HEKTOEN (L.)

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RUPTURE OF THE AORTIC VALVES WITH DEMONSTRATION OF SPECIMEN. ANEURISMS OF RIGHT AURICULAR APPENDIX.*

BY LUDVIG HEKTOEN, M.D.,

CHICAGO.

THE following case is reported because it illustrates excellently the origin of valvular heart disease from the rupture of some part of the healthy valvular structures during sudden and violent physical exertion. The clinical history as well as the post-mortem examination show that the healing of the rupture resulted in valvular insufficiency and all the serious consequences characteristic of disturbances in the circulatory mechanism, and this to a very marked extent.

G. R. H. male, age 27. Married, has one child; brakeman on passenger train. Came under my observation Jan. 31, 1892, complaining of an ordinary "cold on the chest." The physical examination showed at once aggravated valvular heart disease, and by questioning, the following facts were learned:

The patient is an intelligent and quick-witted young man; up to Feb. 1891, he enjoyed extraordinary good health, never quitting his work on account of sickness, and he had remained for seven consecutive years in various capacities, in connection with the practical running of railway trains. His family history is good. He used to drink some previous to his marriage, two years ago, but since then his conduct has been quite exemplary. His wife has borne one healthy child and has had no miscarriages. Previous to Feb. 1891, he could run, do heavy work, and exert himself physically in every conceivable way without noticing any ill effects whatever. One day in Feb. 1891 while running as baggage master on a passenger train, and while he was engaged in the very act of lifting a trunk, which he estimates weighed 125 pounds, the train, running at the rate of twenty miles an hour, struck a curve suddenly and he was thrown backward, falling supine on the floor of the car, dropping the trunk he had in his arms. He involuntarily exerted every muscle in his body to prevent the fall, and, while falling, in spite of his efforts, he experienced a sensation of being stabbed in the region of the heart, and he also claims that he heard something snap in his chest; the stabbing pain lasted three or four minutes; he kept on working and noticed nothing wrong for three

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presented by the author

or four days, then his attention was called to a rumbling or rustling noise, loud enough to be heard distinctly, coming from the region of the heart, occurring synchronously with the beats of the heart; this peculiar noise increased in intensity, could be heard all over an ordinary room and resembled the fitful rustling of a gentle wind through the leaves of trees in autumn; the pulse could be felt beating all over his body—if he placed his hand on his head, on his shoulder, on his thigh, he always felt the beating of the pulse. He felt unable to do anything and consulted a neighboring doctor who told him he had an aneurism of the aorta and explained the production of the peculiar sound as due to that condition. He improved a little, but soon he noticed that he got out of breath very easily; that the noise had gradually disappeared, but there was pain in his chest and palpitation of the heart. He had to give up his work as baggage master and owing to an indulgent conductor, he has been permitted to act as brakeman on a passenger train, his work being made very easy for him. He applied for money from the accident insurance department managed by the company, but it was refused him because the alleged injury left no external marks and because he was not laid up at once. Lately the shortness of breath, the pain, and the palpitation have all increased, he has fallen off in weight and, during the last two weeks, there has appeared a constant, teasing cough which gives him no peace night or day.

Physical Examination Jan. 31, 1892. Weight 135 pounds; height 5 feet 7 inches; rather thin but well developed. Respiration is labored, thirty to the minute, often interrupted by short cough. Face is a little cyanotic; there is no swelling of the legs. The pulse is quick. Pulsation is seen in epigastrium and in 6th and 7th spaces in the left anterior axillary line. The pulsation is diffuse and lifting; pulsation is also seen in the neck and in the crural regions. There are no abnormal areas of dullness on percussion over the lungs. The area of cardiac dullness is bounded by the right sternal margin, by the 3d interspace to a point one inch from the left sternal border, and by a line from the last point to the 7th interspace in the left anterior axillary line $3\frac{1}{2}$ inches from the edge of the sternum. Over the base of the heart is heard a rather rough diastolic murmur, heard best at the left border of the breast bone; at the apex is heard a diffuse, systolic murmur, over the carotid, the subclavian, the brachial, the femoral vessels is also heard a distinct murmur. There was nothing abnormal found in the abdominal cavity and the urine was not examined.

The history of the case, the great probability that the patient was free from heart disease previous to the accident, the occurrence of the sharp pain and the feeling of something tearing away in the chest as he was falling, the development of a loud, noisy murmur soon afterward, with other symptoms of heart disturbance, and the result of the physical examination which has been detailed, made only one diagnosis possible, namely, rupture of a healthy valve, most likely one of the aortic, causing aortic insufficiency which became permanent after healing ensued and resulted in a secondary hypertrophy and dilatation of the left ventricle. It was concluded to present the patient to

this Society at its February meeting, but owing to a misunderstanding this did not occur, and in a few days the patient becoming steadily worse in spite of treatment, went into the County Hospital. Here exacerbation continued and he became anasarcous and ascitic; knowing that death was near he asked to be taken home which was done March 1st. The following night he died rather suddenly in the arms of his wife.

On March 2nd, about twelve hours after death, a hurried post-

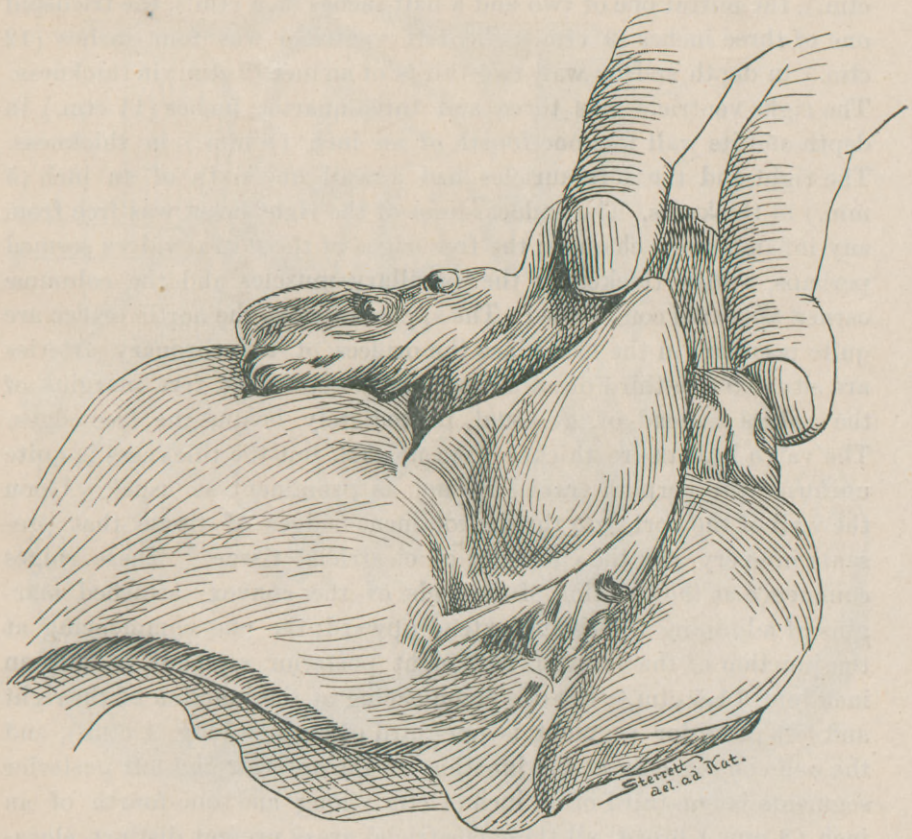

FIG 1.—SACCULAR ANEURISMAL DILATATIONS IN UPPER MARGIN OF RIGHT AURICULAR APPENDIX.

mortem examination was made, the relatives only permitting the heart to be examined. The surface of the body was livid and as the usual incisions were made, all subcutaneous veins were dilated and full of dark red blood. There was moderate anasarca, ascites, hydropericardium, and double hydro-thorax. The right side of the heart contained an immense quantity of dark red fluid blood; both auricular appendices were unusually prominent, and upon the right were noticed two small sacculated dilatations which will be more accurately

described further on. The left side of the heart was also full of fluid blood. The heart weighed twenty ounces.

The external surface was smooth. The coronary veins were filled to distention with blood, both upon the anterior and posterior surfaces of the heart. The apex was formed equally by the left and the right ventricles. The semilunar valves were incompetent to the water test. The aortic orifice had a diameter of one and a half inches (4.5 ctm.), the mitral one of two and a half inches (7.5 ctm.), the tricuspid one of three inches (9 ctm.); the left ventricle was four inches (12 ctm.) in depth and its wall two-thirds of an inch (2 ctm.) in thickness. The right ventricle was three and three-quarter inches (11 ctm.) in depth and its wall was one-fourth of an inch (8 mm.) in thickness. The right and the left auricles had a wall one-sixth of an inch (5 mm.) in thickness. The endocardium of the right heart was free from any inflammatory changes; the free edges of the mitral valves seemed perhaps, a little thickened; the papillary muscles and the columnæ carneæ appeared compressed. The appearances at the aortic orifice are quite peculiar; in the first place the orifices of the coronary arteries are situated one-third of an inch (1 ctm.) above the free margins of the valves instead of, as usual, immediately behind the free edges. The valve leaflets are thicker than normal, but the thickness is quite uniform; the corpora arantii are not as prominent as usual. Upon the wall of the aorta are three prominent ridges of tissue that presents in every way the character of cicatricial tissue. These ridges commence at the junction of the ends of the convex, attached margins of adjoining valves and extend upward; the one commencing at the junction of the anterior and right posterior segment is half an inch long (1.5 ctm.); the one commencing at the junction of the right and left posterior segment is one-third of an inch long (1 ctm.), and the one commencing at the junction of the anterior and left posterior segments is one-third of an inch (1 ctm.) long and one-fourth of an inch (8 mm.) broad; all these cicatricial areas present distinct elevations above the intima and instead of the smooth, yellow surface of the intima they have the peculiar greyish red, slightly uneven surface found on comparatively recent areas of scar tissue everywhere. On the cut surface the structure is that of a dense cicatrix. The free margins of the left posterior and the anterior segments measure one inch (3 ctm.) in length about; the right posterior segment measures one and one-third inches (4 ctm.) and the left third of the convex attached margin of this valve appears torn loose from its attachment to the wall of the aorta, and at the site of its usual line of attachment is a well marked, quite dense, linear cicatrix (see

illustration); the leaflet, consequently, hangs loose, relatively speaking, in the aortic orifice and the pocket formed between this valve and the aorta is small and shallow compared to the pocket of the other two valves, the torn margin is quite smooth and not very much thickened or retracted.

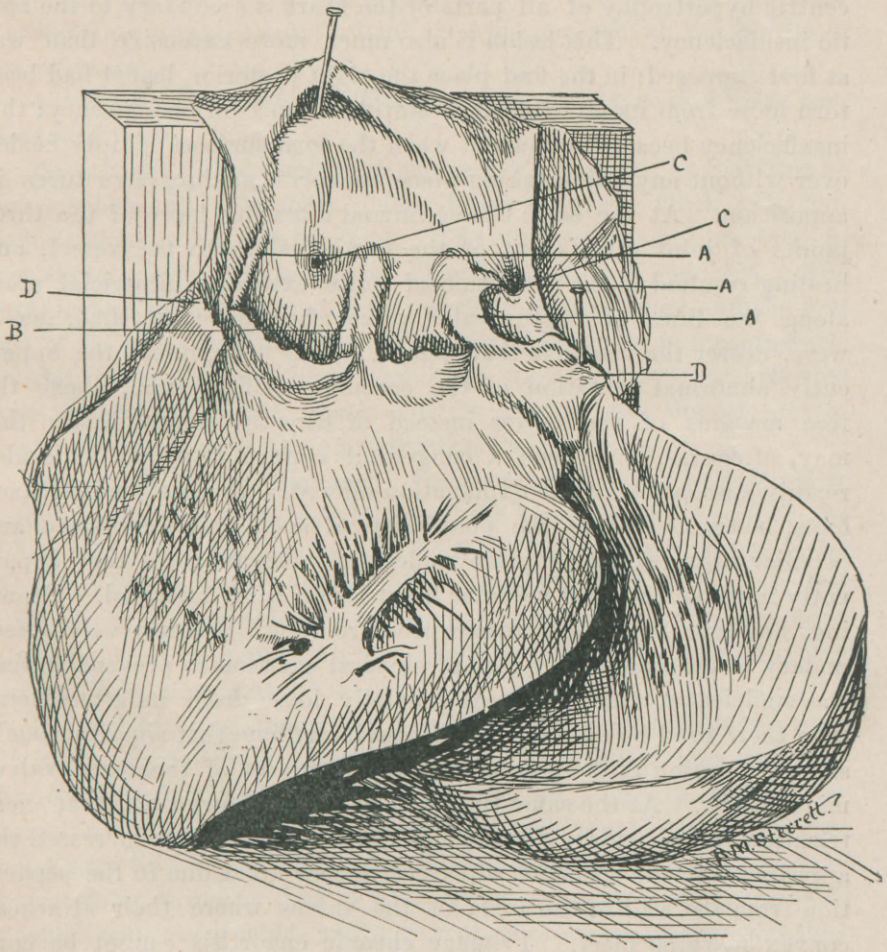

FIG. 2.—HEART WITH EXTENSIVE RUPTURES AT AORTIC ORIFICE (REDUCED).

A. Ridges of Cicatricial Tissue.
B. Cicatrix from tearing of Right Posterior Segment along attached margin.
C. Orifices of Coronary Vessels.
D. Anterior Segment cut across.

Lastly must be mentioned that along the upper margins of the right auricular appendix are two saccular dilatations, as large as a pea, the wall of which is formed by serous membrane, solely, being transparent and apparently at the point of rupture. There are no signs of disease upon the muscular part of the auricle.

There are here, consequently, two small aneurisms of the right auricular appendix the wall of which appears to consist only of the thin epicardium and endocardium.

Remarks. It will be seen from the description of the heart that the fundamental lesion is at the aortic orifice and that the excentric hypertrophy of all parts of the heart is secondary to the aortic insufficiency. This lesion is also much more extensive than was at first supposed; in the first place the right posterior leaflet had been torn loose from its attachment, resulting at once in insufficiency; this insufficiency became permanent when the torn surfaces simply healed over without any union taking place of corresponding structures in apposition. At the same time occurred a tearing loose of the three points of joint attachment of the aortic valves to the vessel, and healing resulted in the formation of quite extensive cicatricial areas along the lines of rupture the valves became reattached, as it were, nearer the ventricle than before. Thus is explained the apparently abnormal situation of the coronary orifices, viz., above the free margins of the valves instead of directly behind them; this may, of course, have been a congenital abnormality, but it is also readily susceptible of the explanation offered. Credulity might, perhaps, be excited as to the possibility of such quite extensive and peculiar ruptures taking place under the circumstances that apparently initiated the fatal valvular heart lesion here described. Granting, however, that the increased pressure upon the aortic valves secondary to the sudden and violent physical exertion to prevent falling was sufficient to tear a segment partially loose from its attachment, then there need be no difficulty in convincing one that simultaneously some separation at the points of joint attachment of the aortic valves might occur. At the same time it is not to be forgotten that cicatrization and secondary dilatation may have still further increased the appearance in the specimen of extensive scar areas due to the separation from the wall of the aorta of the valves where their attached, convex margins meet. Primary chronic enaortitis cannot be conceived capable of producing the lesions described. The examination also established the fact that there was no degeneration of any kind in the valvular structures that could predispose to their rupture.

Of the many instances of rupture of cardiac valves from physical exertion recorded in medical literature reference will, at this time, be made only to the following case,* because, in many particulars, it corresponds closely to the one here recorded. The patient was a muscular man 41 years old, who felt a sudden pain in his chest while

* Tretzel, Berliner Klin. Wochenschrift, 1891. No. 44, page 1073.

pushing a heavy cart; during the day a peculiar sound was heard coming from the man's chest, occurring regularly with the pulse. On examination a murmur was heard as far as three yards away from the patient and this murmur was heard after the apex beat. Pulsation was noticed in the epigastrium, in the vessels of the neck and in the peripheral arteries. The area of the heart's dullness was increased. Auscultation revealed a quite loud diastolic murmur at the middle of the sternum.

A diagnosis of aortic insufficiency, due to rupture of a valve segment was made.

The patient disappeared from notice for two years; at that time he was cyanotic and edematous. The heart was very much enlarged, its pulsations feeble and frequent. The murmur was not as loud as immediately after the accident. The patient died suddenly. The post-mortem examination showed a greatly dilated heart and the first part of the aorta was also dilated, the aortic valves were incompetent; the right segment was torn away from its attachment and floated loose in the orifice and a linear cicatrix marked the site of attachment. Otherwise the valvular structures were normal.

In connection with the case I have reported it is interesting to note the patient's own observation of the loud murmur and of the well marked peripheral pulsation; he seems to have studied the latter phenomenon especially, because he narrates that he felt the heart beat when he put his hand on almost any part of the body; the loud murmur was heard by himself and by his wife; it could be heard all over a room of ordinary size.

In regard to the aneurismal succulations along the upper margin of the right auricular appendix it may be said that they undoubtedly resulted from the increased intra-auricular pressure, forcing the muscular wall apart. The wall of the auricular appendices is often found very thin in places on account of the trabecular arrangement of the muscular structure, but to find distinct aneurismal sacs, the wall of which consists of endo- and pericardium alone, is unique, and their appearent liability to rupture, indicates that such aneurism might become the source of fatal hemorrhage into the pericardium.

119 Loomis St.