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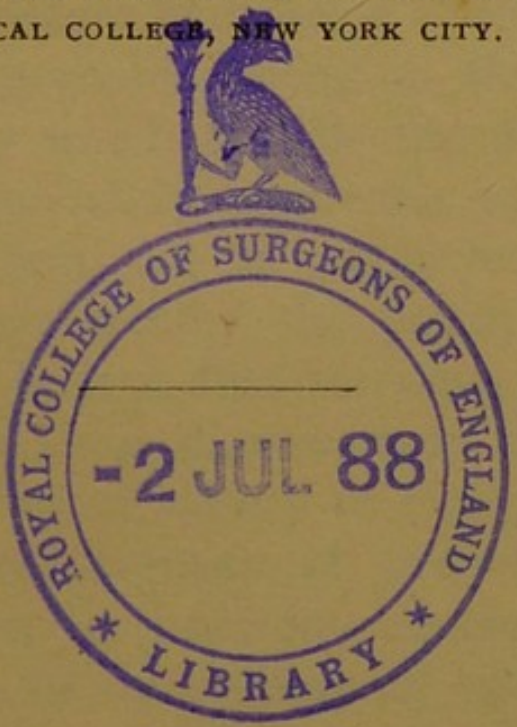

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SELECTED CASES OF SARCOMA OF BONE AFFECTING THE LOWER EXTREMITIES.[1]

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THIS subject is fraught with great interest on account of the meagre knowledge which we possess, and of great importance owing to the fact of the terrible mortality which attends the disease. Sarcoma of bone inevitably terminates in death, and its early recognition and its complete removal are subjects which are worthy the profound study of the surgeon. I believe that sarcoma, in the large majority of cases, is a disease more deadly in its nature than any other variety of malignant tumor. Its unprecedented rapidity of growth, its widespread metastases, its insidious development from unknown causes, its uncertainty of early diagnosis, its absolute certainty to kill, make this disease a subject of paramount importance.

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[1] Read before the New York County Medical Association, Dec. 19, 1887.

The appalling impressions which I have received from a large clinical experience with this dreadful malady lead me to regard this neoplasm as one to which the thoughtful attention of the surgeon should be assiduously directed.

Entertaining these views, as I do, not from hearsay, nor from book-knowledge, nor from a narration of recorded cases by others, but from actual clinical experience with the disease, I know of no subject to which I could invite attention that concerns us more than this.

In studying the subject there have arisen a number of important questions which I shall introduce, with a view to elicit discussion upon these points. It is in this way, by accumulative investigation, and by comparison, that the surgical profession can acquire knowledge upon such diseases. The malignancy, the etiology, the clinical history, the prognosis, the diagnosis, and the treatment, besides other important subjects in regard to tumors, can only be understood by an exhaustive study of a number of individual cases. The consideration of a typical case of sarcoma of bone, for example, affords no reliable knowledge which could be applied to another case of sarcoma of bone. This variety of malignant tumor of bone has a wide range of difference, and it is only by comparison that we can arrive at any satisfactory knowledge.

Before taking up a study of individual cases, a few remarks upon the general subject of sarcoma in relation to its definition, its origin, its situation, its etiology and its classification seem pertinent.

The first question which naturally suggests itself is, What is sarcoma?

Sarcoma is a tumor; and a tumor, according to Virchow, is "a circumscribed new formation of tissue." All tumors are divided into three groups:

I. *Histoid tumors*, which are composed of some one of the many forms of connective tissue. They are derived from the middle blastodermic layer of the fœtus. Lipoma is a typical example.

II. *Organoid tumors*, which are composed of several of the normal tissues of the body, and these tissues stand in relation to each other as in the organ. They are derived from the middle blastodermic layer also, with some elements derived from the internal or external blastodermic layer of the fœtus. Adenoma is a typical example.

III. *Cellular tumors*, which are composed of tissues differing from the normal tissues of the human body in the extreme abundance of the cells. They are derived from any of the three blastodermic membranes of the fœtus. There are only three tumors belonging to this group, viz., carcinoma, sarcoma, and granuloma. It is thus evident that *sarcoma* is a tumor which is composed of tissue cells which normally belong to the human body, and that only extreme proliferation of normal connective-tissue cells is necessary to produce a sarcoma. It is, therefore, a growth of no foreign tissue, and the only difference between normal connective tissue and sarcoma lies in the extreme and rich abundance of the cells. The general impression that in malignant tumors there are new structural elements is incorrect,

for cancer as well as sarcoma and granuloma, as also all other tumors, is simply the result of excess in growth of normal tissue, or else the presence of normal embryonal tissue in places where that tissue does not physiologically belong.

In the three germinal layers: 1st, the epiblast, from which skin develops; 2d, the mesoblast, from which distinct organs and systems of organs develop; 3d, the hypoblast, from which mucous membrane and glandular organs develop, there is found a key to a solution of the origin of these malignant and benignant growths. A careful study of the situation of tumors in the body demonstrates the fact that tumors are found, as a rule, in parts of the body where in the fœtus the cell growth is complicated, as, for example, at the junction of the skin and mucous membrane. Here there is found a union of the tissues derived from the epiblast, the mesoblast, and the hypoblast. Cancer of the lip is a good illustration of this law. Tumors also develop at points where there is constant irritation or mechanical activity; an illustration of this law is found in malignant disease affecting the lips, the pylorus, the cæcum, the rectum, or the testicle when it remains in the inguinal canal. Tumors again develop in special organs which are the seat of physiological activity, as, for example, the breast, the uterus, the testicle, and the parotid.

From such observations a fair inference can be drawn as to the etiology of malignant and benignant growths. The composition of these growths has already been shown to be of no new structural ele-

ments, but of perfectly normal elements and cells of which the human body is composed, only those cells are found in places where they do not belong, and where there is great mechanical or physiological activity. Might not the mere transposition of the cells in the embryo from places where they normally belong to places where they are foreign, associated with the fact that just these places where tumors grow are precisely those places where there is a union of the different germinal layers in the embryo, explain the etiology of tumors? The question of traumatism in developing tumors can be reconciled with Cohnheim's theory of modern pathology; because it is traumatism, perhaps, more than any other agency that produces proliferation in cell growth. The traumatism in itself may not be capable of even producing a malignant tumor; but traumatism in places where a transposition of cells in the embryo has already occurred might act as a predisposing cause to the development of malignant tumors.

With reference to the subject of a special bacillus to explain the presence of a sarcoma, for example, little can be said at the present time. That such an hypothesis may be true is still *sub judice*, and until we are possessed of more reliable knowledge upon this subject, based upon experimental work, the question cannot be said to be settled. In the light of our present knowledge of the etiology of suppuration it is not at all unlikely that in the near future this theory may be proved. However this may be, the law of the transposition of cells, and their pro-

liferation by traumatism would in no wise affect the present state of the subject.

These remarks seem pertinent in order to bring out clearly the place which sarcoma has among the group of tumors. The digression also serves to explain some points in reference to the relation of traumatism to malignant tumors. It is to sarcoma in particular that traumatism seems to act as an exciting cause, and in the cases reported I shall call attention to this fact in connection with some striking examples of sarcoma following rapidly upon traumatism.

Sarcoma has been classified by Virchow in a way that is generally accepted by surgeons and pathologists. It is the best classification in use and with but a slight modification I shall employ it upon the present occasion. Sarcoma may be divided: 1st, *according to the character of the cells:*

1. Spindle-cell sarcoma (like ordinary connective-tissue cells).
2. Round-cell sarcoma (similar in form to leucocytes).
3. Giant cell sarcoma (such as are seen in medulla of bone).
4. Mixed cell sarcoma (composed of some or all of the above variety of cells).

and 2d, *according to the character of the connective substance.*

1. Connective tissue.
2. Gelatinous tissue.
3. Fatty tissue.
4. Cartilaginous tissue.
5. Osseous tissue.

Hence a sarcoma is named according to the variety of connective tissue substance of which it is composed together with ordinary connective-tissue cells.

Thus, for example, if gelatinous tissue is connected with pure connective tissue cells a myxo-sarcoma is developed. I have a beautiful illustration of a myxo-sarcoma growing upon the leg of a patient upon whom I expect to operate. If fatty connective tissue is in combination with ordinary connective-tissue cells, a lipo-sarcoma is developed, of which also I have a typical specimen.

Occasionally a sarcoma is composed of many forms of connective-tissue substance, and it is then termed a mixed sarcoma. This form must not be mistaken for a mixed cell, which differs from a mixed sarcoma in the way already mentioned.

In discussing sarcoma limited to the long bones a very simple classification can be made upon a pathological basis, viz.:

I. Subperiosteal sarcoma.

II. Central sarcoma.

The *clinical history* of sarcoma is an interesting feature of the disease. It is the malignant disease of early childhood, and has been seen in an infant under one year. As a rule, it is a tumor which develops suddenly and which runs oftentimes a rapidly fatal course. In two cases only have I seen the tumor grow slowly. Sarcoma of bone is usually a nodular, painful, rapidly growing neoplasm which in the later stages begins to ulcerate. If it grows from the subperiosteal tissue it is found to affect the

shaft of the bone; is not distinctly circumscribed, grows very rapidly, and is not associated with inflammatory processes. If the sarcoma grows from the centre of the bone it usually affects the extremities of the bones instead of the shaft; it is a distinctly circumscribed neoplasm instead of a diffuse swelling, and grows slowly, which is in marked contrast to the subperiosteal variety. The slow growth is due to the fact that absorption of bone must take place by pressure of the tumor. This pressure causes atrophy of bone, and this process is necessarily slow. The central sarcoma has an egg-shell crepitation in the later stages of the disease. This crepitation is due to the breaking of the attenuated and fragile shell of bone which has been pushed out by the growth from within, and is a pathognomonic symptom of central sarcoma.

The malignancy of sarcoma is manifested by its widespread metastases, by its complete annihilation of adjoining tissue, by pressure effects, and by hemorrhages due to ulceration, by its infiltration through bloodvessels in the majority of cases, and, finally, by its rapid strides toward a fatal termination unless interrupted by a radical operation.

The *diagnosis* of sarcoma in its early stages is often very difficult. The microscope only can decide in some cases. Time, which might afford definite information, cannot be utilized for the purpose of diagnosis. Procrastination in coming to a decision is too dangerous an agency to employ to settle such a momentous question. The use of the harpoon will throw intelligent light upon this doubt-

ful and grave question, and settle beyond all peradventure the malignancy of the growth.

Great care should also be exercised in not making undue haste in coming to a conclusion as to the question of a growth being sarcomatous. I have had three cases sent to me for the purpose of amputation on account of sarcoma. Each of these three cases proved to be a chronic inflammation of bone, and each was completely cured without amputation.

One of these cases was of the thigh, the other two cases were of the tibia, and all three cases had consulted surgeons, who pronounced the neoplasms malignant and advised amputation.

The points of differential diagnosis between sarcoma of bone on the one hand, and chronic inflammation of bone on the other hand, are as follows:

Sarcoma of Bone.	Chronic Inflammation of Bone.
1. Attacks extremities unless subperiosteal.	1. Attacks the shaft.
2. Forms soft swelling in comparison with sclerosis of bone.	2. Forms hard smooth bone.
3. Rapid in its course.	3. Slow in its course.
4. Distended veins over the surface of tumor.	4. No distended veins over surface as in sarcoma.
5. Does not invade joint.	5. Usually invades the neighboring joint.
6. Circumscribed areas of fluctuation over swelling where cysts filled with bloody serum are found.	6. There may be diffuse area of fluctuation; but pus is found instead of bloody serum.

Another very important differential diagnosis must be made between sarcoma and carcinoma.

Sarcoma.	Carcinoma.
1. Origin of growth is from the mesoblast.	1. Origin of growth is from mesoblast and also from hypo- or epiblast.
2. Disseminates by bloodvessels.	2. Disseminates by the lymphatic channels.
3. Tumor may be enclosed in a capsule.	3. Tumor is never enclosed in a capsule.
4. Cachexia appears late in the history of the tumor.	4. Cachexia appears early in the history of the growth.
5. Disease of early life or middle life.	5. Disease late in life as a rule.
6. Not so painful a tumor as carcinoma, and may develop with little or no pain.	6. Sharp, lancinating pains as a rule.

The *prognosis* in sarcoma is as gloomy as can be imagined. It is a disease which destroys life rapidly, unless arrested by amputation. The prognosis may be modified as regards time by the situation and the particular cell variety of the sarcoma. In whatever way we look at the prognosis it is serious. On the other hand a radical amputation may rescue a patient's life even in the cases of the most malignant variety. I shall furnish examples of this fact in the list of the cases that I have operated upon within the past few years.

The *treatment* of sarcoma of the long bones is simple, because there is but one operation, and that is amputation. From an experience derived from a number of these cases of sarcoma of bone, and from opinions formed after careful study of the cases of others, I am more and more impressed with the fact that amputation is the only operation which should be contemplated. I refer to sarcomata of the long bones. The operation of exsection or enucleation,

and an application of caustics are, in my humble judgment, productive of harm; because the disease is not as a rule radically removed by these methods, and oftentimes the tumor returns very rapidly, and the operation seemed only to add fuel to the fire.

I believe that in all cases of sarcoma of the long bones amputation should be decided upon at the earliest period possible, and the operation performed without delay. At the point of election I would suggest an amputation which would remove the entire bone affected, whether it is a subperiosteal or central sarcoma. This necessitates an amputation of the lower part of the thigh in case the tibia or fibula is the seat of the neoplasm. It necessitates an amputation of the hip-joint when the tumor is subperiosteal, and involves the shaft of the femur. In view of the great mortality of hip-joint amputation, a possible exception might be made in case of a central sarcoma of the condyle of the femur which was recognized early, and which was small in size. By amputation in the lower third of the femur in sarcoma of one of the bones of the legs, the popliteal glands are thus removed, and while this point would concern us more if the disease were cancer, yet I have seen a case of sarcoma affecting those glands.

The remedy of amputation which is suggested, is a severe one; but the disease for which the amputation is performed is a uniformly fatal one if left to nature, and in view of the great malignancy of sarcoma, I believe the operation should be the most radical one consistent with a due regard for the life of the patient during the immediate performance of

the operation. It must be remembered that the patient is suffering from a uniformly fatal disease, and the chances of escape from it are in proportion, within proper limits of course, to the distance at which the limb is removed from the seat of the malignant tumor.

In offering a succinct report of a few of my cases of sarcoma of the long bones of the lower extremities, I shall endeavor to dwell upon the particular features of each case, and then in conclusion deduct some inferences which the study of these cases collectively seems to warrant. In the data which I shall give in the final conclusion I shall avail myself only of those cases which I have had under treatment. At some future time I intend to tabulate my cases of sarcoma of the long bones of the upper extremities, and upon another to group the cases of sarcoma of the skull and pelvis. I have carefully prepared notes of upward of fifty cases of sarcoma, of which number thirteen belong to the lower extremities. It is to a study of this group that I shall now invite your attention. Only those where the diagnosis was confirmed by the microscope will be considered.

I have had a number of cases where the sarcoma has affected the lower extremities; but where the starting-point was not from the periosteum or bone. This separate group, which forms a collection of great interest, I shall not embrace in the present paper. These sarcomata grew from fascia and lymphatics, and from the intermuscular septa, and from pigmented moles, which I believe are dangerous to leave upon the body, because they may become the

starting points for sarcomatous ulcers. I shall also exclude from the present group cases of sarcoma developed from a retained testicle in the inguinal canal, and shall refer only to sarcomata having their origin from bone or periosteum.

CASE I. *Subperiosteal sarcoma of femur; amputation at hip-joint; death.* (Examined by Dr. Biggs.)—J. T., æt. thirty-six, admitted to St. Vincent's Hospital May, 1884. He was sent to me by Dr. W. H. Robb, of Amsterdam, N. Y. August, 1883, patient was thrown from the end of a railroad platform-car, his left leg being caught in an iron upright, by which he was held suspended until released by some bystanders. Dr. Robb saw him at once, and found a transverse fracture of the thigh just above the knee-joint. The fracture was dressed in the usual manner with long side-splints and the weight and pulley. At the expiration of one month Dr. Robb found no union of the bone, and applied a plaster-of-Paris bandage. At the end of a fortnight the plaster was cut down, and still no union of the fracture. At the time of this dressing there was noticed a change in the circulation about the seat of the fracture; and this was supposed by the attendants to be a good omen, because it indicated that nature was making an effort to throw out bony callus. Another plaster-of-Paris bandage was applied for a fortnight, and then this dressing was removed. There was now noticed at the seat of the fracture a decided increase in the size of the limb, and there was no attempt at union. The plaster was now discontinued, and a splint was made of leather to support the ununited fracture. The patient was sent to me. The diagnosis of malignant disease which was made by Dr.

Robb was confirmed, and notwithstanding the fact of the nature of the tumor, the patient refused to have his thigh amputated. He remained several months in St. Vincent's Hospital, during which time there were periods when the tumor seemed less painful and diminished in size, especially after the bloody serum was withdrawn by the aspirator.

In July the patient not only gave his consent to an amputation, but desired it in view of the unmistakable diagnosis of malignant disease. The tumor now had become enormous in size, and the patient's strength was very much reduced by repeated secondary hemorrhages. The tumor was also ulcerating and the discharges very foul. The amputation was performed in a little less than one year from the time of the original injury. The operation was not successful, and the patient sank rapidly, and died in a few hours.

Remarks. — The interesting features connected with this case are, 1. The relation of traumatism to the development of sarcoma. 2. The fact of the development of sarcoma from a traumatism of bone resulting in a fracture, and that the seat of fracture was the starting-point of the disease. 3. The probable chances of success if the patient had consented to amputation as soon as the diagnosis was made positive. 4. The rapidity of the growth in a few months.

Case II. *Subperiosteal mixed-cell sarcoma of femur; amputation at hip-joint; recovery.* (Examined by Dr. Grauer.)—W. R., æt. seventeen, admitted to Harlem Hospitla May 19, 1887. Patient sent by Dr. Johnson, of Blairstown, N. J. In January,

1887, the patient felt a dull, aching pain in the left thigh, the pain increasing at night. Shortly after the onset of the pain, a swelling appeared, which rapidly increased in size. Three months later the patient consulted a physician, who aspirated the swelling, and drew off several ounces of bloody fluid. In May, 1887, about five months from the first appearance of the pain, and three months from the beginning of the swelling, he was sent to me. His condition at this time was very unfavorable. From a strong, healthy boy in a few months he became feeble, weak, and cachectic. In a few weeks he lost upward of forty-five pounds. The family history as regards hereditary influence is negative. The urine was normal. The tumor measured twenty-nine inches in circumference. On May 26, 1887, five months from the date of the appearance of the first signs and symptoms of the tumor, I performed amputation at the hip-joint. The hemorrhage was controlled by a simple elastic band, as suggested by Lloyd, of Birmingham, and applied by Dr. Garmany. The patient rallied from the shock, and made a good recovery, debarring a secondary hemorrhage, which occurred on the twenty-ninth day following the operation. The hemorrhage came from the artery which accompanied the ligamentum teres, and this hemorrhage, it is interesting to note, was caused by sloughing of the ligamentum teres, which was not cut off close to the bottom of the acetabulum, but instead was cut off close to the head of the femur: as a result, the ligamentum teres sloughed, and the hemorrhage occurred.

It is a point worthy of attention to cut this ligament close to the femur, and thus avoid this accident. The simple band, as applied, completely

controls all hemorrhage, except from the obturator artery, which cannot be compressed, owing to its passage through the obturator foramen. If this fact is known, the surgeon can at once seize this artery, and then all bleeding is completely arrested until the other vessels are ligated. The patient is now in Bellevue Hospital, and there is no evidence of any return of the disease.

Remarks.—The chief points of interest in this case are, 1, the rapidity of this growth. There were only five months intervening between the onset of the first symptoms and the time of the operation. 2, the simple and efficacious method of arresting the hemorrhage. 3, the gloomy outlook for the patient, though he recovered from the operation.

In thirty-six cases of subperiosteal sarcoma of the femur, reported by Butlin, there was a death-rate of twenty-five per cent. in operations for removal of the disease. Out of the thirty-six cases only one could be said to have been completely cured by the operation, and about this one case there seems to be a doubt as to whether it was not a central sarcoma. The period of three years is taken as the shortest possible time which must elapse before a patient can be said to be cured. The prognosis is, therefore, very serious—for there is not a single case recorded in this list of subperiosteal sarcomata of the femur that was cured. This is most certainly a startling fact in connection with a study of these cases.

CASE III. *Subperiosteal sarcoma of fibula (round-cell variety).* (Examined by Dr. Grauer.)—J. H.,

æt. four. Family history is negative. Patient received an injury to the fibula, February, 1881, and shortly after this injury a small swelling began, which grew rapidly, until at the end of six months the lump became very painful, and the patient was unable to walk. On May 8, 1882, I amputated the limb just above the knee-joint. The tumor was examined microscopically, and pronounced to be a round-celled sarcoma. The boy rapidly improved in his general condition, and has been perfectly healthy ever since the operation, with no evidence at any time of a return of the disease. It is now nearly five years since the amputation, and a long enough time has elapsed to make it certain that no return of the disease will ever occur.

Remarks.—This case is interesting from several points of view. 1. The relation between traumatism and the development of sarcoma is demonstrated in this case. 2. The slowness of the growth in sub-periosteal sarcoma. 3. The complete recovery, with no return of the tumor, notwithstanding the fact that the microscopical examination revealed the presence of the most malignant variety of sarcoma. 4. The encouragement to operate in these desperate cases, though the prognosis seems absolutely fatal at the time.

CASE IV. *Subperiosteal sarcoma of tibia.*—T. M., æt. seventeen. Family history is negative. Patient previous to April, 1884, enjoyed excellent health. In April, 1884, he struck his knee against a coal car. The injury was apparently slight. A small lump was formed, which soon grew painful. Patient consulted Dr. R. H. Gibbons, of Pittston.

He diagnosticated sarcoma, and advised removal of the limb. Patient would not at that time consent to any operation. He was sent by Dr. Gibbons to me in August, 1884, about five months from the date of the injury. I advised immediate amputation, to which proposition he dissented. Upon return to Pittston in the latter part of August, he allowed Dr. Gibbons to try to enucleate the tumor, but would not consent to an amputation. In about three weeks after the operation, the tumor returned, and grew very rapidly until November 16, 1884, when he requested his leg to be amputated. At this late date, patient had become too weak, and finally died December 4, 1884, without an amputation, about nine months from the time of the injury.

Remarks—A piece of this tumor was examined microscopically and pronounced to be a subperiosteal sarcoma involving the upper end of the tibia. The chief points of interest in this case are: 1. The sarcoma following directly upon receipt of traumatism. 2. The rapid course of the disease. 3. The consequences of refusal to an amputation in face of a positive diagnosis of malignant disease. 4. The rapid return after enucleation.

Case V. *Subperiosteal sarcoma of tibia, mixed sarcoma, consisting of a variety of connective tissue substance.* (Examined by Dr. Biggs.)—Mrs. B., æt. nineteen, was admitted to Bellevue Hospital October 1, 1885. Patient has always enjoyed good health. Nine months previous to October, 1885, patient felt a sharp pain in left leg just above the ankle. The pain lasted but a few seconds and then disappeared. There were occasional shooting pains

in the leg until three months later, when severe cramps occurred. The foot became slightly œdematous and the swelling involved the leg. Patient at this time was six months pregnant, and the swelling and pain now disappeared until the child was born. Shortly after parturition the swelling and pain returned and the tumor grew very rapidly.

In September, 1885, the patient was sent to me by Dr. Anderton, who made the diagnosis of sarcoma of the tibia, in which I concurred, and at the same time advised immediate amputation. On October 3, 1885, about nine months from the time of the first appearances of pain and swelling I performed a supracondyloid amputation of the thigh. Patient rallied from the operation and the wound healed by primary intention.

On April 17, 1886, seven months after amputation of the thigh a tumor developed upon the lower jaw. I removed this tumor at St. Vincent's Hospital. The tumor was sarcoma and appeared three months previous.

In March 23, 1886, patient returned to St. Vincent's Hospital with a tumor situated upon the upper jaw. This appeared a few weeks previous and grew very rapidly after the operation upon the lower jaw. In May, 1886, the clavicle became involved and then the lungs, and on May 11th the patient died.

Remarks.—The points of interest in this case are: 1. The rapidity of the growth of the tumor, as well as the multiple return of it, in which the metastases occurred in the bones, but finally in the lungs, which were examined by Professor Janeway. 2. The absence of any return of the disease in those places where an operation was performed. 3.

The temporary arrest of the growth for several months during the period of pregnancy, and its very rapid growth immediately after parturition. This same phenomenon I have seen in a case of sarcoma of the breast. The growth was arrested during pregnancy; but grew rapidly immediately after parturition. The pregnant state seems to hold in temporary abeyance the growth of malignant tumors; but after this condition is removed, the growth takes place with great rapidity. 4. The medico-legal controversy which grew out of the treatment of this case—I refer to this point on account of the importance of the subject.

After the amputation was performed, the husband of the patient began a suit for $20,000 against me for amputating the leg on the ground that the tumor could have been removed and the limb saved. Notwithstanding free permission from the patient, as well as from the husband, to do as I thought best in the operation after cutting first into the growth and thereby giving her the benefit of the doubt, I was confronted with this dilemma. It is needless to state that the suit was never brought to trial. The full, verbal permission to amputate and the microscopical evidences of sarcoma, and the rapid return after a few weeks were all questions of great importance from a medico-legal aspect. The husband made some serious threats of a violent nature; but the sudden return of the disease, and the great suffering of his wife induced him to come back for further advice. I consented to operate on the upper jaw and afterward to operate upon the lower jaw, at

the urgent request of the husband, whom I compelled to make his application in writing with full permission to operate as I thought best.

There is so much ignorance among the less educated upon the nature of the malignancy of certain tumors, and so great a natural antipathy to amputation for the relief of these tumors, that a surgeon, in order to protect himself, should refuse to have anything to do with uneducated patients unless he has obtained their permission in writing. A surgeon cannot otherwise protect himself against the unprincipled lawyer who plays upon the feelings and sentiment of his clients with visions of a large sum of money for supposed malpractice.

CASE VI. *Subperiosteal sarcoma of tibia.*—W. R., æt. forty, admitted May, 1886, to Bellevue Hospital. Patient's family history negative. Two years and a half previous to his admittance he noticed a lump or swelling upon the internal malleolus of the left leg. There was no history of injury. The growth of the tumor was slow, so slow that he was, during all of this time, able to wear a shoe so constructed as to fit the slowly changing shape of his foot, which had the appearance of an aggravated talipes valgus. The urine contained considerable albumen, and a few granular and hyaline casts. He had been addicted to a free use of stimulants for many years. Diagnosis of *sarcoma* of tibia was made by Professor Sayre as soon as he examined the patient, and he sent him to me for operation, as I was on duty at the hospital at the time. It was deemed best to amputate the leg for the relief of the sarcoma, although the condition of his kidneys was known at the time of this decision.

I performed the circular amputation, and the stump at the first dressing appeared in excellent condition, save a little bichloride irritation. He developed delirium tremens, and, with the kidney complication and exhaustion, died in ten days following the operation. The microscopical examination confirmed Dr. Sayre's diagnosis of sarcoma.

Remarks.—The points of interest in this case are: 1. The slow growth of this subperiosteal sarcoma, and in this respect in marked contrast to the other subperiosteal sarcomata. 2. The absence of pain. 3. The cause of death which was due to delirium tremens and uræmia, and not directly to the operation. 4. The difficulty of diagnosis in the early stages.

I have now two cases where sarcomata are present, but where the growths have occupied two years in developing, and on which account both of these patients refuse to have any operation performed. These patients are still alive, and although the disease in each case is progressing slowly, and the diagnosis seemed at first obscure, these tumors, without doubt, will suddenly grow rapidly at no distant date. These two cases present very unusual phenomena in regard to the growth of sarcoma.

CASE VII. *Central sarcoma of tibia, mixed, containing many different varieties of connective tissue.* (Examined by Dr. Biggs.)—J. F., æt. nine. In April, 1887, was struck on the lower end of the leg. Previous to this he had always been well. Following the blow a small swelling appeared upon the front and lower part of the leg. The lump grew rapidly, and he began to walk upon his toes. Four months

after the above-mentioned injury the patient was brought to me. The skin over the tumor was healthy, and the swelling was about the size of an egg. There was a suspicion of an abscess in the bone. The parents consented to an exploratory operation, but would not consent to an amputation in case the exploration revealed the presence of sarcoma. The tumor was scooped out and the wound for a short time did well. He was removed from the hospital September 28, 1887, and taken home.

In November, 1887, he was brought back to St. Vincent's Hospital. The tumor was now as large as an orange, and presented the cauliflower excrescence so characteristic of these malignant growths in the later stages. The mother now consented to amputation; but made the proviso that the amputation should be below the knee. Accordingly, I performed the amputation on November 31, 1887. The Esmarch bandage was applied; but it was employed above the tumor, as it should be in cases of malignant tumors. A sarcoma should never be compressed.

Remarks.—The chief points of interest are: 1. The relation of traumatism to the genesis of malignant tumors. 2. The rapidity of the growth for a central sarcoma. 3. The impropriety of any exploratory operation. 4. The necessity of an amputation as early as the disease is recognized. 5. The necessity of full permission to amputate in case an exploratory operation is deemed necessary for the purpose of a diagnosis. 6. The presence of egg-shell crepitation, indicating the central origin of the tumor in contradistinction to the subperiosteal variety. 7. The encouraging outlook for this boy

in contrast with the boy who had a subperiosteal sarcoma of the thigh. In twenty-nine cases of central sarcoma of the leg reported by Butlin, there was a death-rate of nearly thirty per cent. in the operation for removal of the disease. Out of the twenty-nine cases one patient only could be said to have been completely cured, taking three years as the standard of time. This high rate of mortality in the operation itself is a most astonishing fact, and is only surpassed by one still more startling, that out of this original list of twenty-nine cases only one single case was reported as having been completely cured.

CASE VIII. *Myxo-sarcoma of tibia.* (Examined by Dr. Biggs.)—T. W. æt. thirty-nine, admitted to Bellevue Hospital October 22, 1887. Family history of no special importance. In September, 1887, patient was admitted to the medical ward of Bellevue Hospital on account of chills, pains in head, chest, and back, and a swelling upon the left leg at the seat of an old fracture. He also had purpura hemorrhagica over his legs, thighs, and abdomen. October 22, 1887, he had nearly complete suppression of urine with a large quantity of albumen and casts. His general condition was improved, and on Nov. 4, 1887, he was transferred to the third surgical division. I made a diagnosis of sarcoma, and this diagnosis was confirmed by Dr. Biggs, who found a myxoma in the fungoid growth, and the tumor had caused a pathological fracture. Patient was given special diet, and tonics, with a view to improving his general condition preparatory to an amputation. His appetite increased, there was only a small amount of albumen in his urine, and the prospects

of a successful operation for the removal of his malignant tumor seemed encouraging. He was induced, however, to leave the hospital, to have caustics applied, and would not consent to an operation.

Remarks.—The points of interest are: 1. The development of a malignant tumor at the seat of an old fracture. This same phenomenon I have seen in a number of cases. In one case a child fell upon the back of the head and a sarcoma developed over the seat of a fracture of the occipital bone beneath a large hæmatoma; in another case a sarcoma developed in the line of union of a simple linear fracture of the skull; in still another case after a fracture of the femur. This development of a malignant tumor at the seat of an old fracture is characteristic of sarcoma; because carcinoma never starts primarily in bone; but is always the result of a secondary metastasis. For example, I removed a carcinoma of the breast in a patient some years ago, and within a year from the time of the removal of the breast the same patient fractured her femur while turning over in bed. This specimen I have in my possession, and it forms a unique example of carcinoma in bone from secondary deposit. Epithelioma, however, may arise primarily in a sinus leading to necrosed bone, the result of a compound fracture. In this case the starting-point is not in bone; but in an epithelial-lined sinus with the accompanying irritation, all of which conditions are favorable to the development of this special type of malignant disease. I have one specimen of

epithelioma affecting the femur, arising from a condition just described.

2. The second point of interest in this case is the manifestation of the feeling of antipathy to a cutting operation as contrasted with the treatment by caustics. It is precisely in these cases that the surgeon should try to overcome the natural prejudices to an operation; because tampering with caustics and plaster in these cases of sarcoma is never productive of good, but adds additional danger, and hastens the final end. Much encouragement can be given in these days to patients about to undergo the ordeal of a surgical operation, and the surgeon should avail himself of these arguments to convince kindly and forcibly the patient of his or her error, and persuade these unfortunate and misdirected patients into an operation which is their only safety. In my experience I cannot recall a local recurrence of sarcoma after amputation. This is certainly a most important and encouraging sign, and this fact alone ought to impress upon the surgeon the great necessity of early operation. It ought also to afford a source of great consolation to a patient suffering from this malignant disease.

Finally, I trust that I have been sufficiently clear upon the following points:

1. The importance of early recognizing the disease and the necessity of complete removal of the limb by amputation without delay.

2. The importance of carefully watching the subsequent history of patients upon whom an operation has been performed for the removal of sarcoma.

3. The publication of all cases, whether the result of the amputation was favorable or otherwise, in order to enable surgeons to collect reliable and trustworthy data for future study.

4. The importance of a microscopical examination of every sarcoma. Surgeons are of one opinion upon this point, that a microscopical examination is a *sine qua non* to insure the tabulation of a case for purposes of study.

5. The importance of a radical operation in these cases of malignant sarcomata affecting the long bones of the extremities, and the condemnation of partial enucleations and the use of caustics and plasters.

6. The importance of encouragement to patients suffering from malignant disease of the long bones, on the ground that early and radical operations, even in the most malignant cases, may result in perfect cure.