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SYPHILITIC THORACIC ANEURYSM IN YOUNG ADULTS

BY

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Syphilitic thoracic aneurysm rarely occurs in patients under the age of 30; only two of the 840 admitted to the London Hospital during the past forty-six years were below this age. These two, with a third which was recently under my care, are here described.

Case I

A man aged 29 was admitted to the London Hospital on January 16, 1899. Seven years previously he had contracted a penile chancre, and was treated with potassium iodide for seven months. For three months before admission he had complained of cough, increasing hoarseness, pain in both arms, and, later, of great difficulty in breathing.

On examination he was orthopnoeic, and inspiratory and expiratory stridor was present. His voice was hoarse, and he had a persistent croupy cough; both the vocal cords were completely paralysed. The right pupil was smaller than the left. There were "tissue paper" scars on both legs. The left pulse was stronger than the right. There were pulsation and dullness to percussion just below the right clavicle. The apex beat was in its normal position. The second sound in the aortic area was accentuated. A loud systolic murmur was heard near the right clavicle, but there was no mention of a diastolic murmur. Scattered rhonchi were heard in the lungs. The day after admission tracheotomy was performed without relief, and the patient died after four days. A clinical diagnosis of tracheal obstruction due to diffuse aneurysm of the aortic arch was made.

At necropsy the aorta was dilated from its origin, producing relative incompetence of the aortic valve, and it reached extreme dilatation two and a half inches above the valve, converting the whole of the arch into a large irregular aneurysm, with a thin wall in parts, and filled with laminated blood clot. Projecting from the main aneurysm were daughter aneurysms with small irregular openings of various sizes up to three-quarters of an inch in diameter. The right subclavian artery, right carotid artery, and both recurrent laryngeal nerves were pressed upon. The aneurysm compressed the trachea on the right side one and a half inches below the tracheotomy wound. There was diffuse bronchopneumonia of the lower lobes of both lungs. The heart weighed 22 oz. (625 grammes).

The macroscopic description of the aorta suggests an aneurysm due to aortitis rather than to mucous degeneration of the media, or to severe medial degeneration associated with atheroma.

Case II

A man aged 28 was admitted to the London Hospital on August 8, 1913. Eight years previously he had contracted syphilis and been treated for three months with injections. For six weeks before admission he had complained of shortness of breath on exertion, periodic attacks of severe coughing without expectoration, and a dull aching pain behind the sternum and in the left axilla that sometimes radiated down

the inner side of the left arm. The pain was occasionally sharp, and it passed through to the back and was increased by coughing. Three weeks before admission he had been very breathless and found that he could only sleep with his head on a table placed in front of him.

He was pale and orthopnoeic, and he coughed constantly. The pulse, which was rapid and regular, was not collapsing in character and it was equal on both sides. Pulsation was seen in the second and third rib spaces on the left side, and in this region there was impairment of the percussion note. The apex beat was diffuse. A systolic murmur was heard over the praecordium, loudest in the aortic and faintest in the mitral area. There were signs of emphysema, and crepitations were heard over both lung bases. There was oedema of both legs. No abnormal physical signs were detected in his abdomen or central nervous system. His chest was screened and a large pulsating aneurysm was found. His Wassermann reaction was positive. He developed dysphagia and, later, symptoms of heart failure, and died ten days after admission.

Summary of Necropsy: Congestive Heart Failure; Haemopericardium; Aneurysm of Aorta; Syphilitic Aortitis.—Conspicuous wrinkled white thickening of intima of ascending aorta and arch; one succulent intimal nodule in descending portion of arch. Slight atheroma; sparse fatty streaks in descending thoracic and abdominal aorta and coronary and carotid arteries. Very thin-walled saccular aneurysm, measuring 13 cm. from above down and 16 cm. from side to side, and arising by neck 6 cm. in diameter from the ascending and transverse portions of arch of aorta. Thick layer of laminated clot in sac. Compression by aneurysm of left main bronchus; slight compression of pulmonary stem; partial erosion of sternum. Slight hypertrophy of right ventricle (right ventricle 0.8 cm. thick, left 1.5 cm.) Leakage of aneurysm into pericardial sac; parietal and visceral pericardium covered with brown shaggy fibrin. Bilateral blood-stained pleural effusions (right 28 oz., left 48 oz.); slight bilateral fibrinous pleurisy; partial collapse of lower lobe of left lung. Mucous bronchitis. Congestion and oedema of lungs. Congestive atrophy of liver (4 lb. 1 oz.) causing paradoxical lobulation; slight cloudy swelling of liver. "Back-pressure" congestion of kidneys (11½ oz.) and spleen (5 oz.). Congestion and slight mucous catarrh of stomach and intestines. Oedema of legs and feet. Scar on dorsal corona of glans penis. Well-nourished and well-developed man. Examination of head not permitted.

Case III

A woman aged 28 was admitted to the Essex County Hospital, Wanstead, on January 22, 1940. She married five years ago, and six months later began to complain of palpitation and choking in the throat, which was made worse by excitement and was relieved by sitting up. She had observed abnormal pulsation in the neck. About two years ago she became pregnant, and was admitted to a maternity home three months before term on account of "blood pressure and shortness of breath"; she had a normal delivery. This was the only pregnancy and there had been no miscarriages. For fifteen months there had been a gripping pain in the left submammary region, radiating to the back of the chest. The pain never passed into the back or arms. For six months she experienced throbbing in the head. There had been no dysphagia or aphonia. She denied venereal disease or any of the symptoms characteristic of secondary syphilis. She had had diphtheria at the age of 12, and subsequently was not allowed to play games at school. Her husband and child were healthy; her mother and sister were well and had had no miscarriages. Eighteen years ago her father left her mother and he could not be traced; he was thought to be healthy.

On examination there was capillary pulsation of her lips and conspicuous arterial pulsation in the neck with a systolic thrill over the carotid and subclavian arteries. The pulse was regular, a little rapid, and collapsing in character. The forcible apex beat was displaced one and a half inches beyond the mid-clavicular line. No thrill could be detected over the heart. The second sound in the aortic area could not be heard. All over the praecordium were heard systolic and diastolic murmurs. In the mitral area the systolic murmur was soft, though it was conducted to the left axilla. In the aortic area the systolic murmur was harsh and conducted to the neck. The soft aortic diastolic murmur was heard along both borders of the sternum. Blood-pressure readings were as follows: right

arm, 200/40; left arm, 200/40; right leg, 230/40; left leg, 230/40. There were no abnormal physical signs in the lungs, abdomen, or central nervous system; and there was no evidence of congenital syphilis.

The Wassermann and Kahn reactions were strongly positive in the blood. The husband, baby, mother, and sister had negative reactions. In the cerebrospinal fluid there was no increase in protein or cells, the Wassermann reaction was negative, and the Lange curve was normal.

Cardioscopy showed considerable distension of the left ventricle and aneurysmal dilatation of the descending portion of

FIG. 1.—Teleradiograph of Case III.

FIG. 2.—Electrocardiogram in Case III.

the aortic arch and of the first moiety of the descending aorta. There was no visible dilatation of the ascending aorta. The lung fields were clear.

The accompanying radiograph (Fig. 1) shows the summit of the arch reaching above the level of the clavicle, and great widening of the vascular pedicle from dilatation of the arch and descending aorta. The heart is enlarged to the left.

The electrocardiogram (Fig. 2) shows slight prolongation of the P-R interval, deviation of the electrical axis to the left, slurring of the QRS complexes, and flattening of the T wave in Lead I.

Any paper on syphilitic aneurysm in young adults must necessarily deal with the incidence of aortitis in congenital syphilis, and give consideration to the latent period between the primary infection and the symptoms resulting

from aortitis in *acquired* syphilis. Further, the age incidence of thoracic aneurysm should be discussed.

Aortitis in Congenital Syphilis

Turnbull (1911) recorded two cases of syphilitic mes-aortitis, the first in a girl aged 17 whose father suffered from a similar condition, and the second in a girl aged 7. At necropsy in both cases the macroscopic and microscopical descriptions were characteristic of syphilitic mes-aortitis. There was no dilatation of the aorta. Clinically these patients did not show any of the stigmata of congenital syphilis, and the writer was not able to conclude that the lesions were of congenital origin. Heiman (1919) saw an aneurysm of the thoracic aorta in a boy aged 13 whose Wassermann reaction was strongly positive. This patient also had splenomegaly, and there was a suspicion of a gumma of the liver and Hutchinson's teeth. The mother had had two miscarriages and gave a positive Wassermann reaction. Stolkind (1920) after a careful survey of the literature could not find a single case of proved hereditary syphilitic aortitis in older children, and especially in adolescents and adults. Referring to a child aged 4 described by Willson (1914) as having an aneurysm, he stated that no process typical of syphilitic aortitis was found and that all the signs were inconclusive. Previtali and others (1930) in a series of 50 congenital syphilitics were unable to detect any evidence of aortic dilatation by clinical or radiological examinations. Givan (1930) failed to demonstrate syphilitic heart disease in 417 similar cases, whilst McCulloch (1930) concluded that congenital syphilis plays no part in cardiovascular disease in children up to the age of 15. McDonald (1932) described findings at necropsy in a boy aged 9 with congenital syphilitic mes-aortitis whose father and mother were also syphilitics. The patient had interstitial keratitis and gave a positive Wassermann reaction. The aorta was examined microscopically, but no spirochaetes could be demonstrated. This writer concluded that definite clinical recognition of the condition is possible only in a few cases. Recently at the London Hospital 13 patients with congenital syphilis, whose ages ranged from 13 to 47, were examined clinically and by cardioscopy, and in none of them was there any evidence of aortitis.

It appears, therefore, that congenital mes-aortitis can exist as a pathological lesion, but only rarely does it produce clinical or radiological evidence of an aneurysm.

The three cases described here do not belong to this group. In Cases I and II a history of primary infection was obtained; in the third case no stigmata of congenital syphilis were found, and the Wassermann reactions in both mother and sister were negative.

Onset of Aortitis in Acquired Syphilis

Sandford (1931) stated that in a series of 71 cases of thoracic aneurysm the average time interval between the initial lesion and the onset of symptoms was slightly over fifteen years. He found the shortest period between the primary sore and the earliest symptoms suggesting aneurysm to be two years and the longest fifty years. Coombs (1932) reviewed the literature and concluded that all observers were agreed that this interval was from fifteen to twenty-five years. Boyd (1924) studied 200 cases and gave this period as twenty years. Among 346 cases of cardiovascular syphilis Maynard and others (1935) found 190 in which the date of the primary lesion was known. About a quarter of these showed some evidence of cardiovascular disease within ten years, but the average for the series was twenty years. Evans (personal communication, 1935) examined 55 consecutive patients with acquired syphilis in whom the primary infection was known to be longer than five years. Examination was made

clinically, electrocardiographically, and by cardioscopy. Aortic measurements were taken. Alteration in the aortic outline consequent on age or hypertension was considered when assessing the changes resulting from aortitis. In this series the aorta was judged to be normal in 25 patients and abnormal in 30. In 10 of the abnormalities the aorta was altered as a result of hypertension or atheroma, and in 20 syphilis had produced the deformity. In relation to the primary infection aortitis was found in these 20 cases at intervals of 5 to 10 years in 1, 11 to 15 years in 4, 16 to 20 years in 5, 21 to 25 years in 4, 31 to 35 years in 4, 36 to 40 years in 1, and over 41 years in 1 case.

In the first two cases reported in this paper the interval between the primary lesion and the onset of symptoms was approximately 7½ years. In the third case the initial infection may have been acquired soon after puberty, and there is the possibility that the infection was extragenital and perhaps occurred in infancy.

It is clear that the usual latent period between the primary infection and the onset of cardiovascular symptoms in acquired syphilis is from fifteen to twenty years, but in a few cases the interval is less than ten years.

Age Incidence of Aneurysm

Many cases similar to those here described have been reported from time to time. As early as 1725 Morgagni (Kampmeier, 1938-9) did a post-mortem examination on a young woman aged 28. A small aneurysm was found half an inch above the aortic valve, which had ruptured into the pericardium. So exact is this first description of the morbid anatomical features of syphilitic aortitis that it merits recapitulation: "... that is to say, in some places whitish marks of a future ossification occurred; in others

Table showing Age and Sex Incidence in 840 Cases of Thoracic Aneurysm Admitted to the London Hospital 1893 to 1939

Age	Males	Females	Total
0-9	0	0	0
10-19	0	0	0
20-29	2	0	2
30-39	115	15	130
40-49	230	35	265
50-59	262	40	302
60-69	104	20	124
70-79	12	5	17
80-89	0	0	0

some small foramina, as it were, had begun to be formed; and in still other places were paralleled furrows drawn longitudinally—in this manner was the surface of the artery unequal here and there." In 1847 Crisp collected 12 cases under the age of 30. Le Routillier (1903) reviewed the subject and discovered 18 cases under the age of 20 the aetiology of which was obscure. Richey (1923) after a detailed search of the literature found 41 cases under the age of 18, and remarked that only one of those presented definite evidence of syphilis. Brockbank (1925) analysed the records of 200 necropsies on cases of aortic aneurysm and found that 7.5% were between the ages of 21 and 31. Recently Kampmeier (1938-9) in a series of 633 cases of thoracic aneurysm found 9 (7 negro males; 1 white male; 1 negro female) under the age of 25.

Authors vary as to the period of maximum age incidence of thoracic aneurysm. Lucke and Rea (1923) concluded that this period was 35 to 55, and Boyd (1924) from the investigation of 3,690 cases gave the age incidence as 36 to 40. Kampmeier (1935) stated that the highest incidence was between the ages of 45 and 55, and Cochems and Kemp (1937) in a study of 1,000 syphilitic individuals found 47 aneurysms, 39 of which occurred after the age of 50. The accompanying table compiled from the London Hospital in-patient records shows that the highest peak of incidence was

50 to 59, a somewhat higher figure than is commonly quoted. In this series it is of interest that no female patients with thoracic aneurysm were found under the age of 30.

Summary

Two cases of acquired syphilitic aneurysm in adults under the age of 30 are reported. It is probable that the disease was also acquired in the third case. Although congenital syphilitic mesaortitis does occur the incidence of aneurysmal dilatation is very rare. It is known that symptoms of thoracic aneurysm may appear within ten years of the primary syphilitic infection, but in the majority the period is fifteen to twenty years. As regards age incidence of aneurysm of the thoracic aorta, the maximum was found in the sixth decade.

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NOTE ON THE TESTING OF TRANSFUSION FLUIDS FOR CONTAMINATION

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It is ideal that all bottles of plasma and of citrated blood used for transfusion should have been tested for sterility, but it is also ideal that no bottles should be opened before use. These ideals are in conflict. If each bottle is to be tested it is necessary that the ritual is such as to eliminate any possibility of contamination of the material in the course of the bacteriological examination.

Technique

The technique used in this laboratory for the testing of transfusion material sent for this purpose from the Edinburgh Blood Bank is as follows.

All currents of air in the room are avoided. There is no speaking while the bottles are opened. No bottles are opened if anyone has recently sneezed or coughed near the bench. When a crate of, say, six bottles of plasma or blood is received, six tubes of ordinary or trypsin broth for aerobes and six tubes of Robertson's meat medium sealed with paraffin for anaerobes are set out in a rack and labelled. The cotton-wool plug in each tube is freed by turning, to ensure that it can later be removed with one hand. The bottle is placed near to the rack and the rubber bung or screw cap removed with one hand while a Bunsen flame is played with the other on the upper

rim of the bottle and air immediately above, into the upper inch or so of the aperture, and inside the screw cap or around the part of the bung which is to be inserted. The bung or cap is then replaced, but without ramming home or screwing down. A sterile Pasteur pipette is removed from the copper box in which it has been sterilized, a rubber teat affixed, and the part of the pipette which is to be introduced sterilized once more by passing through the Bunsen flame. The bung or cap is now momentarily removed and about 1 c.cm. of plasma or blood drawn into the pipette, the stopper being lightly replaced. Each culture tube in turn is then lifted between the thumb and ring and little fingers of the left hand, the cotton-wool plug is withdrawn between the index and middle fingers, the medium inoculated with half the pipetteful of fluid, and the plug replaced. In inoculating the anaerobic medium it is important that the pipette be withdrawn before all the fluid has been expelled, to avoid the introduction of air into the medium. The pipette is then discarded into a vessel containing antiseptic, and, with both hands now free, the bung or cap is again lifted and the ritual of flaming the lip and mouth of the bottle and the stopper carried through once more. Bung or cap is now screwed firmly home. All this takes only a few seconds.

The inoculation tubes are incubated at 37° C. for two days. If they remain perfectly clear the result is reported as negative. If there is any trace of turbidity, films and subcultures are made. Sometimes there is a slight change in the Robertson's medium which entails further examination when actually no organisms are present. It will be observed that while most varieties of organisms are catered for by the media used, which are enriched by the plasma or red cells introduced, there is no provision for the growth of haemophilic organisms when the material under examination is plasma. But as such organisms could not multiply in the original bottle of plasma even if accidentally introduced, it has not been thought necessary to use a blood medium.

Precautionary Measures

Strict injunctions are given that no one is to open a bottle except the person carrying out the examination. There is a very real danger here, as blood and plasma are both used in bacteriological laboratories for the preparation of media, and the latter for the coagulase test on staphylococci. If the Blood Bank gives an occasional present of blood to the examining laboratory it makes for additional safety in this respect. Where bottles have to be sent some distance to an outside laboratory it is advisable to seal them before sending, and before returning, in such a way as to make it obvious if they have been tampered with. Instructions are given to the messenger to shake bottles of blood as little as possible during transport.

Before being sent from the Blood Bank for testing, the bottles should be removed from the refrigerator and kept at room temperature for several days so as to give contaminations an opportunity of multiplying.

The technique above described has given satisfactory results, and can be carried through by one person. In no case, so far as can be ascertained, has it been the cause of contamination of a bottle, or failed to detect one when present.

The following notice appeared in the *New England Journal of Medicine* for February 27: "It will help England greatly in the care of victims of bombing raids and help England prepare for the coming invasion if physicians in this country all give discarded or superfluous surgical instruments or surgical dressings. Any such material should be sent to the Medical and Surgical Supply Committee, 420, Lexington Avenue, New York City."