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ART. I.—*On the Difficulties attending the Diagnosis of Aneurism, being a Contribution to Surgical Diagnosis and to Medical Jurisprudence.*
By STEPHEN SMITH, M.D., Surgeon to Bellevue Hospital, New York.

III. ANEURISM AND MALIGNANT GROWTHS.—Errors in the diagnosis of aneurism from malignant growths have occurred under a variety of circumstances. An aneurism may assume so many of the characteristic symptoms of encephaloid disease as to render accurate diagnosis extremely difficult or even impossible. And, on the contrary, encephaloid tumours may be so located in relation to large arteries, and so respond to the ordinary tests of aneurism, as to deceive the most careful and experienced surgeon.

1. *Aneurism mistaken for Malignant Growth.*—An aneurism may gradually enlarge and become so far consolidated as to cease pulsation, and have a feeling of hardness at some points, and softness and fluctuation at others. Under such circumstances, if the early history of the tumour is wanting, or too obscure to be considered reliable, the diagnosis must inevitably be in favour of malignant disease. No amount of manipulation, and no application of tests, could give other than negative evidence. If, however, the fact can be ascertained, that in its early history pulsation and a bruit were present, the nature of the affection would be more apparent. In such cases, therefore, the early history is of the greatest importance to a correct diagnosis.

The following case came under my observation :—

M. S., æt. 30, entered Bellevue Hospital for a large tumour filling the right popliteal region. She was in feeble health, and her mind was so affected that it was extremely difficult to obtain any history of her case, and that which she gave was so imperfect that it was rejected as unreliable. The diagnosis rested upon the examination of the tumour. This was so large that it distended the region of the ham, and caused a fulness of the anterior part of the knee. At

some points it was quite soft and fluctuating, and at others there was the hardness of fibrous tissue—neither pulsation nor a bruit was discoverable. It was evidently rapidly increasing, but no reliable history of its progress could be obtained. The case was very cautiously and thoroughly examined by all the surgeons and consulting surgeons of the hospital, including Drs. Mott and Stevens, and with a single exception, the conclusion was that the disease was malignant, and amputation was accordingly advised. The surgeon who diagnosed aneurism had elicited from the patient, after the most persistent inquiry, slight but yet satisfactory evidence that when the tumour first appeared there was pulsation. Amputation was performed, and on dissecting the tumour an immense aneurism was discovered, partially consolidated.

It rarely happens that any case is made the subject of more exact and prolonged study than this; every effort was made by the most skilful diagnosticians to determine the true nature of the case; the history was carefully obtained, auscultation was repeatedly practised, and finally exploration was resorted to; and yet, in a consultation of nearly a score of surgeons, there was but one dissenting voice from the conclusion reached. And that dissent was based upon an obscure feature of the early history of the case which might well have been overlooked.

A very instructive case was reported by Mr. Paget (*Brit. Med. Journ.*, 1858, p. 724). The case was one of aneurism of the external iliac artery which remained in doubt until the question was settled by the autopsy. At first there was a difference of opinion as to whether it was aneurism or malignant disease, the former view so far predominating as to lead to an attempt to ligate the common iliac. The operator, however, came to the conclusion while operating that the tumour was malignant, and abandoned the operation. The autopsy revealed the existence of an aneurism of the external iliac and femoral arteries. This case deserves being quoted at length “as showing the great extent of unseen disease which is often concealed behind iliac and femoral aneurisms rendering the arteries inaccessible, and also showing how far the ordinary symptoms of aneurism may be modified by changes in the sac making the diagnosis impossible even at the operation.”

J. R., æt. 38, admitted into St. Bartholomew's Hospital April 16th, 1858; temperate habits, and had enjoyed good health. In his right groin was a large elastic and pulsating swelling crossed and impressed by the crural arch, reaching as low as the saphenous opening, through which it protruded, and became subcutaneous, a portion being felt beneath the tensor vaginæ femoris. Above the crural arch the swelling could be felt for two inches and a half upwards and backwards, and here it appeared to end. Externally it could be traced nearly up to the anterior superior spine of the ilium, and in the opposite direction as far as the external abdominal ring. The pulsation was strong and forcible in all directions, synchronous with the pulse, and accompanied by a loud rough bruit. Pulsation of the arteries below unaffected. The patient complained of pain in the swelling, though the movements of the limb were little impaired, cellular tissue œdematous; skin quite congested. Pulse 90, strong, and no cardiac murmur.

The swelling had existed three years without increasing in size, and was attributed to straining in lifting heavy weights. Patient retained his occupation, and a fortnight before admission walked seventeen miles to “walk down” the swelling, and this without inconvenience, though the œdema rapidly increased after the effort.

This case was for a long time a problem to the gentlemen in attendance at the hospital. The appearances of aneurism in the tumour which projected through the saphenous opening were pretty plainly marked; the pulsation was of the aneurismal character and accompanied by a bruit; while, on the other hand, the frequency of pulsating malignant tumours in this situation, the absence of alteration in the pulse lower down the limb, and something in the aspect of the patient caused a suspicion in the minds of many that the disease was of cancerous nature, and unconnected with the vessels except by position. On the 19th of April Mr. Paget operated for ligature of the external or common iliac arteries, as circumstances might decide. On dividing the fascia transversalis and passing the finger into the iliac fossa, this cavity was found filled with a firm smooth convex swelling, which was behind the tumour felt in the groin, and too deep in the fossa to be felt from the front. It extended inwards beneath the iliacus muscle and fascia to the psoas, and below it was continuous with the pulsating mass felt above the crural arch; above it extended to within an inch of the kidney; did not pulsate, but was firm and apparently solid. As neither the external nor common iliac arteries could be reached, and as there was apparently a solid tumour occupying the iliac fossa, the suspicion of the cancerous nature of the tumour was confirmed and the operation abandoned. The patient was put to bed, soon recovering from the immediate consequences of the operation, but finally died, ten weeks after, of secondary hemorrhage.

On *post-mortem* examination a large diffuse aneurism of the external iliac and common femoral arteries was found, the swelling filling the lower half of the abdomen and greater part of the pelvis on the right side. The bladder was pushed to the left of the median line, and the cæcum lifted to the umbilicus. The right common and external iliac artery as it ran over the median surface of the swelling was compressed, but pervious; the coats healthy to within two inches of the crural arch, beyond which point its walls were thickened and rigid with calcareous deposits. In the posterior wall of the vessel there was an opening which led into the cavity of an aneurism. Its edges were regular and smooth, and it was covered with a firm clot. The lining membrane of the vessel was not to be traced for more than an inch beyond the mouth of the aneurism, the sac being formed of the neighbouring tissues condensed and compressed. The psoas passed through the centre of the swelling; it was softened, disintegrated, and separated from its connections. The iliacus had disappeared. The swelling itself consisted of blood clots in various stages of organization, without the concentric arrangement of a well-formed aneurismal clot.

We have in this case an example of a fully developed aneurism which did not perceptibly affect the distal pulsation of the arteries of the limb. This fact evidently proved one element in the diagnosis erroneous. In other instances we have seen the same absence of change in the pulsation of the arteries beyond the growth, and when it was discovered that no aneurism was present, great importance was at once attached to this symptom. It is apparent, however, that the character of the pulsation beyond the tumour has a qualified importance. Though this pulsation is generally diminished in aneurism, it is not invariably; and though the pulsation in the arteries is generally unaffected by the proximity of a tumour, yet such tumour may so far compress the artery as to very materially diminish the strength of the distal pulse.

This case derives much importance from the eminence of the surgeons engaged in its treatment, and the care with which it must have been studied.

A case of femoral aneurism mistaken for malignant disease was recently

reported by Mr. Gloag. (See *Am. Journ. Med. Sci.* for July last, p. 261; from *Brit. Med. Journ.* May 24, 1873). The symptoms of aneurism were all absent, while some of the more prominent features of malignant growths were present. This case has been so recently recorded in this Journal that we need not quote here the details, but we would especially call attention to the judicious remarks of the reporter.

2. *Malignant Growth mistaken for Aneurism.*—The accurate diagnosis of malignant growths from aneurisms, especially when located in the groin or pelvis, is frequently quite impossible. In these cases we may have a tumour forming in the course of an artery, with pulsation and bruit from the first, both of which cease on compression of the artery on the proximal side; exploration yields blood of an arterial character and perhaps with a jet. By no method of reasoning and by no scientific test, except perhaps the removal of some of the substance of the tumour and its examination by the microscope, can the question be definitely settled. The surgeon may suspect malignant disease from the enlargement of the glands, or the appearance of cachexia, but he is quite likely to be deceived in regard to both symptoms, and finally be compelled to act on the most favourable theory of the case.

In the following case, reported by Mr. Moore (*Med.-Chir. Trans.*, vol. xxxv.), we have an instructive example of this class of cases, and of the difficulties which the surgeon may have to encounter.

A man æt. 53 had great œdema of the left lower extremity, and pain in the groin and knee; limb as large again as its fellow; cutaneous vessels congested; œdema reached the crest of the ilium; abdominal walls pitted slightly on pressure for some inches above the groin; this region was swollen, and its folds were almost obliterated by a large pulsating tumour, a small portion only of which could be felt below Poupart's ligament; but it extended upwards toward the umbilicus beyond the horizontal level of the anterior superior spine of the ilium; occupied the situation of the external iliac artery and projected about equally on either side of that vessel; inward reached nearly to the median line, and outward far into the iliac fossa; its whole breadth being apparently about six inches. It was not movable; the greater part of its surface smooth and firm; was lobulated at four or five points, and the prominent parts were soft; tumour pulsated at every beat of the heart; impulse distinct and stronger when the femoral artery was compressed; but the pulsation though strong was less than is generally felt when a large aneurism full of fluid blood communicates freely with a large artery. It also varied at different parts of the tumour, being greater outside than within, at the soft prominences than at the level and firmer parts; the beat was weak on either side of the external iliac artery, which was consequently readily distinguished to be raised and stretched over the front of the tumour. A rough, loud murmur could be heard over the whole tumour; all the arteries beat hard and round, but, in the tibial vessels, the pulse was weaker on the left than on the right side; glands in the groin distinct but not enlarged, and a small hard lump could be felt above Poupart's ligament on the right side, and superficial to the external iliac artery.

The patient's account of his disease varied continually, but the most credible one seemed to be that it had begun three months before with swelling of both knees, which subsided in the right, while that of the left extended to the whole limb. Pain of a gnawing character was felt at the knee extending to the ankle, and followed by a stiffness and slight aching in the groin. Three weeks before admission he noticed a slight beating in the groin, and has lately suffered severe

pain in that part. About a month ago he used to pass an unusual quantity of water; the bowels were costive.

The first impression as to the nature of the disease was, that it was an enlargement, possibly of malignant character, of the iliac glands, and was treated accordingly for eight days following his admission; but the tumour increased in size, and its pulsation became stronger, and accompanied with great pain which prevented him from sleeping. The case was now thought to be one of aneurism, and the common iliac was ligatured; the patient died forty-three hours after the operation.

On examination a large tumour was found in the bifurcation of the common iliac artery. The external iliac arched over the tumour, and was tightly stretched and flattened; the internal iliac beat against its posterior part, and the obturator ran beneath it, so that the tumour was almost encircled in artery, and through its substance ran the large gluteal, sciatic, and internal pudic arteries. About half an inch below the right external iliac artery there was a mass of enlarged glands affected with encephaloid cancer. On examining the urine found in the bladder after death, it was found to contain an abundance of cancer cells. No examination of the urine with the microscope was made during life.

In this case the history given by the patient was entirely unreliable, a fact often noticed in doubtful cases. Another and more interesting feature of this case was the presence of cancer cells in the urine. This discovery was not made until the autopsy. Had this evidence of the existence of malignant disease in the system been discovered before death, it would have doubtless been regarded as decisive evidence of the malignant character of this tumour. And yet the absence of cancer cells in the urine would not be proof positive that the tumour was not malignant. It is noticeable in this case that the distal pulse of the affected limb was diminished.

Malignant growths in the region of the axilla and shoulder sometimes so closely simulate aneurisms as to render the diagnosis extremely difficult if not impossible. All the most reliable tests of aneurism may be affirmative, while the symptoms of malignant disease are doubtful or negative. In the following case, reported by Dr. Nicol (*Ed. Med. and Surg. Journ.*, vol. 72), the attention of the consulting surgeons was especially called to the liability to error in their diagnosis, by an eminent surgeon, and the examination was carefully repeated. After reviewing the symptoms of the case and submitting the growth to a thorough re-examination with the stethoscope, the conclusion was unanimous against malignant disease and in favour of aneurism.

Mr. T., æt. 68, a farmer, fourteen months ago, while suffering from rheumatism in the left shoulder-joint, fell upon the edge of the hatchway; was stunned; felt the rheumatic pain much aggravated; during the night sustained another heavy fall. The shoulder-joint and contiguous parts were very painful, and though the pain gradually subsided and he returned to his avocation with the arm in a sling, yet it was powerless from the shoulder to the elbow; day after accident he was seen by several surgeons, who declared there was neither fracture nor luxation; pain continued and swelling increased. Three months ago, observed pulsation in the tumour, which had attained considerable magnitude, and within the past three weeks its growth has been more rapid and the pain more aggravated; measures 8 inches in its vertical diameter, and $10\frac{1}{2}$ transversely; uniform on its surface, but more prominent over the axilla; portion occupying the axillary cavity being a trifle compared with that on the forepart

of the shoulder. A large vein traverses its surface; no discoloration of parts; is elastic and firm; compression does not diminish its bulk much; arm admits of free motion, but is very painful; embraced by the hand there is strong pulsation and distinct feeling of distension, the hand being visibly elevated, and this sensation and appearance is more marked at its most prominent part over and in the axilla; humeral artery can be felt high up; but in the axilla the pulsation is lost, as in the tumour, and close to it it is sawing and peculiar, but at the wrist differs but little from that of the others; diagnosis of consultants, aneurism of the axillary, or of one of the humeral vessels.

I communicated a history of the case to Prof. Syme, of Edinburgh; that gentleman expressed considerable doubt as to the tumour being aneurismal, and suggested that it might proceed from a vascular medullary growth from the bone. A week after, a second careful examination was made, when Mr. Syme's views were submitted to the consultation; the tumour had sensibly increased; no discoloration of parts; superficial veins had disappeared; notwithstanding the justly entitled deference extended to the doubts of Prof. Syme, none were entertained by the surgeons regarding the aneurismal character of the tumour. On the thirteenth day it was not sensibly increased, though the forearm had become cedematous and on stethoscopic examination the bellows sound was not as distinct as has been described by many writers; proceeded to ligate the subclavian artery above the clavicle; three hours after the tumour was free from pain; more flaccid; not much diminished in bulk; felt somewhat lobular; three weeks after the operation the patient was doing finely; the tumour had sensibly diminished; there was no discoloration; on the evening of that day a severe hemorrhage took place; he died three days after the occurrence of the bleeding. At the autopsy it was found that the humerus was detached about three inches from its head, which was supposed to be due to partial absorption; the artery was *perfectly sound alongside and past* the tumour, to which it was firmly adherent, together with the accompanying vessels and nerves. The muscles were also firmly adherent to the tumour, which was found to be encysted; much diminished in size, and the axillary projection described was caused by its being strapped down by the long head of the biceps; on section it was found to present all the characters of medullary sarcoma. Not a particle of matter was found, and the bone in its whole diameter for three inches downwards had disappeared, a thin shell of the head corresponding with its articulating surface only remained. On disarticulation its surface was sound, as also the scapular cavity, the ligamentous structures being much thickened.

Malignant growths in the region of the neck and lying in the course of the arteries are liable to be mistaken for aneurism, especially when of the encephaloid variety. In these cases the tumours are much more accessible than when located in the pelvic region, and their examination may be more thorough and satisfactory. Difficulties are more liable to be encountered when the growth is in the lower or upper portion of the neck and partially concealed by the upper border of the thorax or by the inferior maxilla. In the following case (*Lancet*, vol. i., 1844) the tumour was situated in the upper part of the neck, and extended deeply under the lower jaw:—

J. M., æt. 44, labourer; unhealthy appearance; had an oval tumour on the right side of the neck, in the post-superior triangle, penetrating deeply so as to push the right tonsil forwards; commenced two years ago; has continued to increase in size without causing him any annoyance; pulsation in the tumour is distinct, and ceases when pressure is made below it on the carotid, though pressure on this artery does not diminish the size of the swelling; has a boggy inelastic feel; no discoloration of the skin covering it; diagnosis, aneurism of the external carotid; the common carotid was ligated. Twenty-four days after the operation the patient died, and on examination the carotid artery was perfectly sound, except at the place where the ligature had been applied, and the

tumour was found to be carcinomatous, part of which was lodged in the angle formed by the division of the common carotid.

IV. ANEURISM AND PULSATING TUMOUR OF BONE.—The first reported case of pulsating tumour of bone (by John Pearson, of London (*Med. Com.*, vol. i.), in a paper read January 23, 1786) was mistaken for an aneurism of the anterior tibial artery. On the dissection of the limb, after amputation, he discovered that the arteries were sound, but that "the whole internal substance of the head of the tibia was destroyed, forming an excavation capable of containing more than half a pint of fluid." About the same time Scarpa (*Reflexions et Observations sur l'Aneurisme*) had a very similar case under observation, which he diagnosed as rupture of the anterior tibial artery. Amputation was performed, and, on dissection, he found the arteries all in the most perfect state of integrity, but extensive destruction of the head of the tibia was present.

Since the date of Pearson's and Scarpa's publications, a large number of cases have been reported, a considerable percentage of which was mistaken for aneurism. These tumours may be classified as follows: 1. Those receiving an impulse from an adjacent artery; 2. Those of a cancerous nature; and 3. Osteo-aneurism. In each variety the difficulties attending the diagnosis may be very great and, in some cases, insuperable. The symptoms of aneurism may present themselves with varying intensity and exactness, and confound the most sagacious practitioner. It is only when the expanded bone is detected that the surgeon is fully assured of the nature of the affection.

Of the many reported cases of error in the diagnosis of pulsating tumour of bone from aneurism, the following, by Mr. Stanley (*Med.-Chir. Trans.*, vol. xxviii.), fairly illustrates the difficulties which may be met with:—

Patient, a man of temperate habits, 42 years of age; pulse varied from 96 to 100, and the finger placed on any of the large arteries received the sensation of the vessels being preternaturally large, the beats being accompanied by a powerful vibration; a distinct bruit was perceptible, with the stethoscope, over the brachial and femoral arteries. The pulsation of the left ventricle of the heart was loud, but there was no bruit. About the middle and inner side of the arm there was a tumour, loosely connected with the surrounding textures, the size of a small orange, painless and devoid of pulsation; had noticed it ten years ago, and had been stationary for the past three years. On the left side of the pelvis was a tumour, connected with the ilium, projecting from both its surfaces, but more so from the abdominal surface. It extended from the abdominal surface of the ilium, downwards, to Poupart's ligament, and into the cavity of the abdomen towards the median line. The tumour was moderately firm, and did not recede when compressed. Everywhere within reach of the fingers the tumour pulsated with the deep heavy beat of aneurism; the pulsation was less forcible on the portion projecting from the dorsum of the ilium. A bellows sound was plainly perceived on auscultating the tumour. The external iliae could be traced by its pulsations along the inner side of the tumour. Compression of the femoral artery below the tumour increased its size and tension, and its pulsation stopped on compressing the lower part of the aorta. A small artery was felt in the lower and outer part of the tumour, and the skin covering it presented a slight blush. A consultation was held, and the preponderance of opinion was in favour of aneurism. Ligature of the

common iliac was performed; after the ligature of the iliac artery had stopped completely the pulsation of the tumour, an artery the size of a crow's quill was discovered pulsating forcibly on its upper surface within the abdomen. Three days after the operation the man died from peritonitis, and, on examining the tumour, it was found that a portion of it had displaced the external iliac artery from the walls of the pelvis, but this artery had no immediate connection with the tumour. The substance of the tumour was composed of a spongy tissue with cells and vessels distributed through it.

The feature of this case which most clearly distinguished its true character was the projection of the tumour from both surfaces of the ilium. An aneurism of one of the iliac arteries could scarcely have produced such destruction of this bone as to have penetrated to its external surface.

Dr. C. D. Smith, of New York (*N. Y. Journ. Med.*, March, 1853), reported a case of pulsating tumour of bone, which was mistaken for aneurism of the posterior tibial artery. A ligature was applied first to the posterior, then to the anterior tibial artery, subsequently to the femoral, and finally amputation was performed. There was no bruit at any time. In this case Dr. Mott was in consultation.

V. ANEURISM AND ENLARGED THYROID BODY.—In the enlargement of a lobe of the thyroid body the tumour may apply itself very accurately to the region immediately over the carotid artery. In this case the tumour receives the pulsations of the artery, it may also emit a bruit when pressed by the ear upon the artery, and it may be so low in the neck as to prevent compression of the artery on the proximal side.

The scientific test of most value, when the tumour (bronchocele) is small and movable, is its movement with the larynx. This is a positive sign that the growth is connected with the larynx, and hence cannot be a carotid aneurism.

Guthrie says:—

"There are few surgeons in London who have not seen one case, at least, of bronchocele which has been mistaken for carotid aneurism, from inattention to the motions of the tumour as dependent on those of the larynx. A gentleman, an adjutant of militia, came, some few years ago, to me, with an enlarged lobe of the thyroid gland, to be operated upon for carotid aneurism, and was cured by iodine."

The following case came under my observation.

J. C., aged 30, entered Bellevue Hospital in 1869, with a pulsating tumour of small size on the right side of the neck, a little below the level of the prominent part of the larynx. The tumour had gradually been enlarging for several months; its pulsations were marked and synchronous with the heart; auscultation revealed an imperfect bruit. The tumour moved freely with the larynx, revealing the nature of the growth. Under the free use of iodide of potassium the tumour rapidly disappeared. The tumour had been diagnosticated aneurism of the carotid by a surgeon in large practice, and the question of ligature of that artery was to be decided.

In that affection of the thyroid body known as "pulsating or exophthalmic bronchocele," the tumour becomes enlarged, with violent pulsations

of the carotid and thyroid arteries, bruits are heard on auscultation, and there is prominence of the eyeballs. The symptoms have some resemblance to those of aneurism of the carotid, and Dr. Stokes notices an instance in which the mistake was made and a day was appointed for the operation of ligating the carotid. Such an error would be avoidable by attention to the symptoms and conditions which distinguish those cases.

VI. ORBITAL ANEURISM.—The various so-called orbital aneurisms generally have characteristic symptoms. There is protrusion of the eyeball, with pulsation of the mass, and a more or less diffused bruit over the temporal or frontal region, perceptible to the patient. But experience proves that these symptoms may all be present and of the most perfect character, and yet no aneurism be present.

Mr. Hulke relates a case (*Oph. Hospt. Reports*, April, 1859) entitled "*all the capital signs of orbital aneurism present, in a marked degree, but independently of aneurism or any erectile tumour.*" The following are the principal features of the case :—

A woman, æt. 40, admitted into King's Coll. Hospital, under Mr. Bowman; five months before, she was struck on left side of head and temple; next day had severe pain in left temple; aggravated when she moved or stooped; subsided after a fortnight, but was followed by a rushing noise like steam engine on same side of head; noise constant, but increased when the heart's action was quickened; gradually increased in loudness, and was heard by her husband; her sight began to be affected, and the left eye projected; there was general fulness of left orbital region; pupil dilated but active; sees distant objects perfectly, but is unable to read; angular vein and one over outer edge of orbit dilated; abrupt depression in lower border of orbit at articulation of malar and upper maxillary bone; loud sibilant bruit heard extensively over left side of head, but most intense above and in front of ear and synchronous with heart; similar bruit along course of great cervical vessels as far down as common carotid artery; fingers placed on closed lids rise and fall, and pulsation plainly felt; loud bruit heard when stethoscope is placed in front of the globe; no giddiness nor loss of memory. Diagnosis, orbital aneurism. Mr. Bowman ligated the common carotid artery; all pulsation and bruit arrested; next day she complained of great throbbing in right side of head, and sound of a distant drum on left side; eye less prominent and less congested; sight improved; one week later a bruit could be heard over the front of the eye and left forehead but more faintly; a little above and in front of the ear of same side a musical note of rather high pitch could be heard at each pulsation; on the eighth day the wound became phagedenic, and hemorrhages occurred which proved fatal.

Autopsy.—No aneurism nor erectile tumour was found; brain and all its vessels quite healthy; disintegrated coagula were found in the cavernous, transverse, and petrosal sinuses, and in the ophthalmic vein where it opened into the cavernous sinus.

The pathological appearances were regarded by Mr. Hulke as those of "phlebitis of the cavernous, transverse, circular, and petrosal sinuses." The bruit, he conjectured, might be occasioned by compression of the internal carotid artery, by the swollen walls of the cavernous sinus, against the side of the body of the sphenoid bone; the cranial bones would have formed a good medium of conducting the sound. The protrusion of the eyeball, as well as its pulsation, might have been due to plugging of the

ophthalmic vein where it joins the cavernous sinus. In commenting upon this case Mr. Hulke remarks :—

“Bruit, pulsation, protrusions of the eyeball, in short all the physical signs of orbital aneurism were present in a marked degree, yet no aneurism or cretile tumour existed. How much doubt this case throws on many of the recorded examples of aneurism of the orbit !”

VII. IRREGULARITIES OF BONE LEADING TO ERRORS IN THE DIAGNOSIS OF ANEURISM.—In the preceding causes or sources of error in the diagnosis of aneurism, the disease or condition simulated has been some form of swelling or tumour. In some cases the tumour has either been so placed upon or by the side of the artery as to receive its impulse, and in other cases the abnormal growth has developed within itself all the elements of error. But the error may arise from a very different cause, viz., by the elevation of the artery by displacement from beneath. In these cases there may be a small tumour which has an expansive pulsation, and a bruit, and on compression of the artery above the tumour, pulsation ceases and the tumour is diminished in size. All the scientific tests in such a case, even that of puncture, would rather confirm the surgeon in his error, as the following case, reported by Mr. Nunnley, illustrates :—

A coal miner, æt. 44, admitted to Leeds Infirmary November 16th, 1866; walked from the railway station to the Infirmary and up to his ward without assistance; had the look of a suffering man; though somewhat lame of the left leg, and using a stick, the limb was neither everted, inverted, nor shortened. The body was bent a little forward, but the whole foot was placed on the ground in walking; complained of stiffness and pain in the groin, and not in the hip. On the left side, just under Poupart's ligament, and in the course of the femoral artery, there was a swelling perceptible to the sight and touch, with decided pulsation, and certainly under the fascia lata; the tumour being not large but well defined; has never met with a fall, accident, or injury of any kind; twenty-two weeks previous to admission, while walking on level ground and in perfect health, suddenly felt something giving way in his groin, and was unable to continue walking; pain was intense; became helpless, and had to be carried home; since then has been unable to work or move the leg much; all his suffering is in the groin; there is neither tenderness nor deformity about the buttock; pulsation was decidedly lateral and apparently expansive, and was distinctly felt and seen. With the stethoscope bruit was plainly perceived, and very different from that in the right thigh; pressure on the femoral below the swelling increased size and distinctness of pulsation, and on the iliac lessened both as long as it was continued. In the popliteal space the artery was less perceptible than that of the right side. The limb was colder than the right one, and not swollen. The patient moved about in the ward by himself; a consultation was held, and all arrived at the conclusion that the case was one of a small aneurism, probably springing from an opening on the posterior part of the femoral artery, high up, and containing little if any coagulum. It was determined to tie the external iliac, which was done on the 22d November. The artery was felt to be of more than ordinary size. As the ligature was tied the tumour lessened and the pulsation ceased, thus confirming the correctness of the diagnosis to every one present.

The patient expressed himself much relieved. There was no peritonitis, but he died on the ninth day, probably from exhaustion, there being no other obvious cause.

On examination there was found a comminuted fracture of the neck of the femur, which must have occurred without symptoms or violence, being sus-

pected by no one, and of which there was no history. The abnormal distribution of vessels was most remarkable, and in connection with the unknown lesion exactly simulated an aneurism.—*Lancet*, 1867, II. 390, 430.

CONCLUDING REMARKS.—In concluding this paper it should be stated that the subject is by no means exhausted. Surgical literature affords abundant examples of errors in the diagnosis of aneurism from other forms of disease and growths than those mentioned. Perhaps, of the catalogue of cases unenumerated, glandular enlargements are most frequent. Collections of blood from ruptured veins and hernial tumours are more rarely reported, while uterine and ovarian tumours, stone in the bladder, etc., are rare and exceptional instances of error.

In reviewing the subject it is proper to refer again to the propositions with which the paper was introduced, and to the general statement that aneurism has no pathognomonic sign or symptom. It is apparent that each sign and symptom has in turn been found fallacious in the ever-varying conditions under which aneurisms appear. If we examine the propositions above-mentioned in the light of the preceding record of cases, the force of this conclusion will become manifest.

1. *A Tumour situated in the course of an Artery is of frequent occurrence without the presence of Aneurism; in itself the symptom is of no positive value.*—That a tumour may appear in the course of an artery, which is not aneurismal, has been frequently noticed in this paper. It has also been demonstrated that an aneurismal tumour may appear at such a distance from the course of the artery from which it springs as to mislead the surgeon as to its nature, and, if correctly diagnosticated, as to its origin. These cases occur more often in the abdominal region. An aneurism of the abdominal aorta may thus first appear in the inguinal region or groin, and mislead the most careful surgeon as to the nature and origin of the tumour. (See pages 308 and 309 of this Journal for April, 1873.)

2. *Pulsation may or may not be present when Aneurism exists; to be of value when present it must be expansive.*—This has been considered a crucial test, and yet it may be present and well marked without the existence of aneurism, as when an abscess partially surrounds an artery, or when a cystic or fibro-cystic tumour is in immediate relations with an artery, or in vascular tumours. (See pages 402–405 of this Journal for October, 1873.)

3. *Cessation of Pulsation when the Artery is compressed on the Cardiac Side with partial subsidence of the Swelling.*—Numerous examples have been given of the variable character of this test. Every tumour deriving its pulsation from its contiguity to an artery will cease to pulsate when the artery is compressed on the cardiac side, and these tumours will subside to the extent to which the fluid contents can recede from the surface. Cystic and vascular tumours placed over arteries and abscesses receiving the impulse of arteries, but so imperfectly circumscribed that the

contents fluctuate, will very accurately respond to this test. (See Mackenzie's case in this Journal, April, 1873, p. 315.)

4. *A Bruit may or may not be present in Aneurism; when present it is variable in its character.*—The variable and unreliable character of this symptom has been so repeatedly demonstrated that it does not require further notice.

5. *Exploratory Puncture may fail to give exit to Blood in an Aneurism, and may give a jet of Blood in several kinds of Tumour.*—In partially consolidated aneurisms puncture often fails to give exit to blood. And, again, blood may flow very freely, and even *per saltum*, as in vascular and malignant tumours, pulsatile tumours of bone, and puncture of the artery when displaced by growths.

To these conclusions we might add the following :—

6. *Diminished Pulsation in the Distal Portion of the Artery affected with Aneurism may or may not exist.*—Some authors lay great stress upon the diminished pulsation of the distal pulse of the arteries of the affected limb, and regard it as a reliable proof that aneurism is present. But the symptom has proved to be unreliable, nor can we fix its value. While diminished pulsation is generally present in aneurism, yet it may not be noticed when the aneurism is well marked. (See Mr. Paget's case, p. 18.) The pulse depends upon the freedom with which the blood circulates through the artery at the point of lesion; this will vary according to the nature of the opening, its situation, and the degree of compression by the tumour. When the lesion is large or irregular, or is situated at the commencement of a curve of the artery, it may receive the direct current of blood, and the force of the heart's impulse is largely expended at that point. Again, the pulse may be diminished by the pressure of any form of tumour directly upon the artery, and hence we may have diminished pulsation without aneurism.

It follows from these conclusions, not only that aneurism has no pathognomonic symptom, at least among those above given, but that the symptoms most relied on in the diagnosis of aneurism may be present when there is no aneurism, and may be absent when aneurism exists.

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ART. II.—*The Present State of our Knowledge of the Pathogenesis of Tumours.* By S. W. GROSS, M.D., of Philadelphia.

IN their histological construction, morbid growths differ from the normal tissues, which they often so closely resemble as to be indistinguishable from them in the arrangement of their constituents, which, instead of