Original Articles.

PERICARDITIS WITH EFFUSION.¹

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THE present paper supplements one published in the Boston City Hospital Reports of two years ago, which was based on an analysis of 100 cases of pericarditis, by taking up in more detail certain points in the diagnosis and treatment of pericardial effusion which have been especially studied in cases recently under observation. While a number of conditions may simulate a collection of fluid in the pericardium, practically the chief difficulty in diagnosis lies in its differentiation from marked cardiac enlargement, unless the case has come early under observation, and it has been possible either to watch the gradual accumulation of the fluid, or, rarely, to follow its fluctuations from day to day as illustrated by the following case, in which each relapse of the joint symptoms was accompanied by a demonstrable increase in the amount of pericardial effusion, both subsiding under increased doses of the salicylates.

CASE I. A colored boy, twenty-two years old, was admitted April 11, 1900, with a history of acute rheumatism of a month's duration, but without evidence of cardiac involvement. No murmurs were heard, but the second pulmonic sound was quite sharply accentuated. The following day friction sounds developed over the precordia. The area of cardiac dullness increased, until on the 15th it extended nearly 3 inches to the right and 4 inches to the left of the midsternal line, and above to the top of the second rib. The point of cardiac impact farthest down and to the left, which may for convenience be called the apex beat, though probably made by a portion of the heart above the true apex, was situated in the fourth space, $\frac{1}{2}$ inch inside the nipple line. An area of dullness was present in the lower left back and axilla merging anteriorly into that of the pericardium, over which the respiration was somewhat diminished and slightly bronchial, with increased voice. At the right base there was evidence of a small amount of fluid.

April 23d. The area of precordial dullness has decreased half an inch on the right side, but not on the left, and the apex can be faintly felt in the fifth space. The joints are improving.

April 29th. The apex is plainly felt in the fifth space, and apparently considerable of the pericardial fluid has been absorbed. The patient, however, is beginning to complain once more of his joints.

May 2d. Fluid has again increased and some epigastric fulness is noticeable. The cardiac sounds are more feeble and the apex beat is once more in the fourth space. There is evidence of fluid at the bases of both lungs. The joints are quite painful.

May 3d. An attempt at aspiration was made today in the fourth space, 1 inch to the right of the sternal border. Although the needle moved freely in the pericardial sac and the heart could be plainly felt against its point, no fluid was obtained.

May 10th. The width of the cardiac area has again diminished, and the apex beat has moved back to the fifth space.

May 14th. Another relapse with a rise of tem-

perature and pain and swelling in the hands and wrists. The apex beat has returned to the fourth space.

Later he gradually improved and was discharged against advice with some fluid still remaining in the sac.

Where, however, no opportunity has been given for watching the progress of the case, the extreme difficulty, or perhaps impossibility, of diagnosis is acknowledged by all writers, owing to the ambiguous character of most of the physical signs. The extension of the dullness beyond the apex beat points to the presence of pericardial effusion, although it is far from conclusive unless very marked, since it is found in cases of uncomplicated cardiac enlargement, while the lack of correspondence between the comparative strength of the radial pulse and the decided weakness of the impulse and sounds of a heart whose percussion outlines apparently show a great increase in size is also suggestive of the same condition. In spite, however, of the striking character of this increased area of dullness, its shape is still variously described. To quote but three of the numerous authors who have recently written on the subject, Roberts says that it assumes "a more or less triangular, pyramidal, or more strictly speaking, pyriform or pear-shaped outline with its truncated or 'peaked' apex above." Ewart says it resembles a bag of fluid spreading out at the base, while F. C. Shattuck describes it as simply that of "the normal heart equally extended in all directions. Therefore, of course, it is also that of a symmetrically enlarged heart, though the latter can seldom, if ever, produce so large a dull area." Both the latter have apparently given up the idea that it is ever pear shaped, while Shattuck denies the pyramidal form. This may be only a question of definition, or it may be due, as he suggests, to the method of percussion adopted, which must give a different outline according as the outer border of the pericardium or the inner limits of the lungs are sought. My experience would confirm in most details the claims of the last two, but it is more in accord with Ewart than with Shattuck. I have never been able to mark out by percussion a pear-shaped outline, perhaps, because, like Dr. Shattuck, I have always attempted, from greater confidence in the results, to define the outer border of the heart and not the limits of so-called cardiac flatness; nor have I ever obtained any outline which suggested the superposition of a smaller on a larger sphere as was found by Sibson on artificially distending the sac with a moderate amount of fluid, either by percussion or with the skiagraph, but my experience with the latter has been limited to few cases, since most of the patients have been too ill to allow their removal from the ward to the x-ray room. The outlines of these photographs lacked clearness of definition, but nevertheless were very similar to those obtained by percussion and showed a general broadening of the area of precordial dullness, especially at its lower portion, the line on the left being nearly parallel to that which is found with a normal heart, while that on the right of the sternum either flared outward toward the nipple, giving a shape which at times was so symmetrical as to fully justify its comparison to a bag of fluid, or ran parallel to the sternal border as if a part of the right side of the bag had been shaved off vertically. It has seemed to me, as Ewart and others have stated, that in connection with the increased area of cardiac dullness the most important single sign of pericardial effusion in distinction

¹ Read before the Clinical Section of the Suffolk District Medical Society, November 21, 1900.

from cardiac enlargement is the angle made by the line bounding the right side of the precordial dulness with that which marks the upper limit of hepatic flatness. In my experience, no matter how large the heart, its percussion border is always a curved line whose lower end tends to approach the sternum so that the angle made by the outlines of the enlarged heart and the liver on the chest wall is an acute one, or at least never exceeds 90°. In fact, when the cardiohepatic angle is equal to a right one the chances are in favor of pericardial effusion.

Secondary signs resulting from pressure or displacement can only be considered as corroborative evidences. The quadrilateral area of dulness in the lower left back described by Ewart was present in a number of cases, but it may also be found where there is very marked cardiac enlargement. More often it has formed a part of a larger area extending into the axilla and to the front, so that the whole lower portion of the chest has been dull with diminished and somewhat bronchial respiration, or else the presence of secondary or coincident pleural effusions has robbed the sign of its significance.

The pulsus paradoxus, which occurs in pericardial effusions as in several other conditions, was found with considerable frequency, but not always when the quantity of fluid was large, as has been stated; in a few cases it has been well marked where the amount of exudate seemed comparatively small.

An accentuation of the pulmonic second sound has been described by Warthin as the earliest sign of pericarditis and in my cases it has occurred sufficiently often to arouse one's suspicions that such a complication is developing when it is otherwise unexplained and persistent in diseases liable to cardiac accidents. Its presence has allowed me on one or two occasions to make what was a lucky, but correct, guess as to the course of future events.

In the early stages a sedative to quiet the heart and in the later a stimulant were the only medicinal measures used. No attempt to control the effusion was made, but an ice bag or a poultice was applied, if they comforted the patient or reduced the pulse rate. Blisters were never used, as their value seems doubtful and they interfere with the examination of the chest, but tincture of iodine was applied if the patient demanded treatment. The chief interest from the therapeutic standpoint lay in the decision as to when and where to aspirate. The history of my own attempts is largely a record of failure, but no harm has ever resulted and the marked relief to the patient which sometimes follows the withdrawal of a few ounces of fluid fully justifies the procedure. While in pleurisy one expects to get fluid on the introduction of the needle, experience shows that a dry tap is by no means infrequent in pericardial effusion. It was so in Dr. Shattuck's published cases, and it has been even more so in mine. In some instances, even where there was no question that a very considerable amount existed, and where the needle moved freely in all directions after its introduction and could be pushed up against the heart itself, no fluid, or at most a drachm or two, could be drawn through the needle by the aspirator. This has been explained as resulting from the presence of flocculi in the exudate or from its trabeculated or loculated nature. The site selected for puncture undoubtedly has an important bearing on the success of aspiration, but it is ques-

tionable if one position *per se* can be selected as better than another, so much depends on the position of the heart in its relation to the pericardial walls, which is not always constant. The close proximity of a friction rub even in the presence of a considerable amount of fluid has several times prevented me from using the fifth left space, the most frequently recommended, from fear of wounding the heart, and with one exception I have found it inexpedient to adopt the route suggested by Dr. Shattuck, to the left of the apex beat, since the outer limit of the pericardium has been impossible to determine, owing either to the presence of pleural fluid or to the dulness caused by compression or retraction of the left lung. Rotch, some years ago, after some experiments on the cadaver, pointed out the advantages of the fifth right space and recently Damsch has recommended either the fifth or sixth right space near the sternum, since he found in a series of similar experiments that the fluid collected in the lower right-hand portions of the pericardium. Although the fourth and fifth right spaces have been the ones more often selected in my cases, as the danger of wounding the heart seems smallest there, the proportion of productive taps has not been particularly encouraging.

The following cases, with the one reported at the beginning of this paper, comprise my whole experience in paracentesis of the pericardium. Cases IV and V have already been reported elsewhere and are given only in outline.

CASE II. H. R., colored, male, twenty-three years old, entered the Massachusetts Hospital, during my term as house physician, in the service of Dr. W. L. Richardson, to whom I am indebted for the privilege of reporting it, October 11, 1884, suffering from tuberculosis of the lungs and bowels. His chief complaint was of pain near the ensiform cartilage on drawing a long breath. Fluid gradually collected in the pericardium until almost the entire front of the chest, from the second rib downward, was dull on percussion. The abdomen became distended, particularly over its upper portion, which was dull on percussion and gave an indistinct sense of fluctuation. This local distention of the abdomen became so marked a feature of the case that on October 24th a needle was thrust into the right side of the epigastrium, well below the costal border, and $1\frac{1}{2}$ ounces of bloody fluid, slightly tinged with yellow and containing numerous red cells and leucocytes, was obtained. Four days later an attempt at aspiration was made through the upper belly of the right rectus muscle not far from the spot previously selected, but without result. On the left side, however, 3 or 4 ounces of bloody fluid were drawn off. He failed gradually and died November 2d. At the autopsy, which is reported from memory, as the records have unfortunately disappeared, almost the whole front of the chest was occupied by the distended pericardium, which had displaced the diaphragm and with it the liver and other abdominal organs, and was the cause of the tumor noticed in the epigastrium and upper abdomen. Over 2 quarts of bloody fluid were contained in the sac.

CASE III. M. N., male, twenty-four years old, admitted to the City Hospital, December 22, 1896, with acute rheumatism and a well-marked pericardial friction rub. The second sound at the base was very loud. Fluid gradually collected in the pericardium and also in both pleural cavities, so that on January

3d the precordial distress and dyspnea were very marked. An aspirating needle was introduced in the fourth space, a little to the left of the left edge of sternum. It moved freely in all directions, and the heart could be felt beating against it, but no fluid was obtained. Twenty-four ounces of serum were drawn from the right chest with relief. He slowly improved and was discharged "relieved" March 23d.

CASE IV. S. B., male, twenty-three years old, admitted June 19, 1897, with acute rheumatism. He later developed a pneumonia of the left lower lobe and a pleurisy with a small effusion in the right base. Fluid also gradually collected in the pericardial sac. The pulse varied between 110 and 120, and the respirations between 40 and 56. A needle introduced in the fourth right interspace, 1 inch from the sternal border, drew off 10 ounces of bloody fluid containing pneumococci. Improvement slowly followed, and he was discharged September 14th.

CASE V. J. D., male, twenty-five years old, was admitted August 3, 1898, with mediastinal and pulmonary sarcoma. Fluid was present in both pleural cavities and in the pericardium. The following day 16 ounces of bloody serum were withdrawn from the left back, with marked improvement in the physical signs above the angle of the scapula. On the 5th an attempt was made to relieve the pericardium by inserting a needle in the sixth left space a little outside the mammillary line. Thirty-eight ounces of bloody fluid flowed out in vigorous jets synchronous with the heart, while a distinct pulsating movement was imparted to the needle itself. So much relief followed that at the request of the patient a further attempt was made on the following day in the fifth left space just outside the nipple line, but nothing was obtained. The sixth space was then tried in the same position as before, but the result was negative. At the autopsy, which occurred less than two weeks later, the left pleura, from which fluid had been withdrawn, was completely obliterated, and so was the pericardial sac with the exception of a few small pockets.

CASE VI. T. M., male, thirty-eight years old. Markedly alcoholic. Admitted November 20, 1899, with a history of rheumatism of three weeks' duration. He was slightly delirious, and little reliance could be placed on his statements. The area of cardiac dullness was somewhat increased. The apex was in the fifth space, $\frac{1}{2}$ inch outside the nipple line. A soft systolic murmur was heard both at the apex and over the aortic area. The second pulmonic sound was accentuated. On the 24th his delirium increased, and on the 28th he grew very hoarse. On December 2d a little consolidation was noted at the base of the right lung. The heart sounds had become distant and feeble and the area of cardiac dullness extended to within an inch of the nipple line on the right, and on the left to just outside that line. A friction rub had been present for one day over the fourth left cartilage. Two days later the cardiac area extended on the right almost to the nipple, and on the left $1\frac{1}{2}$ inches outside it. His respirations and pulse were rising and he was evidently losing ground. A needle introduced in the fifth right space obtained 3 drachms of flocculent fluid. Further attempts at aspiration were made on succeeding days by introducing the needle in the fifth left space, $1\frac{1}{2}$ inches outside the nipple and twice again in the

fourth space. Although the tip of the needle in each instance moved freely as though in a cavity, the results were negative. He gradually failed, and death occurred on the 15th, to which his alcoholic excesses largely contributed.

To summarize these attempts: The fourth right space was used four times with one successful result; the fourth left space once, without result; the fifth left space, outside the apex, was no more successful on the one occasion it was used, but from the fifth right space 3 drachms of fluid were obtained. From the sixth left space just outside the nipple line, the largest amount, 38 ounces, was withdrawn, but owing to the equivocal nature of the physical signs it cannot be said with absolute certainty that it did not come from the pleura. The autopsy failed to throw light on this point. The fact that the fluid was twice obtained in one case below the margin of the ribs is a medical curiosity, and instructive as showing the amount of displacement which occurs with large effusions.

CASES OF ACUTE ORAL INFLAMMATION.¹

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A SEARCH of the records of the Boston City Hospital of cases of stomatitis, glossitis and Ludwig's angina, severe enough to be treated in the surgical wards, has been made in the attempt to secure a clinical picture of these distressing and serious diseases. No account has been made of the lighter forms treated in the out-patient departments. Too few cases have appeared in recent years to give data as to the bacteriology of these affections. In the few cases examined the streptococci and staphylococci were the predominating agents.

Ulcerative stomatitis.—Of 29 cases, 6 were of the gangrenous type, but the distinction between the ulcerative and the gangrenous case is often difficult, the former so easily advances to the latter, and undoubtedly some of the ulcerative cases were rapidly becoming gangrenous until checked by good care and treatment. The lighter cases exhibited more or less superficial ulcerations of the gums, cheeks, tongue or pharynx, singly or collectively, and probably diphtheria was the true condition in some of the earlier cases. In many there appeared to be no recognizable cause, while others started presumably from carious teeth, a glossitis or from burns of liquids. One case of recovery showed ulceration of the entire oral cavity; another had a deep, foul, indurated slough of the cheek that was prevented from perforating by treatment with poultices, washes, etc.; still another had severe swelling of the palate that required incision, but without showing the presence of pus.

In the recovery cases, main reliance was placed upon washes containing myrrh, chlorate of potash, permanganate of potash or hydrogen peroxide, in addition to vigorous supporting and stimulating diet. One child four years old, where the noma perforated the cheek, recovered under this treatment. The process never advanced rapidly enough to warrant surgical interference.

One fatal case is interesting in that the process originated in a tubercular glossitis that could not be

¹ Contributed to the Boston City Hospital Reports, Eleventh Series.