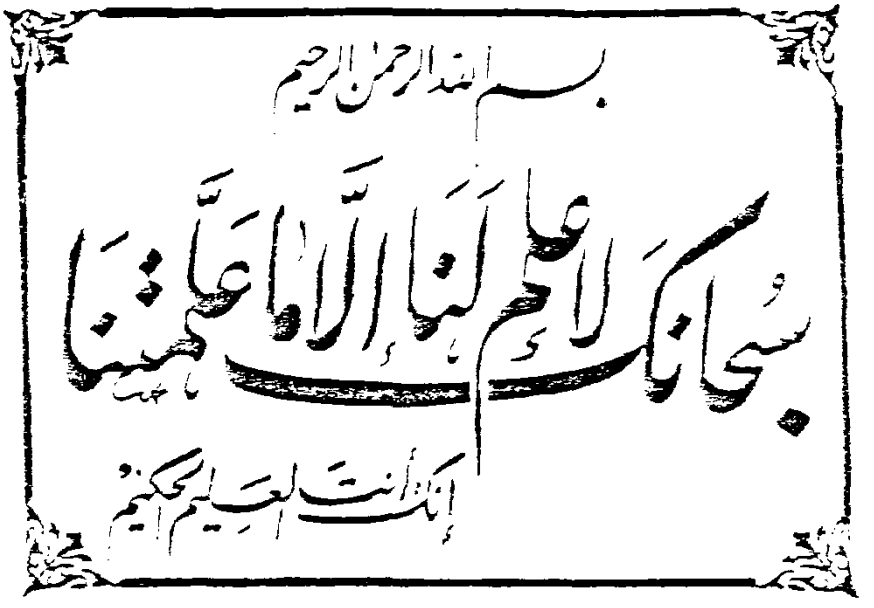

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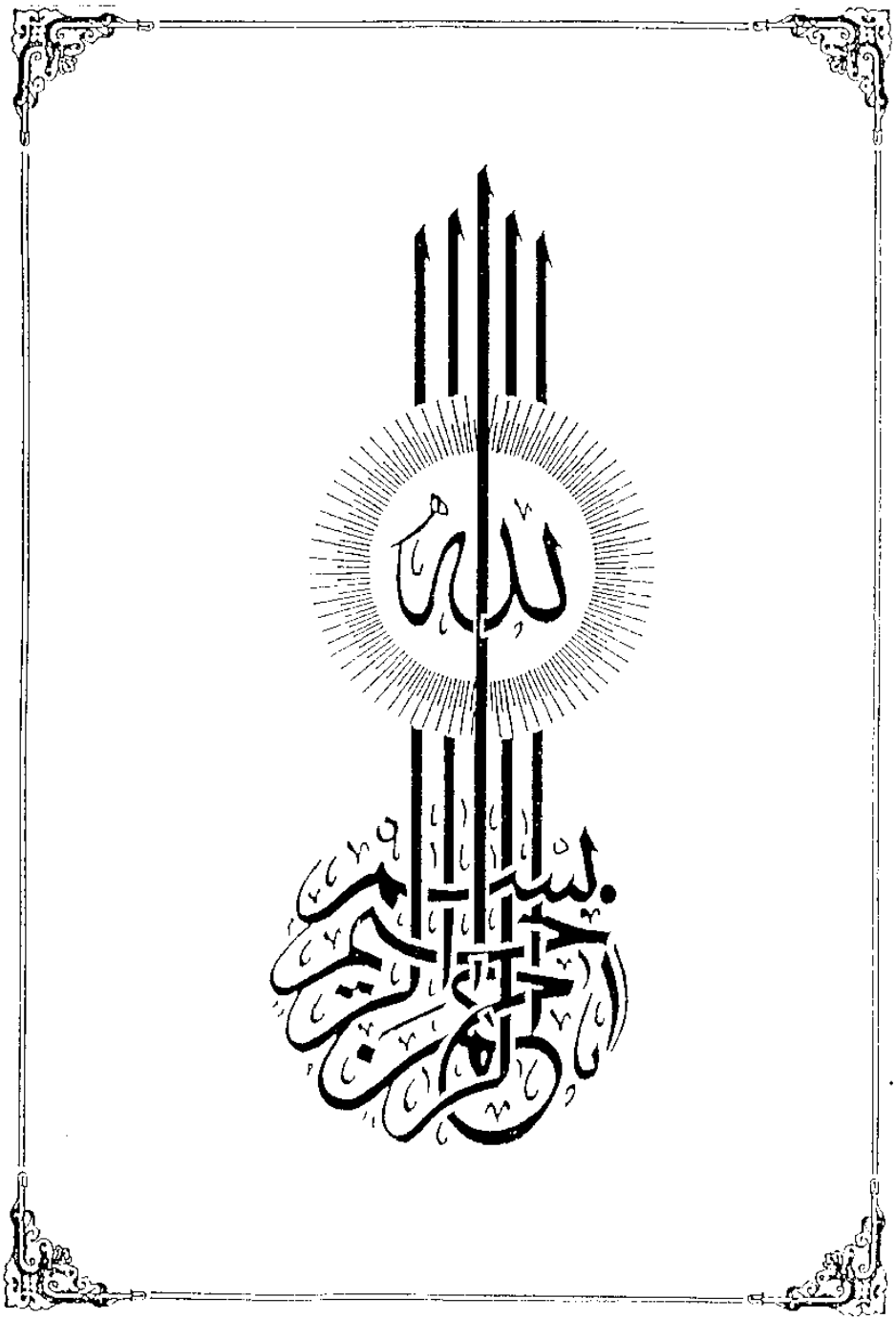

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INTRODUCTION

Complete visualization of the mitral apparatus is a pre-requisite for accurate repair or replacement of the mitral valve.

In most situations, exposure is satisfactory through an incision into the left atrium posterior and parallel to the inter atrial groove (traditional incision and exposure) **(Duran, 1991)**. While, it has never been impossible to expose the mitral valve, there have been several patients in whom mitral valve exposure was difficult with this traditional approach.

If excellent exposure of the mitral valve could always be obtained through this traditional incision, there would not be at least seven alternative approaches described in the literatures. Included among them the superior approach **(Saksena et al., 1981)**, technique that combines the superior and posterior approach **(Kyger et al., 1986)**, the trans-septal approach **(Bowman and Malam, 1965)**, often combines with lateral extension towards the right superior pulmonary vein **(McGrath et al., 1988)** and the right thoracotomy approach **(Cohn et al., 1988)**.

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Exposure of the mitral valve could be difficult under certain circumstances such as

- Small left atrium (Campanella et al., 1990).
- Dense adhesions from previous procedures or recent rheumatic activity (McGrath et al., 1988).
- Presence of a rigid aortic prothesis (Cohn et al., 1989).
- Congenital anomalies of the heart or thorax (Campanella et al., 1990).
- Atrial wall calcification (Campanella et al.,1990).
- Large left atrial thrombus (El Saegh et al., 1993).

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EMBRYOLGY

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EMBRYOLOGY OF THE MITRAL COMPLEX

In the earliest stages of the development of the embryonic heart, the cardiac tube is lined by endothelium which is widely separated from an outer myoepicardial over by a cellular fluid, the cardiac jelly.

By about 34 days, localized masses of mesenchymal cells have accumulated within the cardiac jelly and encircle the common atrioventricular canal. These masses protrude at two locations, superiorly and inferiorly, into the lumen of the embryonic heart as the superior and inferior endocardial cushions, when these endocardial cushions fuse in the midline the freely communicating chambers are then divided into a left and a right atrioventricular canal. The superior and inferior endocardial cushions, also contribute to the formation of the atrio-ventricular valves, the lower atrial septum and the membranous ventricular septum **(Van Mierop et al., 1962).**

By the seventh week of gestation, the superior and inferior endocardial cushions have fused together uniting with the interventricular and interatrial septum to divide the heart into four chambers, communicating only through the foramen ovale.

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By the eighth week, thick blunt tabs of valvular tissue arise from the fused superior and inferior endocardial cushions and from lateral aspects of the endocardial cushion providing a ring of tissue projecting into the left atrio-ventricular orifice.
This tissue is anchored on its under surface by considerable trabecular muscle to the ventricular wall. The valvular tissue then becomes more defined by absorption and under mining of the endocardial cushions. The muscular trabecular connections to the apex of the valve are transformed into fibrous tissue, the chordae tendineae. The muscular connections from the chordae tendineae to the ventricular wall remain as the papillary muscles.

The valve leaflets which at one time are almost completely muscular tissue, are invaded and replaced almost entirely by collagen **(Van Mierop et al., 1962).**

The anteromedial mitral leaflet then has a dual origin, half contributed by the superior and half by the inferior endocardial cushions. The posterolateral leaflet originates entirely from the endocardial tissue of the lateral ventricular wall. The chordae tendineae and the papillary muscles are derived from trabecular muscle which was

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originally, continuous with the entire undersurface of the valve but through considerable thinning and under cutting, eventually retain a contact only at or near the edge of the valve (**Silverman and Hurst, 1966**).

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ANATOMY

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ANATOMY OF THE MITRAL COMPLEX

Morphology of the mitral valve

The mitral valve is a complex structure consisting of five major components: leaflets, chordae tendineae, annulus, papillary muscles and posterior left atrial wall (**William et al., 1983**).

The mitral valve consists of continuous veil inserted around the entire circumference of the mitral orifice.The free edge of the veil shows several indentations, two are regularly placed and permit division of the veil into anterior and posterior leaflets, these are the anterolateral and posteromedial commissures. The ability to define the commisures with certainty came from the recognition of the unique commissural chordae tendineae that inserted into these areas.

The mitral leaflet

The mitral valve consists of two leaflets, the anterior one has a much longer basal to margin length than does the posterior leaflet, but the annular attachment of the posterior leaflet (about 6 cm) is about twice that of the anterior leaflet (about 3 cm), although the basal to margin length and the lengths of the basal attachment of each

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leaflet are quiet different, the surface area of each leaflet is virtually identical (**William et al., 1983**).

Anterior leaflet

The anterior leaflet has also called the aortic, septal or anteromedial leaflet, it has a free margin with little or no indentations, this leaflet has on its atrial surface a distinct ridge that follows the rim of the leaflet, but is 0.8 to 1.0 cm from its free margin. The ridge defines the line of leaflet closure. Distal to the ridge, There is a palpable rough zone of leaflet, tissue. During valve closure, the rough zone on the anterior leaflet comes into apposition with its counter part of the posterior leaflet, its thickness is in part related to abundant chordal insertions in the ventricular surface in this area, between the rough zone and the valve annulus, The anterior leaflet is membranous and clear, this clear zone is devoid of chordal insertions, but may on its ventricular surface shows prolongations of chordal fibres passing from their insertions in the rough zone towards the base of the leaflet. It forms an important boundary of the left ventricular outflow tract, also it has a common attachment to the cardiac skeleton of the heart with the left coronary cusp, and half of the non coronary cusp of the aortic valve (**Raganathan et al., 1970**).

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