

a clear, definite diagnosis when other signs were doubtful. This has most frequently occurred with cancers in the *median* part of the stomach, in which the stomach emptied rapidly. The most common latent cases were cancers developing on an old ulcer, or anacid cases called senile, catarrh or achylia, or patients with syphilis. We must admit that the value of the diagnosis to the patients was limited by the fact that all our latent cases were well developed when discovered, and resection was only possible in one instance.

X-ray evidence has been valuable in helping to rule out cancer in a long list of suspicious cases. In no case where a *normal picture* of the stomach was found, has cancer been proved to exist. In our whole group of cases we may say that either *no cancer* or *well developed cancer* was usually found. We believe this occurred because most cases did not come for examination in the "incubation" period.

X-ray evidence has its limitations. After all examinations a doubtful group remained, about twice as large as the group of latent cases discovered. These were cases of disease at the cardia or where the diagnosis lay between cancer and ulcer or syphilis.

A few mistakes were made in our anxiety to make an early diagnosis in suspicious cases; we overstepped the mark three times and diagnosed cancer where it was absent. We must recognize the limitations of the method and occasionally leave the diagnosis doubtful and have the patient explored.

In spite of these limitations and errors the x-ray evidence had distinctly improved our diagnosis. In 34 operated cases, the correct diagnosis before x-ray examination was 83%, after x-ray 89%. It is almost needless to say that we have studied the x-ray findings in connection with the other clinical data and have not attempted to build a diagnosis on x-ray data alone. This addition of the x-ray method to our other examinations gives an accuracy and completeness to our diagnosis impossible with either alone.

In addition to aiding in diagnosis, the x-ray evidence has definitely located the cancer, shown its size and extent, and helped decide about operability. It may show that a cancer with marked symptoms is small and mobile and ideal for operation.

In short, the x-ray evidence has been a help in discovering and localizing latent cancer and an equal help in ruling out cancer. Our known mistakes have been few, and the group of doubtful cases rather small, and it seems reasonable to expect that with better technic and greater experience, less mistakes will occur and less cases remain doubtful, and with more early and frequent x-ray examination of patients of cancer age, that early diagnosis will be more frequently made, and latent cases discovered earlier, so that radical operation will be possible.

TRAUMATIC ENDOCARDITIS.

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THE situation of the heart between the sternum and the spine, exposes it to severe injuries from blows on the chest, especially in the young, whose chest walls are very yielding. The heart is compressed between the sternum and the vertebrae.

The severer lesions caused by external violence, as rupture of heart or pericardium, rupture or tearing of valves, give rise to symptoms which are recognized very soon or immediately after the accident and are generally fatal at once or after a comparatively short time. They are easily diagnosed, and reports of many such cases are found in medical literature.

Less severe injuries may give rise to slight lacerations of the cardiac muscles or to ecchymoses into its substance or just beneath the endocardium which cause only temporary inconvenience, the symptoms thus produced soon disappearing. These slighter injuries may, however, give rise to changes in the valves which develop slowly and can be recognized only after the lapse of a longer or shorter time. These slight injuries have often been overlooked or entirely ignored as causes of valvular disease, the cardiac changes being ascribed to other causes.

Several cases have been reported in which the early cardiac symptoms have been absent or of short duration and have seemed insignificant. After an interval of apparently restored health, valvular changes have developed, with their usual consequences.

M. L. Rembaud¹ says that in certain cases traumatism can be the true determining cause of a cardiac affection.

In cases of endocarditis, vegetative hemorrhages; in chronic cases, cicatrices and valvular sclerosis are found, also hypertrophy of the heart.

Immediate signs of endo-myopericarditis may be wanting, yet there is generally precordial pain, dyspnea, palpitation. Then at the end of some days, sometimes months and more, the usual symptoms of pericarditis, of a myocarditis, or of an endocarditis are developed,—mitral 12 times, aortic 7 times.

The course of pericarditis is generally rather acute. Myocarditis has a chronic course, and often ends in death several years after the injury. Endocarditis may be acute and cause death in some days. Generally it is chronic from the beginning, and the injured, who has been able to return to his work, complains some time after of symptoms of cardiac insufficiency; examination shows valvular lesion.

Richard Bernstein² collected and analyzed 126 cases. He found that the cardiac symptoms appeared immediately after the accident in 85 cases, 67.6%; after an interval of one month, 22 cases, 17.5%; after interval of one year, 6

cases, 4.7%; after interval of more than one year, 9 cases, 7.1%; time not mentioned, 4 cases, 3.1%.

Bernstein reports two cases. One was a man fifty years old, who fell backwards down stairs. For eight days he passed bloody urine in varying quantities. After five weeks he had pain in the cardiac region,—dyspnea. Eight months after there was diastolic murmur at the base. At night attacks of angina pectoris. Aortic insufficiency.

Another case he reports is that of a laborer twenty years old, who fell from a tree, landing on his neck and feet. No other accident. He had attacks of sense of pressure and suffocation. There was insufficiency of the aortic valve.

A laborer, fifty-seven years old, fell upon his chest. No external injury. Cardiac symptoms were at once noticed. Six years later there was aortic stenosis.

E. Barié³ reports several cases, two of which are as follows:—

CASE 16. A man 44 years of age was hit in the precordial region. After a short time he was able to resume work. Not until after two years did he begin to feel the first functional trouble, epigastria, palpitation, slight sensation of suffocation. Fourteen years after the accident there was considerable hypertrophy of the left side; a strong shock was felt at the moment of systole. A diastolic murmur was heard at the base; a double murmur was heard in the crural arteries.

His Case 17 was that of a man who leaped from a wall twelve feet high, fell, striking the ground with his chest. No appreciable alteration of his health for four years; then he began to expectorate blood. There was insufficiency of the aortic valve eleven years after the accident.

A. Herzfeld⁴ reports a case in which the cardiac symptoms were present immediately after the accident. At the close of his paper he says: "Traumatic endocarditis frequently develops slowly and insidiously, so that we may speak of a latent period or a period of incubation. The patient may suffer little during this period, and, therefore, does not seek advice until new complications arise. In this way it may happen that a traumatic endocarditis, although of longer standing, may not be detected until some time after the injury. The latent period, or period of incubation, may last weeks, months or even years."

Dr. Ritter⁵ reports a case of injury by a severe blow on the chest with fracture of the sternum. No elevation of temperature nor increase in frequency of pulse. After five weeks he left the hospital, nothing abnormal in heart or lungs. Four months and a half later there was a presystolic murmur, clearest at pit of the stomach. Stenosis of mitral valve.

Ulrich Luckinger⁶ reports a case where the patient fell from a load of hay. There was no evidence of fracture of rib or sternum nor injury of any thoracic organs. Subjective symptoms were absent. Until the fourth day all went well, then there was palpitation, difficult breathing; there was increased cardiac impulse, a small weak pulse, sys-

tolic and diastolic murmur at apex, and pericardial friction. There was also friction of the pleura. Here was myocarditis, pericarditis and pleurisy, beginning three or four days after the injury. He thinks the endocardium was primarily affected, the inflammation extending to the pericardium and pleura.

J. C. Wilson⁷ of Philadelphia reports a case where for four months no cardiac symptoms showed after a fall. A man, aet. 36, known to have had no heart disease previously to the accident, received a violent blow on the chest. There was no fracture of ribs; there was abundant hemoptysis. In two or three days he recovered from the immediate effects of the accident. Four months later he had inconstant pain just before attack of blood spitting, a more or less constant sense of weight in lower part of the left posterior lateral region of the chest, no dyspnea, no palpitation, respiratory murmur was normal, no râles. Pulse small, regular, 80-86. Temperature 98. Blood pressure: systolic, 125; diastolic, 80. There was a loud presystolic murmur and thrill in the mitral area and to right. No sign of aneurysm nor of pericarditis. Urine normal.

Heidenhain⁸ reports the case of a sailor who worked on a dredger. In the middle of May he was struck by the winch when something broke in weighing the anchor. He received a severe blow in the breast. He had severe pain in the breast and was not able to engage in severe labor, but continued to work. By the end of June he had to give up work. In November there was enlargement of the heart, a strong systolic murmur and a slight diastolic murmur. The diagnosis was stenosis and slight insufficiency of the aortic valve, insufficiency and slight stenosis of the mitral. The mitral insufficiency is probably a relative; the stenosis of the mitral is so insignificant that clinically it is entirely in the background. The aortic stenosis is much the more important. Marked dilatation and hypertrophy of the left, slight of the right ventricle.

Barney Yeo⁹ reports a case where a man fell down a flight of nine stone steps. He took no notice of the accident at the time, but three weeks after a loud murmur had developed. After two years and a half he died. At autopsy his heart was found greatly hypertrophied; the right anterior and posterior segments of the aortic valve were separated from the wall of the aorta for a distance of a quarter of an inch.

Ernst Romberg¹⁰: "The significance of accidents remains somewhat uncertain in the apparently largest number of cases in which the patients suffer a contusion of the chest wall, a severe shaking up of the whole body, and gradually a chronic heart disease is developed. The discomforts or affections begin oftentimes not immediately after the accident but some days or some weeks later. They appear first when the patient has imagined himself somewhat better. Sometimes there comes at first only subjective discomforts of the heart, strong palpitation. The objective examination of the heart gives at first no abnormal condition. One is inclined to refer the symptom to traumatic neurasthenia or hysteria. Then appear, gradually, coming ever more strongly to notice, the signs of valvular affection,—very often in these cases a mitral or

aortic stenosis or the symptoms of a chronic insufficiency. It may be months before the symptoms come to a complete development, and the further course differs in no way from the ordinary affections of this nature."

If one can follow the development of the cardiac affection from the accident, a clearly accidental coincidence of the beginning of the heart disease is scarcely to be accepted, and it is to be noted as most probable that the traumatism, the contusion, the concussion is answerable for the development of the cardiac affection.

C. Nelaton¹¹ states that small tears may occur involving only the free border of one of the sigmoid segments. These borders become thickened, rough, calcareous, and leave slight fissures between, rendering the valves insufficient. There exist constantly around the ruptures, vegetations and roughness, which may extend to the mitral and cause insufficiency there. The cardiac muscles, often healthy, may be diseased.

The following case is of interest as being one in which there were slight cardiac symptoms immediately after the accident, which disappeared, and for a time, not determined by the history, the patient was free from any prominent cardiac symptoms. After an interval, not determined by the history, there were symptoms due to commencing valvular disease. He could not run so long as before the accident, could not do heavy work. Three and a half years after the accident serious cardiac lesions were found.

At no time in his life, either before or after the accident, did he have any affection which could give rise to valvular disease. He never had any illness, rheumatism, any eruptive or other fever, never syphilis nor gonorrhea, never any other accident.

J. G. Aet. 16, a well developed, rather large and strong boy, was riding about 9 p.m. in a wagon with his brother, on Dec. 24, 1908. The streets were icy and snowy. They were on the electric car track in East Boston, near the Chelsea bridge, going towards Chelsea. A car struck the rear of their wagon, lifted it, turned it over and around, clear of the other track, throwing the horse down. J. G. was thrown across the street; a man passing found him lying with the left side of his chest on the curb stone, his right chest projecting over the gutter. He was picked up, taken to the Relief Hospital in East Boston, arm bandaged and later was sent home. He was unconscious for about half an hour. He was scratched and bruised on the left side, dirt was ground into left arm and leg, black and blue on the upper part of his left arm and shoulder. His head, shoulder and back pained him; he could not lie on his left side; he had dizzy and fainting spells often,—during the first week three or four times a day; these continued for six weeks. At first the pain was so severe he was faint and had cold sweats. His breathing was smothered-like for five or six weeks; he seemed to choke up in his back and chest in the region of his heart. When he had hard spells of breathing his face would flush,—become dark red. He did not spit blood.

He could give only an imperfect account of his

own condition. Most of the preceding was obtained from his mother.

About ten days after the accident he was taken to the Massachusetts General Hospital. An x-ray of his left shoulder showed a separation of the upper epiphyses of the humerus.

I saw him Feb. 9, 1909. Then he complained mostly of his back and left arm. His head was pretty well. Once in a while he had pain at the back and on the left side, then he was dizzy. When he lay on his left side at night there was pain in the middle of his upper arm and his left hand went to sleep; there was some difficulty in using his left hand. He complained chiefly of his back and that he could not carry weight on account of pain there.

On examination it was found that the motion of the left arm was restricted at the shoulder; there was tenderness above the left clavicle over the nerves of the cervical plexus and somewhat in the axilla. There was no tenderness over the nerves in the arm. The sixth to the eighth dorsal spinous processes were somewhat tender and stooping forward caused pain there. Heart sounds and area of dullness were normal.

He was not seen again until Sept. 5, 1912. He was then working at teaming. He was a tall, fleshy strong-looking man. He could not lift heavy weights alone. If he tried he had pain across lower dorsal region. He could run only about half as long as before the accident; if he continued running he got out of breath. He could not do as heavy work.

There was a strong systolic souffle over the whole cardiac region, loudest at the edge of the sternum opposite the fourth rib; a very slight souffle at beginning of diastole. The impulse was felt at the seventh intercostal space about half an inch to right of the left nipple; the dullness extended to half an inch to left of the left nipple. He had been walking some distance just before I saw him. After sitting quietly for some time the sounds were much lower, but on exercising they became louder and the pulse went from 78 to 114. There was a very slight edema of the legs. When the murmur was loudest it could be heard at times over the left carotid.

When he had to work hard he said he was out of breath much more than before the accident, and the work made his heart beat more.

Since I first saw him in 1909 he had had no illness. Urine was acid, sp. gr. 1022, no casts, some epithelial cells, some urate crystals.

He sat habitually with his left hand on the upper part of his thigh, his arm raised at his side and a little forward, forearm nearly perpendicular.

I saw him on Jan. 9 and 19, 1913, on June 10, 1913, and once or twice since. On June 10 I saw him with Dr. W. H. Robey. The opportunity to examine the heart then was in some respects better. I found then that the murmurs were clearest over the aorta and the mitral, and much less distinct between these two points.

An explanation of the development of endocarditis some time after an injury may be found in those cases of injury causing early death from lesions other than cardiac where at the autopsy slight lesions of endocardium or myocardium were found to have been the origin of commencing inflammatory changes.

J. Riedinger¹² mentions as one of the lighter

affections small ecchymoses within the heart. He says little notice has been taken of the hemorrhages, but they deserve notice since they may not be absorbed and may cause changes in the valves similar in appearance and effect to valvular changes from other causes. They can occur without severe immediate disturbance.

He reports the case of a woman 54 years old, who fell from the third story into the street. Died three days after. Fracture of lumbar vertebrae, of occiput. On the aortic valve was a thin exudation. The valve and its vicinity were infiltrated and colored by the blood. On the mitral the insertion points of the cordae tendinae were considerably swollen. Under the endocardium were many small hemorrhages. Small collections of blood in the valves. In the endocardium were separate spots of inflammatory infiltration.

J. L. Casper¹³ reports the following case:—

A bag of corn fell on a man, aet. 66. Fracture of right thigh, which was amputated. Complete transverse fracture of third dorsal vertebra. He died eight days after the injury. On right side of pericardium an ecchymosis size of a half crown and in left wall of heart itself running from the auricle to the ventricle an ecchymotic stain two inches long and a quarter of an inch wide. Here, therefore, there had been a true and most singular concussion of the heart.

These slight superficial lesions may become the seat of valvular changes giving rise to stenosis or insufficiency, the symptoms not becoming evident for several weeks or months after apparent recovery.

J. G., having never been ill, having had no previous accident, was thrown with considerable violence from his wagon, striking on the curbstone with his left side. Immediately after he had symptoms indicating irregular or imperfect action of his heart. About seven weeks later the heart, on examination, did not show the slightest indication of any valvular affection. After an interval not determined by the history signs of a cardiac affection developed; there was an inability to run as well as before the accident, and inability to do as hard work without getting out of breath and having unusual acceleration of the heart's action. When these were first noticed was not learned though they had been present some time before he was seen in 1912, at which time there was well marked valvular disease, the aortic and mitral valves both being affected.

There was a slight injury to the heart by the accident; the earlier symptoms were of only moderate duration. Later endocarditis developed, but compensation was sufficient so that he could meet all the ordinary demands of life. The valvular lesions when first recognized in 1912 must have been in existence many months. It is not unreasonable to believe that the changes began immediately after the accident and progressed steadily to the stage when I first noticed the murmurs.

It is very unlikely that there was rupture of any of the valvular structures or of any of the cordae tendinae. There was an endocarditis due to the injury of the heart on Dec. 24, 1908, and the changes in the valves were due to that.

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INTRASPINOUS USE OF SALVAR-SANIZED SERUM.

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WITH the administration of mercury, iodides, and salvarsan intravenously, most cases of cerebrospinal lues and of tabes dorsalis can be relieved of many of the clinical signs and symptoms, but the changes occurring in the cerebrospinal fluid are evidences of active syphilis of the central nervous system, and no treatment can be considered adequate which does not result in the permanent disappearance of these abnormalities.

For this reason Swift and Ellis have developed a method whereby salvarsan can be directly introduced into the cerebrospinal canal, and thus aid in the eradication of the spirochaetae from the central nervous system.

The technic is as follows: "One hour after the intravenous injection of salvarsan, 40 cc. of blood is withdrawn directly into bottle-shaped centrifuge tubes, allowed to coagulate, after which it is centrifugalized. The following day 12 cc. of serum is pipetted off and diluted with 18 cc. of normal saline. This 40% serum is then heated at 56 C. for one-half hour. After lumbar puncture, the cerebrospinal fluid is withdrawn until the pressure is reduced to 30 mm. cerebrospinal fluid pressure. The barrel of a 20 cc. Luer syringe (which has a capacity of about 30 cc.) is connected to the needle by means of a rubber tube about 40 cm. long. The tubing is then allowed to fill with cerebrospinal fluid so that no air will be injected. The serum is then poured into the syringe and allowed to flow slowly into the subarachnoid space by means of gravity. At times it is necessary to