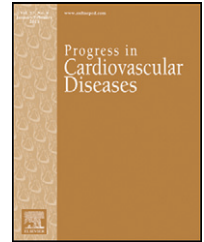


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Surgical Management of Pericardial Diseases



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ABSTRACT

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Outcomes

Disease of the pericardium represents a relatively rare indication for cardiac surgery, and there exist no widely accepted guidelines for surgical management. As such, the surgical approach to the pericardium has relied largely on institutional experience with a slow evolution based on published studies. In particular, management of pericardial constriction has varied widely from surgeon to surgeon and institution to institution, in large part due to a perception of inherent high risk to the procedure. This review covers the current practice of surgery for disease of the pericardium, with particular focus on the evolution of indications for pericardiectomy, new applications in inflammatory or relapsing pericarditis, and the progressive refinement in surgical technique and operative planning which have led to significantly improved outcomes in experienced centers.

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Contents

Surgical Anatomy and Function of the Pericardium	408
Evolution of Pericardial Surgery	409
Indications for Surgery	409
Congenital Abnormalities of the Pericardium	409
Acquired Pericardial Disease	410
Preoperative Workup	410
Operations for Pericardial Disease	411
Drainage of Pericardial Effusion	411
Inflammatory Pericarditis	412
Pericardial Constriction	412
Operative Approach	412
Conduct of the Procedure	413
Outcomes	415
Mortality	416
Perspective	416
Statement of Conflict of Interest	416
References	416

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Surgical Anatomy and Function of the Pericardium

The pericardium surrounds the heart with a thin flexible membrane, which has often been described as providing a

Abbreviations and Acronyms

CRP = C-reactive protein

CT = Computed tomography

ESR = Erythrocyte sedimentation rate

IVC = Inferior vena cava

LV = Left ventricle or ventricular

MRI = Magnetic resonance imaging

PA = Pulmonary artery

PV = Pulmonary vein

RV = Right ventricle or ventricular

SVC = Superior vena cava

“protective layer” around the heart, although this teleological explanation is debatable.¹ The pericardium is composed of multiple layers, including a serosal layer and a fibrous layer. The serosal component is composed of single layer of mesothelium that forms the parietal and visceral layers; the parietal layer lines the fibrous pericardium and together they compose the parietal pericardium. The very thin and transparent

visceral pericardium or epicardium is separated from the parietal pericardium by the pericardial space (Figure 1.) The pericardial space normally contains a small volume of fluid, < 50 mL, which functions to provide lubrication to the beating heart under normal circumstances.

The pericardium is able to accommodate to alterations in fluid volume which occur slowly over time, however, the pericardium is relatively indistensible in the short term, and thus provides a fixed volume in which an excess of fluid can rapidly lead to tamponade. With the exception of pericardial cysts and pericardial inflammation causing pain, most pericardial surgery is performed to relieve external pressure on the heart, and thus the surgical approach to the pericardium is dependent on whether the goal is drainage of fluid or removal of the pericardium itself.

The pericardium is attached to the ascending aorta immediately inferior to the innominate vein, to the superior vena cava (SVC), and reflects along the right pulmonary veins (PV). Inferiorly, the pericardium encircles the inferior vena cava (IVC), although the most posterior aspect IVC is typically loosely adherent to the pericardium. On the left side, the pericardial reflection proceeds around the main pulmonary artery (PA) and along the left PVs, with a posterior reflection in the oblique sinus. The pericardium is perfused via the pericardicophrenic arteries and veins, which travel in a fat pedicle along with the phrenic nerves. While the position of the phrenic nerves is variable, they are readily identifiable within the fatty pedicle anterior to the pulmonary hilum in both pleural spaces. External to the pericardium there are pericardial fat pads associated with the thymus superiorly, and at the junction of the pericardium and diaphragm inferiorly. These may be quite large in obese patients, and are occasionally subject to fibrosis in certain types of

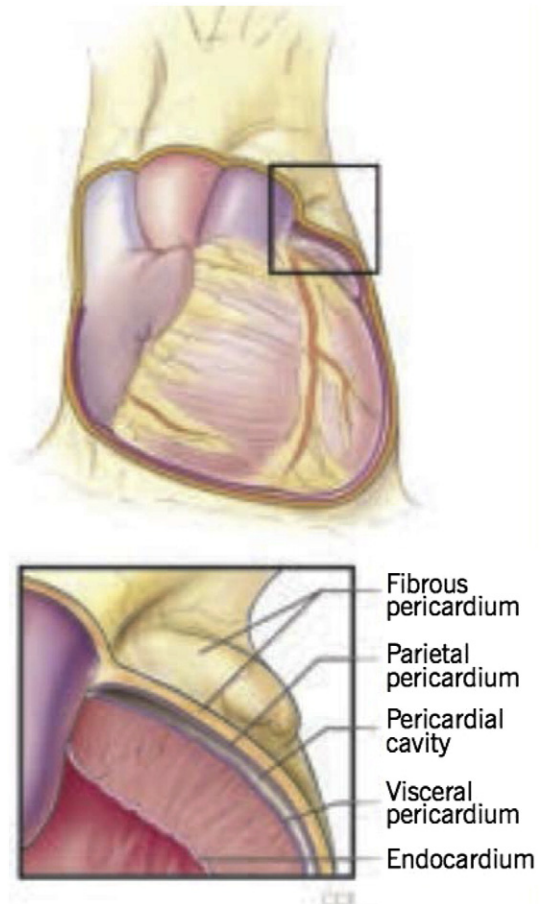


Figure 1 – The layers of the pericardium

pericardial inflammation. The posterior reflections of the pericardium and phrenic nerves represent the important anatomic landmarks for pericardial resection (Figure 2).

Evolution of Pericardial Surgery

Morgagni described pericardial constriction in 1761 as “A heart so constricted and confined that it could not receive a proper quantity of blood to pass through it.” Surgery to relieve pericardial constriction was suggested in 1828 by De Lome, and the relationship between pericardial constriction and liver dysfunction was identified as early as 1896 by Pick. However the first documented pericardial resection for constriction was performed by Rehn in 1913 via a left anterolateral thoracotomy,² and later refined by Sauerbruch. The procedure was evolved and publicized in the 1920’s in the United States most notably by Edward D Churchill at the Massachusetts General Hospital, who published a series of operations for tuberculous pericarditis also performed by a left thoracotomy.³

Most reports of clinical outcomes for pericardial surgery lack the specificity of surgical technique necessary for true

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