The entire heart is covered with a certain membranous involucrum, to which it is joined at no point. This involucrum is much more ample than the heart and is moistened by an aqueous humour. (Realdus Columbus, De Re Anatomica, 1599)

The pericardium is something of an enigma. Like the vermiform appendix, we can very well do without it, yet when it becomes diseased it can, because of its strategic position, place a stranglehold around the heart and thus threaten life itself.

The pericardium has another peculiarity: while seldom the primary seat of a systemic disease, it may be involved in almost every such disease. In some instances pericardial involvement overshadows all other features of the systemic disease, whereas in others, pericardial involvement may escape detection, unless specifically sought out. Pericardial disease is a successful mimic; for example, pericardial pain may simulate that of a thoracic catastrophe such as acute myocardial infarction, pulmonary embolus, or dissecting hematoma of the aorta. The pericardial friction rub may be a patient’s most dramatic physical sign, but it may simulate a cardiac murmur. Pulsus paradoxus seldom fails to excite the interest of physicians, but may be mistaken for pulsus alternans or arrhythmia, especially when the examiner is not suspecting cardiac tamponade. Finally, the electrocardiographic abnormalities may be alarmingly like those of ischemic heart disease.

This chapter deals with the structure of the pericardium. In a discussion of the structure of an organ, one should perhaps avoid too teleological an argument. Although Galen stated “nature has made nothing without reason,” to concede that the pericardium has specific functions does not prove that it
was designed to carry out these functions. Rather, as is so often the case in nature, the functions may come about by chance, and the pericardium may exert its influence on the heart and circulation simply because of its structure and location - a stiff membrane that closely envelops the heart, the origins of the great arteries and the terminations of the great veins. Possession of a protective membrane is not unique to the heart, since all important organs of the body are enveloped in an invaginated membrane that contains a small volume of fluid between its layers. The heart is not different in this regard, but in regard to its vulnerability to serious effects from a relatively small effusion or modest fibrosis.

1. GROSS ANATOMY

A pericardium is found in vertebrates ranging from the lower forms to humans, and it has been studied in a wide variety of animals. It is commonly stated that the human pericardium is up to three millimetres thick. Measurements from autopsy, computer assisted tomograms, magnetic resonance images and trans-oesophageal echocardiograms agree fairly closely. A recent study, however, using high resolution computerized tomography in 100 patients found that the thinnest portion of the pericardium measured 1.2 using 10 mm. slices and 0.7 using 1 mm. slices (Bull, Edwards, Dixon, 1998) (see also Chapter 6). A study using magnetic resonance imaging visualized an average pericardial length of 60 mm. The average thickness was 1.7 mm (range 1.5 - 2 mm.) (White 1995).

1.1 Layers of the pericardium

The mammalian pericardium comprises a serous membrane, composed of a single layer of mesothelial cells and a fibrous outer layer. The inner layer is intimately applied to the surface of the heart and epicardial fat, where it constitutes the visceral pericardium. It is reflected back so that it lines the inner aspect of the fibrous pericardium, together with which it forms the parietal pericardium.

1.2 Sinuses of the pericardium

A short tube-like extension encloses the origins of the aorta and pulmonary artery and is known as the arterial mesocardium. The pulmonary veins and venae cavae likewise are invested by the venous mesocardium. The oblique sinus lies behind the left atrium and within the sweep of an