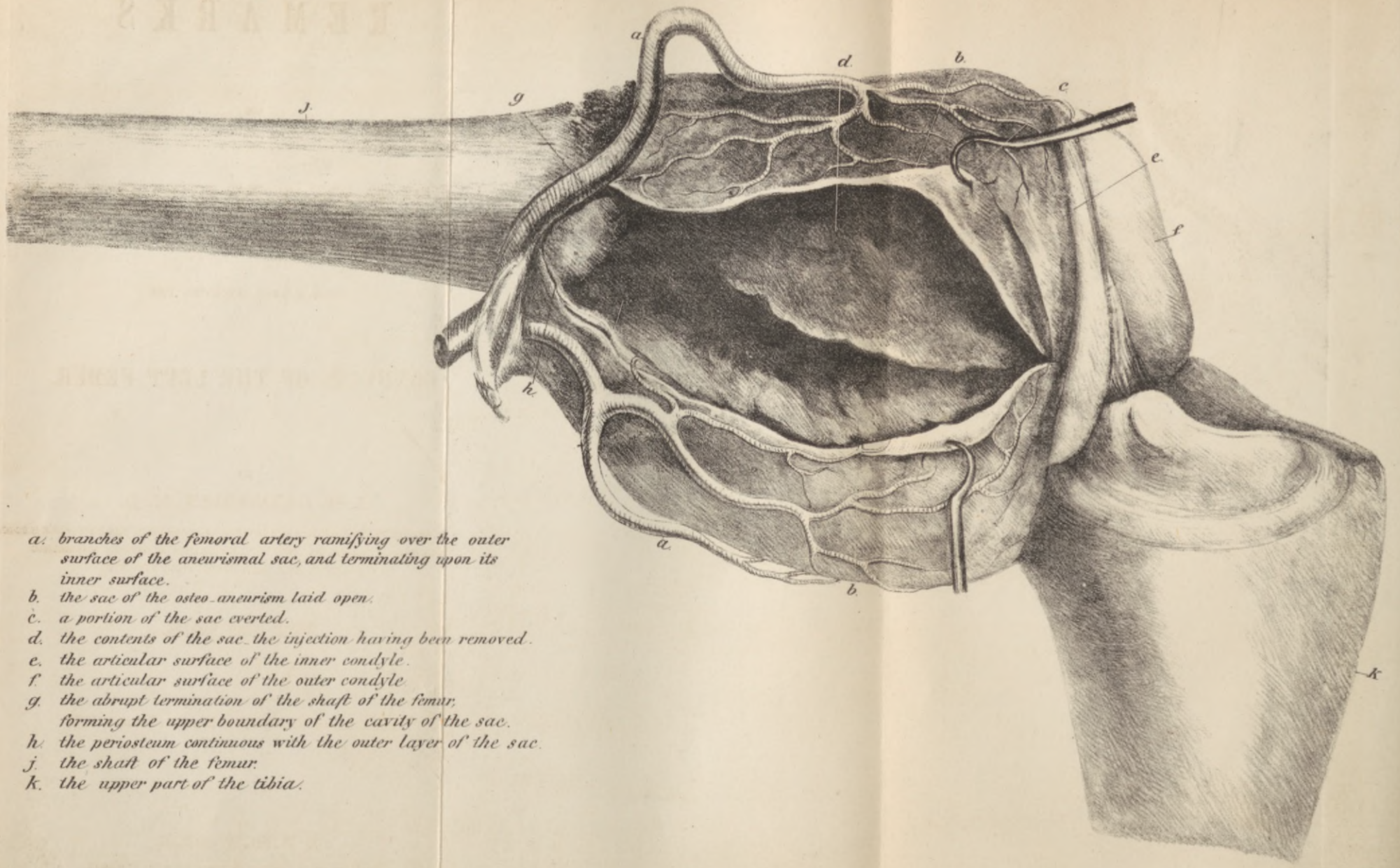
Dr CARNOCHAN'S CASE OF OSTEO ANEURISM.



a. branches of the femoral artery ramifying over the outer surface of the aneurismal sac, and terminating upon its inner surface.
b. the sac of the osteo-aneurism laid open.
c. a portion of the sac everted.
d. the contents of the sac, the injection having been removed.
e. the articular surface of the inner condyle.
f. the articular surface of the outer condyle.
g. the abrupt termination of the shaft of the femur, forming the upper boundary of the cavity of the sac.
h. the periosteum continuous with the outer layer of the sac.
j. the shaft of the femur.
k. the upper part of the tibia.

REMARKS

ON

OSTEO-ANEURISM,

WITH A CASE INVOLVING THE

CONDYLES OF THE LEFT FEMUR.

BY

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With Two Plates.

From the New-York Medical Gazette, January, 1853.

NEW-YORK:

D. Fanshaw, Printer, 35 Ann-street, corner of Nassau.

1853.

REMARKS ON OSTEO-ANEURISM,

WITH A CASE INVOLVING

THE CONDYLES OF THE LEFT FEMUR.

The pathological condition met with, at times, in certain portions of the osseous system, under the name of Osteo-aneurism, has as yet received but little notice from surgical writers in this country. As generally it involves the cancellated structure of the extremities of the long bones, and even encroaches, at the early period of its developement, upon the contiguous articulation, the diagnosis may be found embarrassing, and the disease mistaken for some of the other diseases of the joints, attended with abnormal enlargement and a morbid condition of the articular surfaces. The case related below, and from which the accompanying drawings were taken, passed into my hands after having been pronounced a strumous affection of the knee joint by very good surgical authority; and it was only after several careful examinations, that the pulsative and aneurismatic character of the tumor was detected.

The first description of this disease dates no farther back than the close of the last century, when Pearson, of England, in 1790, and Scarpa, in 1792, reported each a case of this disease of the osseous tissue. More than a quarter of a century elapsed before any new facts were recorded; and it was not until the year 1826 that science was again enriched by the observations of Dupuytren, Lallemand, and Breschet, on the pulsatory tumors of the bones. More recently, cases of pulsative tumors of the bone have been furnished, principally by M. M. Roux and Velpeau, of France, and by Liston and Handyside, of Scotland; but it is to be inferred from the descriptions of some of these cases, that they were not strictly cases of Osteo-aneurism.

The distinctive feature of true Osteo-aneurism, or aneurism of bone, appears to be the existence of a pulsatory tumor, formed by an osseous shell, the cavity of which contains blood or coagula, and communicates with the interior of the arteries of the bone.

There are other tumors of bone which present pulsations, and are of a sanguineo-fungoid composition; but they are malignant, and are to be classed as medullary or encephaloid cancers. There may, also, exist tumors of bone where the osseous tissue has expanded into a cyst, containing a sero-sanguinolent fluid, but having no pulsation and no direct communication with the arteries of the bone.

A perusal of the cases of pulsative tumor of bone, recorded by surgical writers, would induce the belief that the true Osteo-aneurism, disconnected with other disease, is rarely to be met with; but it is probable that in many cases the tumor has commenced as Osteo-aneurism, and that the encephaloid degenerescence becomes superadded to the original disease, during its progress.

The medullary, or encephaloid tumor of bone should be regarded as a distinct pathological condition from true Osteo-aneurism; the former being invariably malignant in its character and progress, and the latter being by no means necessarily so. The pathological characteristics made manifest upon examination, after removal of some of these pulsative tumors, and the influence of the application of a ligature upon the principal artery of the limb, in causing the disappearance of the tumor, will not allow us to doubt that Osteo-aneurism may exist simply as such, and be unaccompanied by any malignant degenerescence, as a complication. The morbid appearances of the tumor represented by the accompanying plate, and of which a detailed history is subjoined, furnish an example of true Osteo-aneurism; that is to say, the tumor was formed of an osseous shell, the cavity of which was filled with fibrinous coagula; and the enlargement was not accompanied by any cancerous structure. I will here remark that the diseased part, after removal, was examined by the microscope, by which my opinion was confirmed. The entire recovery and present good health of the patient, and the total absence of anything like malignant cachexia, also corroborate the view that the morbid structure, of which the tumor was composed, was not of a malignant character.

It is to Scarpa that we are chiefly indebted for the facts thus far known in relation to the morbid anatomy of Osteo-aneurismatic tumors. Whatever may be the elementary lesion of tissue in this disease; whether it be of a character analogous to the erectile tumor of the soft tissues, or whether the incipient change of structure be dependant upon a degeneration and dilatation of the coats of the smaller arterial tubes by which the spongy portions of the bone are nourished, it is to a certain degree established that these tumors of bone invariably originate in the cancellated structure of the osseous system, and most commonly in the tibia, at its upper extremity, and next, in the condyles of the femur. The diplöe of the flat bones of the cranium would also seem, at times, to afford a nidus for the development of the pulsative osseous tumor, and even the cancellous structure of the scapula has been found to be the original seat of the disease.

The disease once developed, a cavity is formed in the interior of the bone, at the expense of the cancellous structure, and this apparent loss of substance continues as the disease advances, until the extremity of the bone becomes enlarged and expanded into a laminated shell. This bony cyst, presenting on its external surface, upon manual examination, irregularities and depressions, will become so thin as to be flexible and elastic under pressure, affording to the fingers a sensation of crackling or crepitus. As the tumor enlarges, the osseous wall may be destroyed, at certain points, by absorption; the intervening spaces, previously occupied by the lamellated bone, being then replaced by thickened periosteum and the super-imposed tissues. In some instances, the destruction of the cancelli is so great that a trifling force will be sufficient to separate the entire articular extremity of the bone from its shaft. This was the case with the condyles of the femur represented in the drawing, [vide plate No. I.] On the external surface of the sac, the periosteum is found thickened, and the articular arteries are seen enlarged and creeping over the tumor; some of them perforating its wall. The inner surface is irregular, unequal and rough, presenting at points, where the arteries have been injected, the open orifices of the arterial vessels. The interior of the sac, as related by Scarpa, presented in one instance clots of blood and strata of coagulated fibrin, similar in appearance to the contents of a sac of a true

arterial aneurism. The principal arterial trunk is not implicated in the disease; but according to the last named authority, the vessels which enter into the cancellated tissue of the bone are enlarged, and terminate abruptly by open mouths, upon the inner wall of the aneurismatic sac. The contiguous articulation is not invaded by the growth of the tumor; the articular cartilage and synovial membrane maintaining their integrity, even where the osseous tissue has disappeared, down to the cartilage.

The development of Osteo-aneurism is generally preceded by the presence of pain, more or less severe. The pain may be slight and gradually supervening, occurring at intervals during a certain period of time, and then remaining continuous and severe; or it may suddenly attack the part during some accidental motion; being then ushered in by a sensation of crepitus about the neighboring joint, and causing much suffering from its first accession. Within two or three months from the accession of the pain, evidences of the enlargement of the bone, at the seat of the disease, begin to show themselves; and in a short time the tumor increases so as to encroach upon the adjoining articulation, and to present to the inexperienced, characters similar to those of strumous engorgement of the joint. When the extremities of the long bones are affected, the tumor projects generally upon one side of the articulation; the projection not being abrupt, but gradual. The super-imposed skin retains for a time its natural color and appearance; but in the progress of the disease it acquires a redish tint and seems to be more tense. The veins in the subcutaneous cellular tissue appear to be distended and are seen creeping over the surface of the tumor, which now assumes the suspicious aspect of a malignant growth. The tumor, at different parts, gives evidence of varying consistence; the most prominent parts convey to the fingers the sensation of elasticity and fluctuation, while resistance and hardness become more apparent as the examination is extended towards the base of the enlargement; by pressure upon some parts of the tumor, a kind of crepitus is distinctly felt, as if the osseous shell had become thinned down and cracked into contiguous fragments; lastly, the limits of the tumor are not distinctly marked, the base appearing to merge gradually into the surrounding healthy structures.

In addition to these external characteristics, the tumor is accompanied by aneurismatic signs, from which it has received its distinctive appellation. As in aneurism of the large arterial trunks, there is evident pulsation, synchronous with the action of the heart, and marked by the expansive dilatation peculiar to aneurismal pulsation; and the pulsation also ceases, when the circulation through the principal arterial trunk is interrupted by pressure, and re-appears when the pressure is withdrawn. During the pressure on the artery, the tumor becomes somewhat more flaccid and soft; and by examination with the fingers, the depression or excavation in the bone can then be, in certain cases, more or less distinctly perceived. It has been said that the pulsations, although synchronous with the systole of the heart, may not be accompanied with any *bruit de soufflet;* but in the case here related, the *bruit de soufflet* was distinctly audible.

By degrees the function of the contiguous joint becomes impeded, and after a time entire extension becomes impossible. If it be the femoro-tibial articulation that is affected, the limb assumes a semi-flexed position, similar to that represented in plate No. II. As the tumor grows and acquires farther developement, the pain becomes more and more aggravated and lancinating. At this stage the patient may demand amputation as a relief from the excruciating torture he endures.

The march of Osteo-aneurism is not rapid in its course; it may be present for one or two years, during which the tumor slowly increases in size, without marked constitutional sympathy. The termination of the disease, most likely, if left to pursue its course, would be to ulcerate at some point and to burst, the laceration of the sac being accompanied by profuse and exhausting hemorrhage. Various kinds of treatment are resorted to, but they generally prove unavailing; and it is generally cut short by amputation and cure, or by death, caused by consecutive accidents and subsequent complications.

Pathological researches induce the belief that the proximate cause of Osteo-aneurism, or the initiatory morbid changes of structure which accompany its commencement, are to be looked for in the vascular tissue of the bone. Whether this be a dilatation of the smaller arterial tubes, or an erectile developement of the vessels of the osseous

cancelli, have been controverted questions. My own opinion is, that the elemental lesion consists in an earthy calcareous and atheromatous degeneration of the tunics of all the arteries, by which the cancelli of the bone, at the seat of the disease, are supplied. It is difficult, otherwise, to account for the abrupt termination of the vessels of the bone by open mouths upon the inner wall of the sac, for the definite character of the excavation of the bone, or for the fibrinous character of the contents found in it.

The remote cause of the tumor is generally reported by the patient to be some antecedent injury received from a fall or sprain, or to some such accidental or sudden violence.

The diagnosis of an Osteo-aneurismatic tumor, especially in its incipient stage, is often involved in obscurity. If there be a combination of encephaloid degenerescence with the aneurism, it may be impossible to detect its presence until after the removal of the morbid growth from the living body. Osteo-aneurism, in certain localities, may be mistaken for aneurism of one of the large arterial trunks; for Osteo-cephaloma or the encephaloid cancer of bone, when accompanied with pulsation; for strumous engorgement of the neighboring articulation, or for the encysted tumor of bone. When osseous aneurism is seated near a large artery, as for example, when the condyles of the femur are thus diseased, much embarrassment may occur in determining whether the pulsatory tumor may not be the result of an enlargement of the popliteal artery. The characteristic differential traits will be the sensation of crepitation, imparted to the fingers when pressing upon some points of the surface of the osseous sac of an Osteo-aneurism; the structure of the tumor, relatively to the course of the artery; the shape of the tumor and its apparent continuity with the surrounding structures and the subjacent bone; its entire immobility, while ordinary aneurism is more or less moveable; and lastly, the excavation or loss of substance of the bone, which, together with an abrupt bony margin, can be felt, by pressing for some time upon the tumor. It has been said, in cancerous pulsatory tumor of bone, auscultation will discover the *bruit de soufflet*, which is absent in true Osteo-aneurism; but this diagnostic mark cannot be admitted as invariable or certain, for in the case here recorded, the *bruit*

de soufflet was distinctly heard over the greater part of the tumor, by myself, and also by my colleagues, Drs. Henry Cox, MacNeven, and Ford.

Osteo-aneurism and the encephaloid tumor of bone have many symptoms or signs in common; both may be attended with expansive pulsation, crepitation, elasticity and lancinating pain. The greater reduction of the tumor, when compression is applied upon the large arterial trunk by which it is supplied, the more distinct saccular formation of the osseous cyst, the entrance into the sac, by open mouths, of numerous small arterial tubes, upon its inner wall, the microscopic character of the contents of the sac, showing them to be fibrinous deposit and coagula of blood, and lastly, the passage into the interior of the sac, of coarse injection or wax injected into the arterial trunk, are the chief signs which distinguish Osteo-aneurism from the encephaloid tumor of bone.

As regards strumous engorgement of the joint, the absence of pulsation, the more general tumefaction of the joint, and the history of the growth of the tumor, are signs sufficiently distinct to prevent the observer from confounding the disease with Osteo-aneurism.

The encysted tumor of bone is so very different in its symptoms from Osteo-aneurism, that it is not allowable to suppose that in any case one disease can be mistaken for the other.

The existence of an Osteo-aneurism once discovered, the surgeon is warned that he has to contend with a disease of a very serious character. Its tendency, when unimpeded, is to destroy the cancellated structure of the entire extremity of the bone where it commenced; so much so, that in the long bones, the epiphysis may become completely detached from the more solid structure of the shaft. Pressure and topical applications are unavailing and the ligature of the principal artery of the limb, as appears from recorded cases, is a proceeding of doubtful efficacy; in fact, except in the incipient stage, amputation is almost the only remedy by which the life of the patient may be saved.

The analogies between ordinary aneurism and Osteo-aneurism, that is to say, the pulsation attendant upon both forms of tumor and some other characteristics, naturally suggested the idea that the interrup-

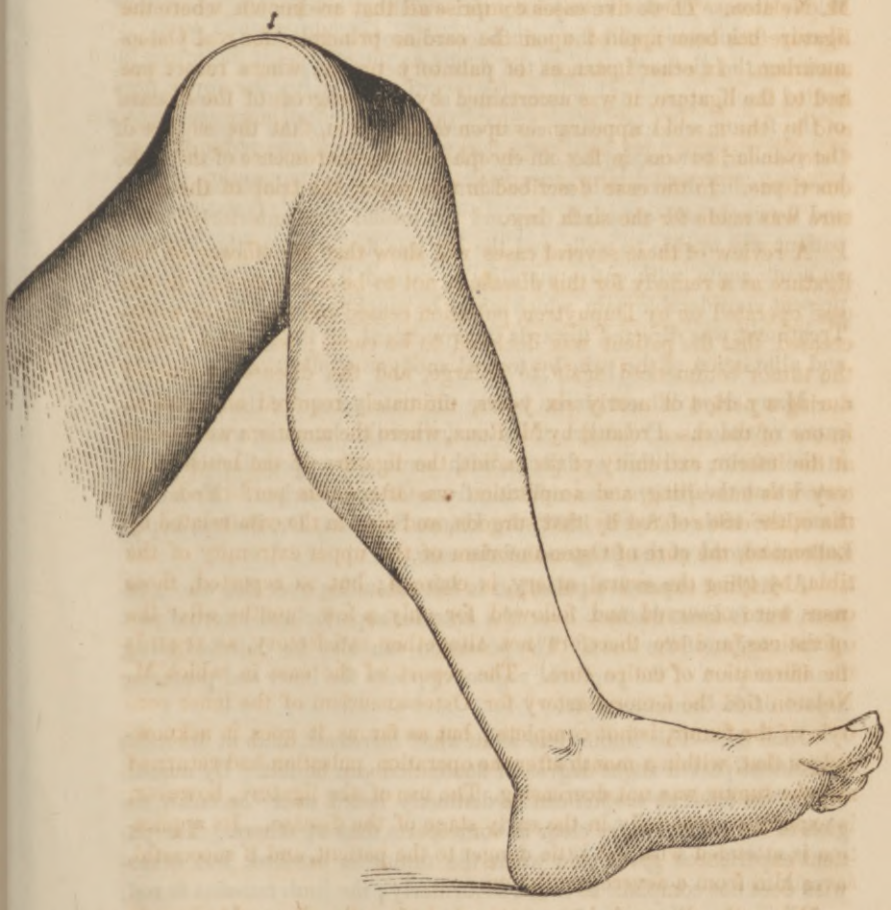
tion to the circulation, above the seat of the disease, by ligature or by compression, might prove as successful in one disease as it was known to be in the other; but in practice, the ligature of the principal artery, above the seat of the disease, has not been entirely successful. In 1819 Dupuytren, acceding to the doctrine of Breschet, that Osteo-aneurism was formed by an erectile tissue, for the first time, applied the ligature upon the artery, above the seat of the disease. Since that time we have the records of four cases, treated upon the same principle; one related by Lallemand, two by M. Roux, of Paris, and one by M. Nelaton. These five cases comprise all that are known, where the ligature has been applied upon the cardiac principle, for real Osteo-aneurism. In other instances of pulsatory tumor, where resort was had to the ligature, it was ascertained by the progress of the disease and by the morbid appearances upon examination, that the supposed Osteo-aneurism was, in fact, an encephaloid degenerescence of the osseous tissue. In the case described in this paper, the trial of the ligature was made for the sixth time.

A review of these several cases will show that the efficacy of the ligature as a remedy for this disease is not to be relied upon. In the case operated on by Dupuytren, pulsation ceased and the tumor so decreased that the patient was declared to be cured; but after a time the tumor commenced again to enlarge, and the disease, protracted during a period of nearly six years, ultimately required amputation. In one of the cases related by M. Roux, where the aneurism was seated at the inferior extremity of the radius, the ligature of the brachial artery was unavailing, and amputation was afterwards performed. In the other case related by that surgeon, and also in the case related by Lallemand, the cure of Osteo-aneurism of the upper extremity of the tibia, by tying the crural artery, is claimed; but as reported, these cases were observed and followed for only a few months after the operations, and are therefore not altogether satisfactory, as regards the affirmation of entire cure. The report of the case in which M. Nelaton tied the femoral artery for Osteo-aneurism of the inner condyle of the femur, is not complete; but as far as it goes, it acknowledges that, within a month after the operation, pulsation had returned and the tumor was not decreasing. The use of the ligature, however, is expedient, especially in the early stage of the disease. Its application is attended with but little danger to the patient, and if successful, saves him from a severe mutilation.

When the diagnosis is ascertained, before the disease has made

much progress, and the osseous tissue has not become extensively invaded, resection of the articular extremity of the long bones is at times justifiable.

In the advanced stage of the disease amputation remains as the only remedy; then the osseous sac can no longer be obliterated by the interruption of the circulation, and the devastation of the cancellated structure, at the seat of the disease, becomes too great to admit of resection as a remedy.



No. II.—Showing the appearance of the tumor, its projection upon the inner aspect of the knee, and the position of the limb before the femoral artery was tied.

Case.—Hannah Martin, æt. 35, married, a native of England, with dark hair and complexion, of nervous temperament and small stature, was admitted into the Immigrants' Hospital on the 13th day of April, 1852. Sixteen months before her admission she had received a severe injury on the region of the knee, from a fall. From this, in a few weeks she entirely recovered. Eight months after she was suddenly attacked by uneasy sensations about the knee, which were soon followed by severe pain and by slight tumefaction. She had applied for relief elsewhere, and had been treated for some months for scrofulous disease of the knee-joint; the swelling, meanwhile, continued slowly to increase, and the pain became more aggravated. Upon examining the diseased part, at the date of her admission, a tumor presented itself, apparently commencing at the middle of the lower third of the femur, and extending downward in front, to the upper part of the patella; but occupying chiefly the anterior and inner aspect of the knee, passing downwards and backwards toward the popliteal region, and forwards and outwards, beyond the mesial line, anteriorly. The patient was unable to walk, and the leg was flexed upon the thigh at an acute angle, with entire inability to extend it. There was always present considerable pain, which might be much increased by pressure. Treatment was directed towards improvement of the general health, and alleviation of the pain by topical anodyne applications.

Many days did not elapse before the true nature of the disease became revealed. Pulsation of an aneurismatic character was detected in the tumor, and this symptom, with some other peculiarities, indicated that the patient was suffering from Osteo-aneurism. From this time, the 18th of April, 1852, the House Surgeon, Dr. Bailey, kept a correct record of the progress of the case.

A distinct expansive pulsation is felt extending over the whole tumor, but is most distinct over the anterior-superior and internal part of the region of the knee. The pulsation can also be detected along the inner part of the popliteal region, opposite the inner and posterior aspect of the inner condyle.

June 3d.—The tumor has somewhat increased, and at its most prominent part a slight degree of fluctuation can be felt. By auscultation, the *bruit de soufflet* can be distinctly heard over the entire region of the tumor, more clear at some parts than at others. The patient experiences great pain when the tumor is handled, but otherwise does not complain as much as formerly; the limb remains flexed, and the patient is confined entirely to bed.

It is concluded to try continued compression upon the femoral

artery, as practised in cases of ordinary aneurism. For this purpose, a suitable instrument is applied so as to compress the artery a little above the middle of the thigh. As soon as the circulation is interrupted through the artery, all pulsation of the tumor ceases, and the swelling becomes flaccid and softer. The application of the instrument was at first well tolerated, but notwithstanding the administration of a strong anodyne, the pain caused by the action of the instrument became so excessive as to render its removal necessary. The catamenia appearing next day, the patient was allowed to rest, taking at proper times anodyne draughts.

June 19th.—As compression could not be borne, in the presence of several of my colleagues I applied a ligature upon the femoral artery about an inch below the origin of the arteria profunda. The pulsation again immediately ceased, the tumor diminished in size and became softer and flaccid; while the skin over the tumor, heretofore natural in appearance, became livid and shrunken. Although the nutrient artery of the shaft of the femur takes its origin from one of the branches of the profunda, the condyles of the femur, originally an epiphysis, and separately developed from the shaft, receive ramifications from the crural trunk immediately before and after it becomes the popliteal artery. The experiments of Bellingham and others lead us to believe that aneurismatic tumors are cured by retardation alone of the circulation through the sac, and seeing the pulsation in the tumor cease entirely, when pressure was applied upon the femoral artery below the origin of the profunda, I selected as the safer operation, the point where I applied the ligature, in preference to an operation which would require the ligature to be placed upon the artery between the profunda and the deep epigastric and the circumflex iliac artery.

Besides the other immediate effects of the application of the ligature, the pain was much allayed at the seat of disease.

The operation was followed by little constitutional disturbance, and from the 19th of June to the 9th of July, every thing went on favorably.

July 9th.—The shell of bone seems to be collapsing. In rubbing the hand over the tumor, abrupt edges can be felt, arising from the bony shell giving way under pressure. Elevations and depressions can also be felt, as if the osseous shell had become broken up into thin irregular fragments. The greater part of the tumor is more or less elastic, and the sensation imparted to the fingers would indicate that the shell is very thin and yielding. The tumor has greatly diminished in size, and the leg can now be considerably extended.

July 11th.—The ligature came away, to-day (the 22d day after the

operation,) unattended by any hemorrhage. The knee-joint is still larger than natural, but the circumference of the limb around the seat of the disease has diminished, by measurement, one and a half inches.

July 16th.—Patient continues to improve; appetite good; and her general health is much better than previous to the operation.

August 10th.—The patient has now recovered the use of her limb to a great extent; being able to extend the leg while standing, so as to rest the fore part of the foot and toes on the ground. At her own request, she was discharged from the hospital to-day, much improved in general health, and with good prospect of the disease being ultimately entirely cured.

Upon leaving, she was supplied with a proper apparatus to apply equable pressure upon the tumor, and ordered so to use it as not to produce pain.

September 16th—This patient has again been admitted into the hospital, having had a relapse, as she states, from falling down some stairs and severely hurting the diseased part. The tumor has enlarged, and the pain is so intolerable that she is desirous of having the limb amputated. The osseous tissue of the condyles had evidently become too much devastated, from the progress of the disease, to admit of any probable benefit resulting from the use of the ligature higher up the femoral artery, or upon the external iliac.

On the 18th of September, acceding to the wish of the patient, she was placed under the influence of chloroform, and I removed the limb through the middle third of the femur.

The morbid appearance of the tumor confirmed the diagnosis which had been formed.

Before examining the diseased limb, a coarse injection was thrown into the trunk of the femoral artery. The skin and subcutaneous layers were healthy, and below these, after removal, numerous arteries, enlarged, were found ramifying along the surface of the aneurismatic sac. [Vide Plate, No. I.] The sac, externally, was formed partly by the periosteum of the condyle, which was seen thickened and continuous with that investing the shaft, and partly by the layer of tissue which resulted from the blending of the periosteum with the capsular ligament of the knee-joint. Below, and closely adherent to this investing layer, was found the osseous shell of the sac, formed chiefly by the external bony plate of the inner condyle, expanded into a thin and attenuated layer of osseous tissue. This osseous layer was not altogether continuous, but at parts was broken up into lamellated fragments, between some of which there were spaces occupied by the outer soft envelope of the sac. A distinct sensation of crepitus was imparted to the fingers,

while pressure was being applied over the sac, particularly at the most prominent part of the tumor, where the bony shell was most attenuated. Upon opening the femoro-tibial articulation, the articular surfaces were found in a state of integrity; the intra-articular arteries were injected; the synovial membrane presented not the slightest point of ulceration, nor did the articular or the semilunar cartilages. [Vide Plate No. II.] At the depression between the condyles the osseous tissue was thinned down to an extreme degree of tenuity, and at one point, in this part of the cyst, the bony tissue was entirely absorbed; the synovial membrane and articular cartilage remaining as the only barrier between the interior of the aneurismatic sac and the cavity of the joint.

The osseous sac was formed at the expense of the entire internal condyle, and of two-thirds of the external condyle, ending above abruptly, at the shaft of the bone, and encroaching slightly upon its lower extremity. The destruction of the cancellated structure of the condyles to the extent just named, was entire; the shell of the sac being formed by the expansion of the outer layer of the bony structure of the condyles.

The internal surface of the portion of the sac formed by the expanded condyles, was irregular, rough, and in close apposition with the contents of the sac; and upon everting the wall of the sac, the open orifices of numerous branches ramified upon the outer surface of the sac, were seen filled with the injection. The upper wall of the sac, internally, is formed by the lower portion of the diaphysis of the femur, which also is rough, uneven and irregular. Upon opening the aneurismatic sac, at some parts a layer of the injection was found between the inner aspect of the wall and the contents. The interior of the sac was filled by fibrinous coagula, distributed partly in layers, and presenting no characteristic of malignant growth, either upon general or microscopic examination. [Vide Plate No. I.]

After the amputation, no constitutional disturbance or untoward complication retarded the union of the flaps and the cicatrization of the stump. On the 28th of December, 1852, the patient was discharged from the hospital, perfectly cured and in excellent health.