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OF THE  
PERICARDIUM.

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## THE SURGERY OF THE PERICARDIUM.

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THE operative procedures that are permissible upon the pericardium are aspiration, injection of antiseptic solutions, and incision either as a diagnostic or therapeutic measure. A few years ago simple aspiration was regarded with suspicion, injection considered quite improper, and incision with the introduction of a drainage tube looked upon as too hazardous to be even mentioned. Investigation, experimentation, and clinical experience, however, have shown that these operations are not only justifiable, but are attended with brilliant results. I, therefore, desire to briefly call attention to some practical points in pericardial surgery.

In all cases of pericardial effusion that present dangerous symptoms of heart failure, aspiration should be performed as soon as it is evident that medication is not lessening the embarrassment of the central organ of circulation. It is bad practice to delay the operation until exhaustion, pulmonary engorgement and degeneration of cardiac muscle render permanent relief impossible. In nearly all instances the tendency is to wait too long, instead of operating promptly and affording immediate relief. Clinical experience has abun-

dantly shown that when the pericardial fluid is evacuated the dyspnoea, cyanosis, irregular pulse and other threatening symptoms are lessened, and usually at once. The time for operation depends less on the amount of fluid than would at first be supposed, because the sudden effusion of a moderate amount of serum will exert more pressure upon the heart than a much larger quantity poured out in so gradual a manner as to allow the pericardium to become stretched. Hence I say: "Aspirate in all cases of effusion, in which dangerous symptoms of heart embarrassment occur, as soon as medication fails, without regard to the supposed quantity of fluid."

If there coexists pleural effusion of considerable amount, the pleural sac should be aspirated first, because it is difficult to discriminate between respiratory distress due to pulmonary pressure and that resulting secondarily from interference with cardiac action. This rule applies to pleurisy of the right side as well as of the left.

When the amelioration of symptoms following pericardial aspiration is not permanent, because reaccumulation takes place, the operation should be repeated. It is better to vary the point of puncture lest, on account of adhesion of the layers of pericardium at the original point, the heart be wounded at the second tapping. Should repeated tapping be demanded I should be inclined, after the third operation, to inject some irritating fluid, such as tincture of iodine, into the sac, with the idea of producing adhesion of the two layers of the pericardium. Universal pericardial adhesion is found after cure by simple tapping, and injection has been done without preventing, or apparently interfering, with recovery. The fluid injected ought probably to be concentrated, as the object to be obtained is a pericarditis which will furnish plastic lymph instead of serum. Carbolic acid undiluted, as used in hydrocele, would be the proper

agent, were it not for the possibility that its contact with the heart walls might induce cardiac spasm.

When aspiration has shown the pericarditis to be distinctly purulent, it is almost certain that repetition of the operation will be demanded. If a second tapping is required, the introduction of a carbolized drainage tube, after a free incision has been made, strikes me as the most judicious kind of surgery. The cavity can be washed out daily with antiseptic solutions, and purulent accumulation, with its attendant dangers of pressure on the heart and septicæmia, avoided. This line of treatment has been advocated by me since 1876,<sup>1</sup> and although I am opposed by the opinion of many distinguished writers and teachers, I cannot but believe it the proper course to pursue in such cases. Empyema is known to result most favorably when so treated, pericardial fistulæ seem no more dangerous than pleural fistulæ, and pus allowed free egress from serous cavities under antiseptic precautions, is much less disastrous in its effects than when partially removed by the repeated use of the aspirator.

My opinion, which was founded on these facts, has received confirmation in the recent case reported by Rosenstein,<sup>2</sup> who, after withdrawing 620 cubic centimetres of pus by the aspirator, was compelled to repeat the operation. As the fluid again reaccumulated, an incision, about three centimetres long, was made, with antiseptic precautions, between the fourth and fifth ribs, near the left edge of the sternum, and two drainage tubes were introduced. The wound was dressed according to Lister's method. Cicatrization occurred in less than three weeks (January 30 to February 19), and there were no further pericardial troubles. Left pleuritis coexisted, which was treated also by aspiration, followed

<sup>1</sup> *New York Medical Journal*, December, 1876. See also *Paracentesis of the Pericardium*, by John B. Roberts, 8vo., Phila., 1880.

<sup>2</sup> *Berliner klinische Wochenschrift*, No. 5, January, 1881.

subsequently by incision. The patient was finally discharged cured. No better illustration of the value of the method advocated could be furnished; for not only was a pleuritic, but also a pericardial effusion, treated and cured by incision, after failure of aspiration.

Incision may be useful as a diagnostic procedure in cases where doubt exists between a large pericardial effusion and a dilated heart. The dissection down to the pericardium, if made carefully, will scarcely increase the danger if dilatation be the pathological condition, but will save life if effusion be the cause of the threatened dissolution. In Vigla's case, upon which Roux operated because effusion was suspected, incision disproved the diagnosis and showed the existence of cardiac dilatation, from which the patient died, but without reference to the operation.

In cases of foreign body in the pericardium, incision would be justifiable for the purpose of removal, even if resection of a costal cartilage was required, to give opportunity for manipulation. The time may possibly come when wounds of the heart itself will be treated by pericardial incision, to allow extraction of clots, and perhaps to suture the cardiac muscle. Autopsies have shown a considerable amount of repair going on after wounds of the heart, and life is frequently prolonged many days after the receipt of such injuries. Perhaps a less expectant treatment would give more favorable results than those usually obtained. Puncture of the heart has been repeatedly done without injurious consequences.

Dr. L. A. Sayre<sup>1</sup> has reported a case of gunshot wound of the chest, in which the laceration laid open the pericardium so that the contused heart could be seen. Recovery followed, and four years later no sign of cardiac disease was present.

<sup>1</sup> Bulletin New York Pathological Society, January and February, 1881.

The best point for aspiration of the pericardium is in the fifth interspace just above the sixth rib, about 5 or 6 centimetres ( $2-2\frac{1}{4}$  inches) to the left of the median line of the sternum. In a child it should be nearer the sternum. This point is outside of the line of the internal mammary artery, is in a wide portion of the intercostal space, corresponds with the notch in the border of the left lung, is low enough to preclude wounding auricle and high enough to avoid the diaphragm, and does not approach the point where a cartilaginous band usually joins the fifth and sixth cartilages. Both layers of the pleura will probably be pierced by the aspirating needle at this point, but this is not an important complication, and can only be avoided with anything like certainty by going close to the sternum, which is objectionable on other grounds.

The ordinary aspirating needle, or the aspirating trocar which I here exhibit, may be employed. In all cases the vacuum should be attached to the needle or trocar as soon as its point is buried beneath the skin, in order that the flow of fluid may indicate the moment when the pericardium is entered. The instrument should be, of course, clean and, I think, anointed with carbolized oil.

The aspirating trocar which I have devised for the purpose, and which I believe to be well adapted to the requirements of pericardial tapping, consists of a moderate sized aspirating needle, flattened at its upper extremity to give the surgeon a firm hold, within which slides a canula. The distal end of the canula, made flexible by a spiral, when thrust beyond the point of the needle curves downwards,

FIG. I. ASPIRATING PERICARDIAL TROCAR.



and thus prevents the point of the puncturing instrument injuring the heart when the fluid is nearly evacuated. During penetration of the thoracic wall the canula is retracted so that the flexible end is contained within the needle. The perforation at the end of the canula allows fluid to escape as soon as the pericardial sac is entered. The canula is then thrust forwards until the sharp point of the needle is guarded. This movement brings a lateral fenestra in the canula opposite a similar opening in the needle, and thus provides a second orifice for the escape of fluid in case the terminal one becomes occluded. The external end of the canula has a square shoulder to prevent rotation within the needle, and terminates in an enlargement for attachment to the tube of the aspirator. The needle, or outer canula as it may be called, is marked on the surface to show the number of centimetres concealed in the tissues. If the inner canula is suspected to be clogged with lymph-shreds or pus, it can be withdrawn without disturbing the needle; and the attachment of the pump may then be made to the latter as if it were an ordinary aspirating needle.

This instrument, in my opinion, is preferable to the ordinary aspirating needle, because, while it can be used as such, it renders abrasion of the heart impossible. It is an improvement on Fitch's dome-shaped trocar, because that has no terminal perforation to show, by escape of fluid, when the sac is entered.