CASE
OF
SPONTANEOUS INGUINAL ANEURISM
IN A BOY AGED TWELVE YEARS ;
FOR WHICH THE EXTERNAL ILIAC ARTERY WAS TIED.
WITH
A TABLE OF ALL THE OTHER RECORDED CASES OF EXTERNAL
ANEURISM IN PERSONS UNDER TWENTY YEARS OF AGE.

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THE rarity with which external aneurisms are met with in young persons induces me to lay the present case before the Society.

Frederick L—, æt. 12 years and seven months, a German by birth, was admitted into the East London Hospital for Children on October 31st, 1882.

Previous history.—The patient's mother having died five or six years previously, no very reliable history could be obtained. As far as could be ascertained there was no evidence of rheumatism nor of syphilis. He had begun to suffer from hip-joint disease on the right side when between two and three years old. This was said to have been caused by an injury. Owing to this disease he had

used a crutch, and though going regularly to school had never engaged in rough play like other boys.

Present illness.—This began suddenly. On October 1st he went to bed in his usual health and was roused up from sleep in the middle of the night by a “cutting” pain in the left groin running down the thigh towards the knee; however, he got up next morning and went to school as usual. In a “day or two” the boy noticed a “lump” in his groin; the pain continued and was so aggravated by walking that he gave up going to school. The lump was not seen by a doctor until two days before his admission to the hospital.

Condition on admission.—The boy is very pale and emaciated. His fingers and toes are slightly clubbed. In the left groin, just below Poupart’s ligament, there is a swelling in the course of the femoral artery, which pulsates. This swelling is somewhat square in shape, measuring about two inches from side to side. The pulsation is most marked along the outer border of this swelling, where it passes beneath the Sartorius muscle; it is so forcible that a pulsatile movement is apparent on the outer surface of the thigh just above the trochanter. This pulsation is quite arrested when pressure is made on the external iliac artery. A purring vibration is felt in the arteries below the aneurism, as low down as the dorsalis pedis. The pulsation below the aneurism is much weaker than on the opposite side. The superficial vessels of the leg are not enlarged, neither is there any œdema. The thigh can be fully extended, but some pain is felt in the groin on making extension. Slight (reflected) pain is also present on the inner aspect of the knee. His right femur is firmly ankylosed to the pelvis at an angle of 115° . There is no pain or tenderness whatever in this limb; but the purring vibration described in the left leg is felt in all the arteries of the right leg down to the foot. This is best appreciated by grasping the limb with the hand; it suggests the sensation of small hard bodies circulating with the blood. The pulsation in the articular arteries about

the knee is very visible and striking ; these arteries all appear to be enlarged.

On inspecting the chest, which is of a very rickety type, a strong, heaving pulsation is noticed about the inner ends of the clavicles, while the visible cardiac pulsation extends for some distance beyond the left nipple. On percussion, cardiac dulness is found not to extend beyond the right border of the sternum ; it is absolute as far as the mid-line of the sternum, and for about half an inch outside the nipple line ; it commences above in the second space and reaches down to the sixth. On auscultation a loud constrictive and a regurgitant aortic murmur are audible at the base. There is a soft mitral murmur at the apex, which is audible also at the angle of the scapula. The lungs do not present any signs worthy of record ; breath sounds are weak.

The right radial pulse is markedly stronger than the left, the reason for which is not very obvious ; both beat 112 per minute, and are of the "water hammer" type.

The following tracings were obtained ; 4 oz. pressure used in each case.

Right radial pulse.

Left radial pulse.

The fundus of the eye is found to be quite normal. The urine is healthy.

As the boy had been badly fed for a long time past it was decided not to operate at once ; he was kept quiet in bed, and put upon a generous diet.

On November 10th, eleven days after his admission, I ligatured the external iliac artery under a carbolic spray, using for the ligature Chinese twist-silk well soaked in 5 per cent. carbolic acid solution. There was no obvious disease in the artery at the spot tied. The operation presented no difficulty whatever. The limb was subsequently enveloped in cotton wool. At 8 p.m. the circulation in the limb was good and the toes of the left foot were almost as warm as those of the right. The wound healed by the first intention, except at the spot where the drainage-tube emerged.

On November 18th a raised erythematous blush was noticed on his left cheek, and there was some elevation in his temperature; a few days later this redness had assumed an erysipelatoid character, and spread across the nose to the right side of the face; his temperature rose to 102° F.

On December 4th, at 10 p.m., he vomited some blood, and a motion which he passed about the same time also contained blood. It was then found that hæmorrhage was going on from the posterior nares; this continued more or less all night though various measures were ineffectually tried to arrest it.

On December 5th, at 9 a.m., he was blanched; his temperature was 97° F., and his pulse hardly perceptible. On examining the pharynx a slight trickling of blood could still be seen. At 6.30 p.m. he vomited profusely, after which he gave two or three gasps and died.

The autopsy was made twenty-four hours after death. In the head all the arteries were carefully examined; no lesion, obstructive or otherwise, was discovered. The membranes and substance of the brain were healthy; there was no effusion into the ventricles. The lungs were everywhere adherent to the chest walls; they were rather œdematous, but presented no trace of pneumonia nor of infarcts. The liver and spleen, stomach and intestines, and the kidneys were all quite healthy. The right hip-joint was firmly ankylosed to the pelvis; within its capsule was

some inspissated caseous matter. The heart was removed together with the aorta, and its terminal branches as far as the popliteal spaces. Beyond the aneurism itself no other abnormality of any kind was detected. Portions of the arterial walls were subsequently examined microscopically with a like negative result.

The ventricles were much hypertrophied, the left one being quite half an inch thick. The mitral valve was not diseased. The aortic valves were much thickened; they were covered over with loose vegetations, some being very large.

The aneurism was quite consolidated, being filled with laminated clot. It involved the femoral artery at a point just above and including the origin of the profunda. The fibres of the anterior crural nerve were spread out upon the sac.

At the seat of ligature there was a narrow band of white cicatricial tissue, in the centre of which at one point the unaltered silk ligature could be perceived. There was a little partially decolorised clot above and below the seat of constriction. Below this, and above the aneurism, there was about three-quarters of an inch of apparently unobliterated artery. (See the illustration at page 66.) The preparation is preserved in the College of Surgeons' Museum (No. in Catalogue 3241a).

Remarks.—It may be well to say that I use the term “spontaneous aneurism” to signify an aneurism which is not due to a penetrating wound of an artery. It would be difficult without some such arbitrary definition to say where spontaneous aneurism leaves off, and where the traumatic variety begins; for it is quite impossible to prove that external influences, such as sudden strains, blows, sudden or long-continued exertion leading to increased heart pulsation, are not largely concerned in the production of the so-called spontaneous aneurism, even in cases in which a morbid condition of the vessel is found.

The causes of such aneurisms and their exact mode of production are little understood. In my own case, the

cause was not by any means obvious. The aortic valves were much diseased, but no infarcts were found in any of the viscera after death. There was no history of rheumatism nor of syphilis, nor of any injury to the vessel either direct or indirect. Owing to the uselessness of the right lower limb, however, the left one was unduly worked, and might even occasionally be overstrained in consequence.

Whether, or how, this excessive use of the left limb may have contributed to the formation of the aneurism it is difficult to say. A marked feature in this case were the intensity and force of the heart's impulse; even after the boy had been kept at rest in bed for a week arterial pulsation was very violent and could be seen in all places, where the arteries were at all superficial. Such action was well calculated to put a severe strain on the arterial system, and if marked disease had existed at any spot it must almost necessarily have led to arterial dilatation. With regard to degeneration of the coats of arteries as a cause of this aneurism, a careful examination of the arterial trunks after death failed to detect disease at any spot (except the aneurism itself), nor did the microscope reveal any changes which the naked eye might have overlooked.

Concerning *age*, as a general cause of aneurism, the foregoing case is interesting on account of the youth of the patient. If we exclude the intracranial cases, spontaneous aneurism is rare in subjects under twenty years of age. In consulting the standard works on the subject I was at first led to imagine that even more cases had occurred than is actually the case. In the various tables of collected cases which have been published, the individual cases have doubtless been tabulated more than once, and hence the mistake.

With a view to greater accuracy I have tabulated all the cases of extracranial *spontaneous aneurism* occurring in subjects *under* twenty years of age, of which I could find *original records*, and as some of these records are not within easy reach, I have added to the table a very brief abstract of the notes of each of the cases.

Table of Fifteen Cases of spontaneous external Aneurism in persons under twenty years of age, compiled from the original records.

Case.	Author, date, where recorded.	Artery: position.	Patient's		Condition of		Result.	Remarks.
			Age.	Sex.	Heart.	Vessels.		
1	Dr. James Sykes, 1823, Philadelphia Journ. Med. & Phys. Sciences, No. 11, May, 1823, p. 139	Carotid	18	F.	Not stated	Not stated	Cured by ligature	Fall from her horse two years previously. The tumour was of the size of a goose's egg. Made an excellent recovery after ligature of the common carotid. "A double animal ligature" was used, and the vessel tied in two places; the artery was not divided.
2	Sir A. Cooper, 1824, Lectures, edited by Tyrrell, vol. ii, p. 40	Ant. tibial	11	M.	"	"	Not stated	No details are given.
2A	Mr. Clive, 1824, quoted by Sir A. Cooper, op. cit., vol. ii, p. 63	Dorsalis pedis	Not stated	M.	"	"	"	No details are given.
3	Moulinié, 1832, Journ. Hebdomad., vol. ix, p. 226	Ant. tibial (lower part)	19	F.	"	"	Died	Details are rather scanty. The aneurism became very large. Ligature of anterior tibial, which was undertaken on account of hæmorrhage, was followed by amputation. Death.
4	Dr. T. R. Smyth, 1834, Lancet, vol. i, p. 626	Ascending aorta	16	M.	Valves (aortic) diseased	—	Death	Walls of aorta were as thin as paper, soft and easily torn, but free from every kind of morbid deposit. The patient was seized suddenly with a sharp piercing pain in the region of the heart, after having ascended a ladder.
5	Mr. Grundy, 1834, Lond. Med. Gaz., vol. xiii, p. 509	Femoral (inguinal)	9	M.	Not stated	Not stated	Recovery	Followed on a kick in the thigh 18 months previously. Boy's health had been perfect up to the time of the onset of the tumour. The operation was difficult on account of the boy's struggles. The wound healed by the first intention.

Case	Author, date, where recorded.	Artery: position.	Patient's Age. Sex.	Condition of Heart.	Condition of Vessels.	Result.	Remarks.
6	Dr. Mignel, 1835, Bull. Génér. de Thérapéut., vol. ix, p. 393	Aorta	14 M.	Normal	Not stated	Sudden death	The heart was of normal size; its orifices were free. The boy had been indisposed for 8 days only before the onset of acute symptoms, which were at first thought to be typhoid in nature. Before recording this case, Dr. Mignel remarks on the great rarity of aneurism in children.
7	Dr. Kingston, 1842, Edin. Med. and Surg. Journ., vol. lvii, p. 69	Int. carotid, near its origin. Basilar, close to its commencement	14 or 15 M.	Dilated; valves normal	Diseased	Death from embolism	Pulsation had been noticed for 2 years. A sudden onset of symptoms, including right hemiplegia and aphasia, which were considered as due to cathartides (but which were more probably due to embolism), led to his death in 2 days.
8	Prof. Syme, 1844, Lond. and Edinb. Monthly Journ. Med. Sci., Oct., p. 823	Popliteal	9 M.	Not stated	Not stated	Cured	Noticed 2 years before coming under Syme's observation. This author just refers to two other cases, but gives no details. He remarked on the rarity of the disease, and carefully discussed his diagnosis. He believed this to be the first case which had been "remedied by the modern operation at so early a period of life."
9	Dr. Armitage, 1857, Path. Soc. Trans., vol. ix (1857), p. 85	Aorta (bifurcation)	7½ F.	Healthy	Healthy	Died (suddenly)	No atheroma or roughness existed in the coats of the arteries. "The child had suffered from palpitations from her earliest infancy."
10	Dr. Ogle, 1865, Brit. and For. Med.-Chir. Rev., vol. xxxvi, p. 500	Ulnar	17 M.	Mitral valves diseased	Not stated	Death	Was admitted into St. George's Hospital with a pulsating swelling of the forearm. Sudden unconsciousness and aphasia supervened, and right hemiplegia. At the autopsy diseased heart and vessels were found, with extravasation of blood into substance of brain. Preparation is in the St. George's Museum (Catalogue, ser. vi, 129B).
11	Mr. Thomas Smith, 1867, Brit. Med.	Common femoral	12 M.	Aortic valves	Vessels healthy	Cured	The patient was a native of Wales; he was running after some horses in a field, when he experienced a

Journ., March 16 (1867), p. 280	Ext. iliac (orifice of)	7	F.	diseased	Aortic and mitral valves diseased	Aorta itself normal	Not discovered during life	sudden pain in the groin. The ligature came away on 7th day; the artery where tied appeared quite healthy. Mr. Smith informs me that this lad died some years later of internal (? aortic) aneurism. The preparation is in St. Bartholomew's Museum (No. 1460 ¹), and is a true sacculated aneurism. The child died suddenly in the out-patient department. She had previously suffered from acute rheumatism.
12 Dr. Norman Moore, 1882, Path. Soc. Trans., vol. xxxiv, 1883, p. 71	Common femoral	12 yrs. and 7 mos.	M.	Aortic valves diseased	Healthy	Death	Aneurism cured. The patient died after repeated and copious epistaxis. The preparations are in the Museum of College of Surgeons (No. in Catalogue, 3241A).	
<i>Unpublished Cases.</i> ¹								
14 Dr. [Sir Wm.] Gull, 1857. <i>vide</i> Guy's Hosp. Reports of Inspections, 1857, No. 127	Axillary	14	F.	Aortic valves "lacerat- ed, retro- verted, and covered with granula- tions"	Basilar artery and circle of Willis "were found healthy and per- vious"	Death	Guy's Hospital Museum—Heart and Circulatory System, 1520 ²⁰ . The girl had never had rheumatism. Illness began 6 weeks before her admission to hospital. Left hemiplegia set in suddenly during sleep one night. She died some weeks later of a second attack of cerebral hæmorrhage. The aneurism was of the sacculated variety.	
15 Dr. Habershon, 1872, <i>vide</i> Guy's Hosp. Reports of Inspections, 1872, No. 146	Femoral	16	M.	Mitral and aortic valves diseased	Diseased	Death	Guy's Hospital Museum—Heart and Circulatory System, 1519 ²¹ . The lad had had rheumatic fever 12 months before his fatal illness. He died comatose after convulsions. At the autopsy, ulcerative endocarditis was found; heart weighed 15 ounces; cerebral arteries were much diseased; with secondary changes in the brain matter.	

¹ I am indebted to Dr. Goodhart, Curator of Guy's Hospital Museum, for reference to these specimens, and for permission to make use of them.

Among alleged causes, and more especially as a cause of aneurism in young subjects, must be mentioned *embolism*. In analysing the foregoing table of cases, we cannot fail to notice the frequency with which valvular disease of the heart has been found coexistent with aneurism. Thus of the 15 tabulated cases in 2 cases only (Nos. 6 and 9) is the heart stated to have been healthy. In 5 cases (Nos. 1, 2, 3, 5, and 8) its condition is not recorded, while in 8, the remaining cases (Nos. 4, 7, 10, 11, 12, 13, 14, and 15) it is stated to have been diseased. These fifteen cases of extracranial aneurism are too few in number to allow us to arrive at any definite conclusion as to their cause or exact mode of formation. Even if we fall back on the much more numerous cases of intracranial aneurism (which, whether occurring in young subjects or in adults, are now generally believed to be due to embolism) the question cannot be positively settled. Nevertheless, the frequency of their association largely strengthens the view that embolism stands in some etiological relation to aneurism.

Since Dr. Kirkes first (in this country)¹ drew attention to this subject, many other papers have been published tending to confirm his views and to enlarge and point their bearing on aneurismal pathology.

Sir Wm. Gull,² in a paper "On Aneurisms of the Cerebral Vessels," says, "Whenever young persons die with symptoms of ingravescient apoplexy . . . the presence of an aneurism is probable. . . ."

Mr. T. Holmes³ relates a case in which the left internal carotid artery was affected by aneurism at the anterior part of the cavernous sinus. The tumour was as large as a small nut. The dilatation seemed to involve the whole circumference of the vessel, which was perfectly healthy in the rest of its course. The patient, a boy, æt. 16, was originally admitted into St. George's Hospital on August 21st, 1860, with heart disease, but unconnected with any

¹ In the 35th volume of our own Transactions.

² 'Guy's Hospital Reports,' 3rd series, vol. v, 1859, p. 281.

³ 'Pathological Soc. Trans.,' vol. xii, p. 61, 1861.

history of rheumatism. There were clear indications of mitral disease and hypertrophy of the heart. He died some weeks later, and on examination a copious deposit of bead-like lymph was found lining the internal surface of the left auricle; and masses of similar lymph appeared also on the edges of the mitral valve. From the occurrence of embolism in the viscera, and the presence of vegetations on the valves, Mr. Holmes concluded that "embolism was probably the cause of the aneurism."

Dr. Ogle also contributed a valuable paper on this subject and case,¹ in which he argued to the same conclusion. More recently Dr. Church² published a little monograph "On the Formation of Intracranial Aneurisms in Early Life," in which he tabulates thirteen cases (including four under his own care) in subjects under twenty years of age; the arteries, without exception, are stated to have been free from atheroma or other disease; in seven of the cases the heart was diseased, and in six of these there were vegetations on the valves; in four of the cases the state of the heart is not mentioned. From these facts he concludes "that disease of the arterial wall is very rarely if ever a cause of cerebral aneurisms in the young." On the other hand "the extreme rarity of the disease renders it impossible that the co-existence of vegetations on the endocardium and aneurism of cerebral arteries can in all these instances be due to fortuitous circumstances." Dr. Church further emphasised these facts by contrasting them with cases of aneurism in adults. He examined fifteen consecutive cases in the dead-house of the hospital, and found the cardiac valves in every case quite free from vegetations.

Interesting cases of aneurism in young subjects, associated with valvular disease of the heart and infarcts in internal organs are also recorded in vol. xxviii of the Pathological Society's Transactions (1877) by Mr. Bryant and Dr. Goodhart. After discussing the subject the con-

¹ 'Medical Times and Gazette,' 1866, vol. i, p. 196.

² 'St. Bartholomew's Hospital Reports,' vol. vi, 1870, p. 99.

clusion was that "embolism and aneurism had the relation to each other of cause and effect" (loc. cit. p. 112).

The foregoing cases make it all but certain that embolism leads to aneurism, yet it is by no means easy to explain the exact mode in which the aneurism is brought about. Unfortunately there are no cases at our disposal, in which an aneurism is actually in process of formation, although there are many cases illustrating other effects of embolism—such as, dilatation of arteries above the seat of obstruction, and infarcts and their consequences in internal organs in all stages. Thus Mr. Shaw,¹ in describing a case of plugging of the right middle cerebral artery, says the artery was obstructed "by a firm white substance causing it to be stretched to about one third above its usual size." Mr. Joliffe Tuffnell² relates a remarkable case of dilatation of the popliteal artery. This dilatation during life had been regarded as "aneurismal," but it disappeared in large part after collateral circulation had been established. When the patient died the artery was examined. "No disease whatever could be found in the upper portion, but towards its lower end it had been converted into a fibrous cord of greyish-yellow colour, as solid as the walls of a long standing gristly stricture of the urinary canal."

These cases do not demonstrate the exact mode in which the aneurism is produced. For we cannot consider *dilatation of an artery immediately above its obliteration*, as in the cases just alluded to, *to be the same process as that which leads to the development of an aneurism in a vessel through which the circulation continues to go on*. Indeed, it is not a little remarkable, I think, that dilatation is not more common than appears to be the case, judging from the recorded instances that are to be found in our literature.

In Mr. Tuffnell's case the patient was very ill; he was suffering from ulcerative endocarditis, following a second

¹ 'Path. Soc. Transactions,' vol. vi, p. 34.

² 'Dublin Quarterly Journal,' May 1st, 1858, p. 371.

attack of rheumatism; he had likewise just previously contracted syphilis, for which he had been mercurialised. It is, therefore, by no means certain that arterial disease did not exist, although Mr. Tuffnell argued against it. It is specially worthy of observation that the "aneurismal development" occurred simultaneously with the embolism and that it disappeared within a few hours of the establishment of collateral circulation. Is it not possible that the embolism was arrested at the narrowest point of an artery, which was being gradually occluded by an arteritis and that the remainder of this softened area was dilated by the force of the blood-current and constituted the pulsating swelling observed during life? In one of Dr. Goodhart's cases (*loc. cit.* p. 108) it is stated that "the left brachial artery was considerably distended at its bifurcation, and on opening it a white creamy fluid escaped like pus, and having the microscopical features of pus. The lumen of the vessel was dilated and its walls soft. No clot was present in the vessel."

Dr. Goodhart argues that the "dilatation occurs not behind the obstruction, but in the obstructed spot." The mode of production he thinks is as follows: "The artery is plugged at a fork, and the clot gradually increases behind the original infarct, and as it increases it becomes squeezed together by the blood-pressure behind, and the artery is thereby dilated. Once weakened by dilatation, the remainder is easy to explain, we should rather expect an aneurism."

Dr. Goodhart, however, doubts whether this is the usual or only cause of dilatation, "because if so, all embolisms should show some such tendency to produce aneurisms, and they do not do so." He believes that the endocarditis is not the simple, but the ulcerating form of the disease, "generally producing fever and septic conditions. The clot detached from such a focus will poison the part in which it is lodged and lead to acute softening of the arterial wall."

If aneurism only occurred in association with ulcerative

endocarditis, such a view would deserve great attention, but this is not the case, as a glance at the records of the cases sufficiently shows.

Dr. Church (*loc. cit.* p. 106) says: "I think it probable that aneurismal dilatation takes place when the blood stream through the artery is obstructed, but not completely stopped." It would be less difficult to accept this theory, if aneurisms were only found in the smaller arteries; as, however, aneurisms occur in such arteries as the external iliac and in the femoral, I am inclined to regard this explanation also as insufficient. It is very difficult to explain how an embolon, sufficiently large to obstruct the femoral artery, could be lodged in the artery without giving rise to symptoms of arterial obstruction; whereas if the embolon be of small size, by what means is it arrested in its course, by what process does it become adherent to the vessel wall? It is urged that the plug is arrested at a bifurcation; but this is not by any means always the case.

In only two of the cases in the table is the aneurism stated to be of the sacculated variety (Nos. 12 and 14). Doubtless in such a case the aneurism may have commenced as a softening of that part of the arterial wall to which the embolon was adherent; but, in my own case at least, the artery is uniformly dilated, suggesting a uniform condition of the arterial wall, acted upon by some condition which was uniformly distributed over the whole calibre of the vessel.

In a paper entitled "Ueber embolische Aneurysmen, nebst Bemerkungen über das acute Herzaneurysma (Herzgeschwür)," Dr. Ponfick¹ recorded several interesting cases, and discussed the embolic causation of aneurism at some length. He found in some of his cases that the vegetations had become calcified, and that such calcified vegetations had been detached, washed into the circulation, and given rise to occlusion in some cases, to aneurisms in others; he argued that the sharp extremity

¹ 'Virchow's Archiv,' vol. 58, 1873, p. 533.

of a calcified vegetation had penetrated the intima, and, urged on by the constant thud of the circulating blood, had finally pierced the arterial wall. He gives drawings of two carefully dissected specimens, showing, as he thinks, this condition. The aneurisms are of the sacculated variety, and thus far support his contention.

Whether such a view as this is applicable to the majority of cases, I am unable to say. In my own case, it would not be tenable, for the vegetations were not calcareous.

For the present, therefore, while admitting that aneurism is frequently associated with embolism in the same subject, I do not think there is sufficient evidence to show that embolism is actually a cause of aneurism. Moreover, in the table of cases, there are at least two in which the heart is described as being *healthy*. It would seem probable (and be in keeping with many other pathological phenomena), that there are many factors at work. Apart, of course, from calcareous embola such as those described by Dr. Ponfick, I venture to think that *the condition which leads to plastic inflammation in one part of the arterial system, may produce local changes in other parts, which permit of the development of aneurism without the immediate intervention of an embolon.*

*Aneurysm of Femoral Artery ; Ligature of External Iliac ;
Death from Epistaxis.*

- A. Seat of ligature, a little partially decolorised clot above and below.
- B. Aneurysmal sac, filled with laminated, partially decolorised clot.
- C. Anterior crural nerve, spread over the sac.
- D. External incision, through which the artery was approached.