Chronic Constrictive Pericarditis
(Surgical Aspects)

M. C. A. KLINKENBERGH, M.D., F.C.C.P.
Utrecht, Netherlands

Chronic constrictive pericarditis can be diagnosed in a positive and simple manner, a resection of the diseased pericardium has definitely put an end to a marked or menacing invalidity. The operation has become sufficiently safe to be recommended to patients.

Operations of the pericardium, which have inaugurated the whole science of intrathoracic surgery, have themselves later on profited by the great progress made by modern intrathoracic surgery and by the technique and forms of modern anaesthesia.

Before proceeding to the question of resection of the pericardium, the point should be raised whether the removal of the pericardium is permissible. For the pericardium has, no doubt, several important functions. In the first place it enables the heart to move smoothly by lessening frictional resistance. Next it plays a defensive part against external injuries but also against violent dilatation of the heart (in forced coughing or an explosion). But of greater importance is its aid and support of the heart's action.

It now appears quite certain that almost the whole pericardium may be removed without involving danger to life. Incidentally—in an autopsy of some people who apparently had always been in good health—complete or partial aplasia of the pericardium was found. In animals the whole pericardium has been removed without any subsequent symptoms, even in cases where the animals were subjected to severe tests of strenuous work. Nowadays it occurs regularly that the surgeon opens or removes pieces of the pericardium with impunity. This does not imply that it serves no purpose at all. Everything in the human body has its reasonable ground and the pericardium even a very special and significant one. But the loss of the pericardium may be counterbalanced and consequently the body can do without it if resection is indispensable.

**Principle of the Operation**

The principle of the operation is the removal of the cortex that encloses the myocardium—its decortication—in which the auricles

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and orifices of the veins should be treated with the utmost care.

Chronic constrictive pericarditis is an internal symphysis of the heart, characterized by the development of a progressive fibrosis which encloses the myocardium, otherwise normal, in a covering which in certain cases is calcified. This carapace implies the impossibility for the heart to dilate, so an a-diastole.

One of the fundamental points is that the cardiac muscle is practically normal in nearly every case. The myocardium is not diseased and is potentially sound, though it may be seriously atrophied by inactivity. But any muscle atrophied by inactivity may recover its strength and the cardiac muscle probably faster than a skeletal muscle. It is the scarred mantle, often reinforced by encrusting calcification, which strangles the movements of the heart, especially the diastole. This sheath, which is formed by thick cicatrix-tissue shares the properties of this tissue; the absence of elasticity (cicatrix-tissue has no elastic fibres) and the fatal cicatrix-contraction, which progresses slowly and will, in due time, compress the heart.

Just as strictures and stenoses occur in an old burn of the arm or on the intestine (after intestinal tuberculosis) there is cicatricial contraction of the heart; it is an enclosed heart under compression (chronic tamponade). It is easy to understand that pericarditis develops slowly but steadily and almost inevitably results in death, unless an operation is resorted to, since the compression and stran- gulation of the heart-movements can only be removed by direct excision of this scarred pericardium. Operation is the only treatment and it is absolutely effective if performed in time.

The operation falls into two parts: first the making of an incision in the thoracic wall to expose the heart sufficiently for the operation, and second the removal of the mantle that envelops the heart, while as a third point we want to stress the importance of postoperative care.

Opening the Chest

I. Local anaesthesia has been totally superseded by intratracheal anaesthesia since the pleura has to be opened and the operation may occupy a long period of time. Practically all the older authors started with local anaesthesia. All modern authors have adopted anaesthesia by means of a closed system with oxygen and nitrous-oxide or cyclopropane, this is combined with curare and, at discretion, attended with controlled respiration.

Also regarding the choice of access great progress has been made. We want an opening which exposes the heart from the apex to its base. Formerly, and it is still often done, many authors made a horseshoe incision, parasternal, to the left. This incision
is correct, but large and takes a long time, but what is worse; it leaves a considerable gap in the structure of the thoracic wall through which palpitations of the heart will always be visible beneath the skin; besides it is disfiguring, especially in women.

In using the new way of approach we profit by the working-methods of pulmonary surgery. This incision of 10 to 12 cm. which is rectilinear or slightly curved follows the fourth intercostal space to the left, while in the case of women we make the incision below the fold of the breast, a little lateral to the sternum; the fibres of the pectoral muscle are to be severed, the intercostal muscles are cut and the mammary artery and vein are ligated. The fourth and fifth costal cartilages are cut close to the sternum and a powerful retractor fully distends the ribs, which leaves a sufficient aperture. Nothing is removed, neither cartilage nor rib, which allows of a better reconstruction of the thorax. Median sternotomy is never used in our technique. We do not need it as we never decorticate the right auricle.

One of the outstanding developments in surgical technique is abandoning of the formerly used extrapleural way for the deliberately chosen transpleural way, which allows a more extensive removal of the diseased pericardium beyond the phrenic nerve.

II. After opening the chest and exploring the pericardium we start with the decortication, which should extend over almost two-thirds of the circumference of the heart and especially liberate the two ventricles. Without any fear of heart failure we proceed to decortication over the right ventricle, and from there we pass on to the left ventricle.

It is not necessary to liberate either the auricles or the caval or pulmonary veins. Angiocardiographic studies before and after operation showed us that the stasis of the blood in the large vessels of the base of the heart is caused by the insufficient re-refilling of the ventricles, not by constriction of the entrance of the caval veins. It has been found that even when the vena cava at its entrance had but the circumference of a lead pencil, there would be a sufficient flow of blood if the ventricles could be filled again. Heart catheterization strengthens us in this opinion. We never found a difference in blood pressure in the caval vein and in the right auricle which might be expected if it were difficult for the blood to pass into the auricle.

The apex of the heart, which may be firmly attached to the diaphragm, should in all cases be exposed, otherwise the contraction of the ventricles might be interfered with; for the heart should be in such a position that it can contract longitudinally to ensure an ideal circumvolution.

The pericardium is always to be removed in fragments, which
before their resection may serve as tractors. In case of a haemor-
rhage caused by an injury to a coronary artery or even a perfora-
tion of the heart, the wound may be covered with these pericardium
flaps. The surgeon should never forget that he operates upon an
organ that is in constant motion, and, besides, an organ that is
highly sensitive to external influences which may cause irregular
contractions, tachycardia, even fibrillations or arrest of the heart.
The more gently the operation is performed the fewer reactions
there will be. The manipulations should be performed at intervals
in order to relieve the cardiac muscle; these pauses are part of
the technique, and one ought to take into account that the relief
does not commence until the heart resumes its normal rhythm.

Nowadays the intravenously given procaine is a great help to
the surgeon when manipulating the heart. The reaction caused
by the stimulants are less severe.

III. After the operation draining is necessary, for the raw sur-
face of the myocardium and the neighbouring ribs always brings
about an abundant oozing of blood and especially of lymph. A
considerable quantity of fluid is accumulated in the precordial
space and but for the draining the heart would again be com-
pressed, but now there is not a chronic but an acute tamponade.
Therefore draining is necessary. However as external draining is
dangerous, it has been superseded by internal draining: pleuro-
pericardial.

Through the decortication of the ventricles a large commu-
nication is effected between the pericardial space and the left pleural
space. The fluid accumulates at the back in a costophrenic sinus.
The effusions can be easily observed by means of x-ray films and
the puncture can be made in the back. It often happens that some
pints of a haemorrhagic fluid have to be removed. Sometimes
patients become dyspneic and anoxic but they feel at once re-
lieved after the aspiration of the fluid. In general two or three
punctures suffice. The remainder of the fluid is absorbed by the
pleura and there are cases where a mild jaundice, caused by the
resorption, manifests itself. Naturally such a quantity of fluid
has sometimes resulted in death after a skillfully performed opera-
tion. Therefore careful postoperative observation is necessary.

It is also important to know that these patients need oxygen
very badly the first days after the operation. The oxygen may be
administered by oxygen-tent, nose mask or nose catheter. In its
need of oxygen for good functioning, the heart comes second only
to the central nervous system. According to researches by L. Binet
a muscle is able to double its function under an atmosphere of
40 to 50 per cent oxygen and recover much faster. So oxygen should
be liberally applied. As in cases of chronic pericarditis the volume
of blood increases from 30 to 40 per cent, care should be taken in administering blood, serum or salt solutions. A small quantity of blood or plasma will be sufficient to prevent postoperative shock. Nevertheless blood transfusion must sometimes be given to combat hypoprothrominemia, which is apt to arise especially in those cases where ascites brought along loss of proteins. This is even worse when several punctures of the abdomen were necessary before operation. Loss of proteins and vitamins favors complications and retards the healing of tissue.

In general the results of skillfully performed pericardectomies are among the most interesting in the field of surgery. They range from disappointment to something spectacular. The cure manifests itself in a lower pulse, an increase in diuresis, the disappearance of oedema and ascites. The results are not always immediately apparent after the operation. We may have to wait months or even a year before we can see any definite results. The operation is performed in comparatively too limited a number of clinics, which is to be explained by the fact that the disease is not properly diagnosed but often mistaken for cardiopathies or liver-cirrhosis.

SUMMARY

Interventions on the pericardium are to be included among the first intrathoracic operations. They have greatly benefited from the advances made by modern intrathoracic surgery.

Anesthesia is not effected any more by local infiltration of the walls, but by intratracheal general narcosis. The former horse-shoe shaped incision, resecting 3-4 ribs, is now rectilinear and intercostal: the deformation of the thorax is considerably reduced.

Decortication is effected on the two-thirds of the heart circumference, and only of the ventricles. As inner pleuro-pericardic drainage is made; effusions are aspired by pleural puncture. The results although satisfactory, are not always immediate.

RESUMEN

Las intervenciones sobre el pericardio deben incluirse entre las primeras operaciones intratorácicas. Estas intervenciones se han beneficiado grandemente con los adelantos de la cirugía intratorácica moderna.

La anestesia ya no se hace por infiltración local sino con anestesia general intratraqueal. La antigua incisión en herradura, resecando 3-4 costillas es ahora rectilínea e intercostal; así la deformación torácica se ha reducido considerablemente.

La decorticación se efectúa en los dos tercios de la circunferencia del corazón y solo de los ventriculos. Se hace una canalización
interna pleuro-pericárdica y los derrames son aspirados por pun-
ción pleural. Los resultados aunque son satisfactorios, no son
inmediatos.

RESUMEN

Les interventions sur le péricarde ont été parmi les premières
opérations intrathoraciques.

Actuellement, elles bénéficient des progrès de la chirurgie tho-
racique moderne. On ne fait plus l’anesthésie locale par infiltra-
tion des parois, mais l’anesthésie par intubation. L’incision que
l’on faisait autrefois en fer à cheval avec résection de trois ou
quatre côtes, est maintenant rectiligne, intercostale, et permet une
meilleure reconstitution du thorax.

La décortication est faite sur les deux tiers de la superfi
cie cardiaque, et n’intéresse que les ventricules. On fait un drainage
interne pleuro-péricardique et les épanchements sont aspirés par
ponction pleurale. Les résultats sont bons, mais ne sont pas
toujours immédiats.