

STATED MEETING, HELD APRIL 6, 1914.

DR. JOHN H. GIBBON, President, in the Chair

SPRENGEL'S DEFORMITY OF THE SHOULDER

DR. J. TORRANCE RUGH presented a boy, four years of age, one of a family of four children. The other three were normal. This boy when two years old was noticed to hold the left shoulder higher than the right but, never having complained of any pain, nothing was done until a short time ago. He first came to the Orthopædic Dispensary of the Methodist Hospital in March, 1914, and examination showed an undersized child of rather inferior mentality. The left shoulder was carried nearly an inch higher than the right, the normal curve of the neck on that side was much altered, giving the appearance of a short neck. The scapula was raised and tilted forward and could not be moved up and down. There was inability to raise the arm above the shoulder level or backward as freely as the right, but other movements were normal. Palpation showed a mass anterior and superior to the scapula which moved with the scapula. The posterior-superior angle also appeared fixed, so that scapular movement occurred about this point as a pivot. The spine appeared slightly deviated to the left side in the upper dorsal region, but was not fixed. The chest anteriorly showed prominence of the upper ribs to the right of the sternum, while the left side showed some flattening as in cases of left dorsal rotation of the spine. No other abnormalities were present in the body. A diagnosis of congenital elevation of the scapula (Sprengel's deformity) was made and a röntgenogram was ordered (Fig. 1). This apparently showed a bony formation running from near the coracoid process upward into the neck, which was the mass to be felt by the fingers. It was thought at this time that this bony formation was the cause of the deformity.

Later, operation was performed, on April 28, 1914, at the Methodist Hospital. The bony mass was found to be a hooked scapula (upper border) which lay close to the deep neck muscles and quite high up. This upper edge was removed with forceps but the shoulder could not be brought down for any distance. The posterior-superior angle was then exposed by direct incision, and a distinct articulation was found to exist between that point and the tip of the seventh cervical spine. This latter was greatly elongated and turned to the left side as though it had been pulled over by the scapula. The röntgenogram also shows

FIG. 1.

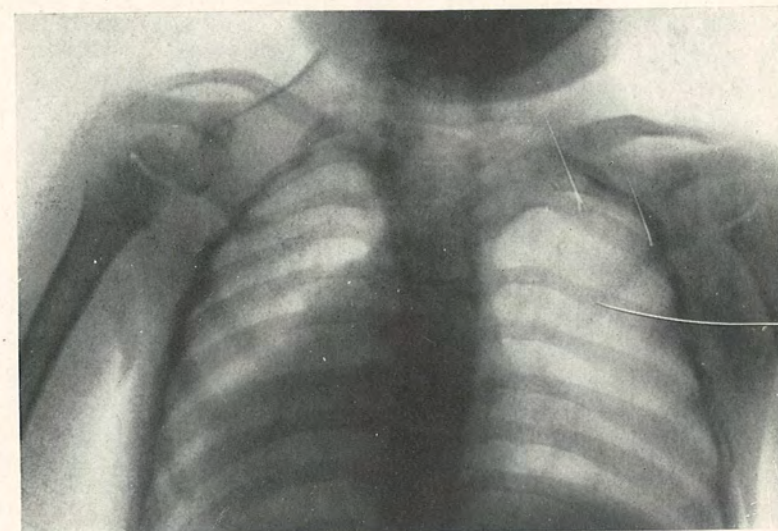
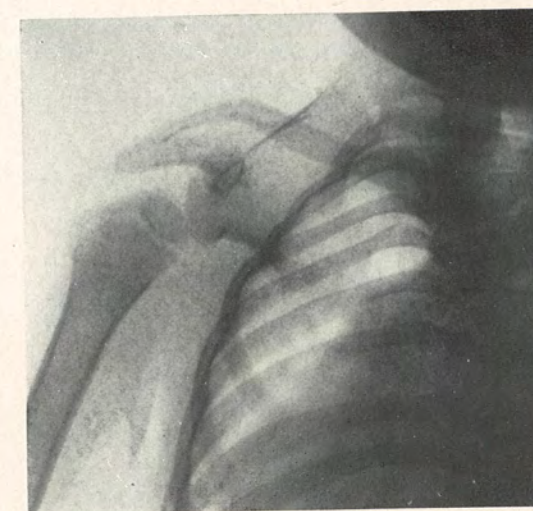


FIG. 2.



FIGS. 1 and 2.—Sprengel's deformity of the shoulder.

twisting of the lower part of the cervical spine to the left side and this accounts for the prominence of the anterior right ribs. Three-fourths inch of the spinous process was excised and the scapula freed from attachments. It was then easily pulled down to a level with its fellow. The incisions were closed with catgut and broad straps of adhesive plaster were used to pull the shoulder well down on the chest wall. Recovery was uneventful and a röntgenogram taken showed a quadrangular-shaped scapula lying in practically the same relation as its fellow (Fig. 2).

Dr. Rugh also showed a case of a boy of five years of age who had received repeated injuries to the right shoulder. Marked enlargement of the upper end of the humerus resulted, with more or less limitation of function, but practically no pain. The diagnosis lay between exuberant callus (from possible fracture), a bone cyst and sarcoma, and the opinion of the Fellows of the Academy was asked regarding it. Röntgenograms taken at different periods were also shown.

It was the opinion of the Fellows that the case was one of bone cyst.

DR. JOHN H. GIBBON, apropos to the Sprengel's deformity case, presented an X-ray plate of a child operated on by him a year ago, in which there was found a narrow band of bone running from the base of the spine of the scapula to the transverse process of a cervical vertebra. This bone was excised. An interesting point in this case is the cleft cervical vertebræ plainly shown in the plate.

DR. ASTLEY P. C. ASHHURST said that Dr. Gibbon's mention of the cleft cervical vertebræ reminded him of a specimen recently secured from an adult cadaver by a student at the University of Pennsylvania: in this the vertebræ were cleft and there was a bony mass running from the vertebræ over toward the scapula. Evidently no treatment had been required.

Regarding Dr. Rugh's second case he considered it a bone cyst, and that operation is indicated for removal of its contents, and partial obliteration of the cavity by crushing its walls.

RECENT TRAUMATIC DISLOCATIONS OF THE HIP

WITH A REPORT OF TEN CASES AND THEIR END RESULTS

BY CARL R. STEINKE, M.D.
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DURING the 9 years from February, 1905, to February, 1914, at the Episcopal Hospital of Philadelphia, 10 cases of recent traumatic dislocation of the hip were admitted out of some 23,000 surgical cases, 6000 of which were classified as surgical injuries, making approximately 1 dislocated hip to every 600 surgical injuries. For the privilege of reporting the following cases I am indebted to Drs. Frazier, Davis, Deaver, Neilson and Mutschler, under whose services they were admitted.

CASE I.—M. M., male, age twenty, admitted February 21, 1907 (file No. 619). The patient was admitted with a history of having had a large amount of coal fall upon him. On examination a high posterior dislocation of the left hip was found. The leg was adducted, inverted and flexed. Pain, tenderness and rigidity were noted about the hip. The patient was placed on a table face down, the knee and thigh were flexed and direct traction made downward while an assistant guided the head of the femur by pressure on the great trochanter, thus reducing the luxation (Stimson method). Five days later the patient was discharged in good condition.

Diagnosis.—High posterior luxation of the left hip. At the time this article was prepared no trace of the patient could be found.

CASE II.—T. S., male, age fifty (?), admitted October 15, 1907 (file No. 2846). The patient had jumped from a third-story window and was brought to the hospital in an unconscious condition. There was a fracture of the skull and through the middle third of the left femur. The head of the right femur could be felt anterior just below Poupert's ligament. The luxation was easily reduced by circumduction. The next day the pulse became weak and irregular and Cheyne-Stokes respiration was present. The respiration and pulse gradually became weaker and he died on the eighteenth, three days after admission.

Diagnosis.—Fractured skull and left femur, and dislocation (pubic), anterior, of right hip.

CASE III.—J. V., male, age forty-five, admitted June 28, 1909 (file No. 1610). He had been thrown from a crane, dislocating his right femur, the head being felt close to the sciatic notch. After reduction sand bags were placed on either side of the affected thigh. On the eleventh day he was up and about with no pain in the hip, so was discharged the next day.

Diagnosis.—Posterior (sciatic) luxation of the right hip. No further history of the patient obtainable.

CASE IV.—J. M., male, age fifty-five, admitted April 19, 1910 (file No. 5094). The patient was admitted with a posterior dislocation of the right hip. The right thigh was flexed on the abdomen and adducted, while the knee was flexed and the foot turned in. He was unable to extend the thigh either by force or voluntarily, but could flex it on the abdomen. The great trochanter was felt anterior to its normal position and not prominent. The head of the femur could be felt in the sciatic area and could be felt to rotate with the thigh. Under ether anæsthesia the leg was flexed on the thigh and the thigh on the abdomen in adduction followed by outward circumduction and extension. The head of the femur was felt and heard to snap back into its normal position. Sand bags were placed on either side of the thigh. There was tenderness about the right hip for a week, otherwise he was in good condition. Four weeks later he was up and around, the hip being slightly painful, but he walked about on crutches. He was discharged on the forty-sixth day in good condition.

Diagnosis.—Posterior (sciatic) luxation of right hip. March 23, 1914, four years after the accident, he was working and found no disability from his dislocated hip.

CASE V.—B. S., female, age thirty-eight, admitted February 9, 1911, (file No. 473). One week previous to admission, while attempting to cross the railway tracks, the patient was struck by the tender of an engine, the engine and fire box passing over her, causing severe bruises, a fracture through the middle third of the right clavicle and a dislocated hip. The left foot was inverted and rested on the instep of the opposite foot and the head of the left femur could be palpated between the acetabulum and the crest of the ilium. The following day under gas and ether anæsthesia the luxation was reduced by the Allis method. Buck's extension with 10 pounds was applied. Three weeks later the left hip-joint was not particularly painful and showed no tendency of recurrence. The clavicle showed good union with slight deformity. She was discharged in care of the family physician.

Diagnosis.—Posterior (iliac) luxation of left hip.

In a letter from her physician January 24, 1914, three years after the accident, he says concerning her hip condition: "She has disability of the left leg due to the dislocated hip and fractured pelvis, and numbness and loss of power due to nerve injury from deep laceration of the thigh." It would seem her present condition is probably not due so much to the dislocation as to the nerve injury received at the time of the accident.

CASE VI.—H. K., male, age twenty-eight, admitted June 7, 1912 (file No. 1834). The patient fell from a 10-foot fence and was immediately brought to the hospital. The left leg was normal. The right leg was flexed and fixed in internal rotation, while the foot lay in inversion and the head of the femur could be felt on the flaring wing of the ilium. There was great pain when the leg was moved and some laxity of the iliotibial band. Under chloroform anæsthesia the luxation was reduced by flexion,

traction, external circumduction and extension. The right leg then measured $\frac{1}{4}$ inch longer than the left. The next day there was aching pain in the affected hip but he could invert the foot and evert the toes fairly well. On the ninth day the general motion of the hip was fairly free and he was allowed to be about on crutches. Discharged 3 days later, walking on crutches with no limitation of motion and no shortening of the right leg.

Diagnosis.—Posterior (iliac) luxation of right hip. X-ray No. 2527 showed reduction of dislocation. The last of March, 1914, he was reported to be in good health and had a good functional result in his right hip.

CASE VII.—B. L. S., male, age sixty-one, admitted January 23, 1913, (file No. 319). In jumping from a third-story window to the ground he caused dislocation of the right hip. The right thigh, well in the position of flexion and internal rotation, could not be brought into full extension. Measuring from the anterior superior spines to the internal malleoli gave $\frac{1}{4}$ inches shortening of the right leg. The base of Bryant's triangle on the right was $\frac{1}{2}$ inch shorter than the left. With the right thigh flexed the trochanter was felt $1\frac{1}{2}$ inches above the Roser-Nelaton line. There was an area of tenderness on the level of the anterior superior spine and about 5 inches from it on the right. Reduction by the Stimson method (as in Case I) attempted for 11 minutes. The deformity was improved but the luxation not reduced. The following day the X-ray No. 5243 showed the hip still luxated. The patient being anesthetized was placed in the supine position on a hard mattress on the floor, and the thigh flexed on the pelvis to a right angle and leg at right angles to the thigh. With traction upward, internal and external rotation of the thigh, together with pressure on the trochanter, the head of the femur was brought into position in the acetabulum. Buck's extension applied with light weights. Two weeks later the patient was in good general condition, and at the end of the third week the weights and straps were removed, making him much more comfortable. Starting at the end of the fourth week he was gradually allowed to remain out of bed for longer intervals and there was no notable deformity of the leg. On the forty-seventh day he was discharged in good condition as cured.

Diagnosis.—Posterior luxation of right hip.

In a letter from the patient just one year after the accident (January 22, 1914), he says: "I run, hunt, climb ladders, skate, and am able to work in the fields of my farm." This is sufficient evidence that he suffers no ill effects from the dislocation.

CASE VIII.—W. B., male, age twenty-six, admitted May 8, 1913 (file No. 1803). A cart load of coal was dumped, striking him in the middle of the thigh, covering him with coal, and he had to be lifted on to a stretcher. He complained of pain in the right hip-joint and inability to walk. Examination: The head of the right femur palpated posterior and high up above acetabular rim. The right leg was flexed, inverted and shortened. Ether anesthesia given and the dislocation reduced by the Allis method. Discharged one week later as cured.

Diagnosis.—High (iliac) posterior dislocation of right femur.

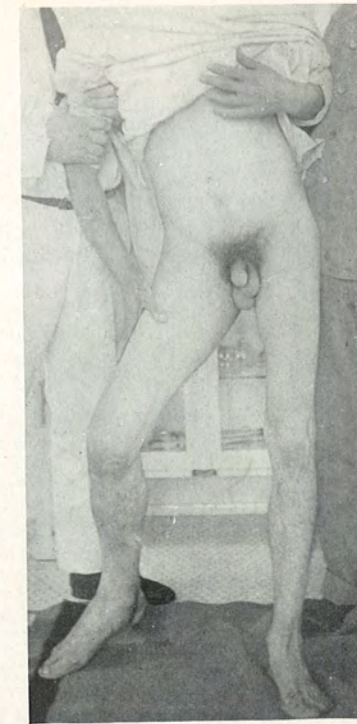


FIG. 1.—Case IX. Showing anterior luxation of right hip.



FIG. 2.—Showing method of reduction (direct) in Case IX.

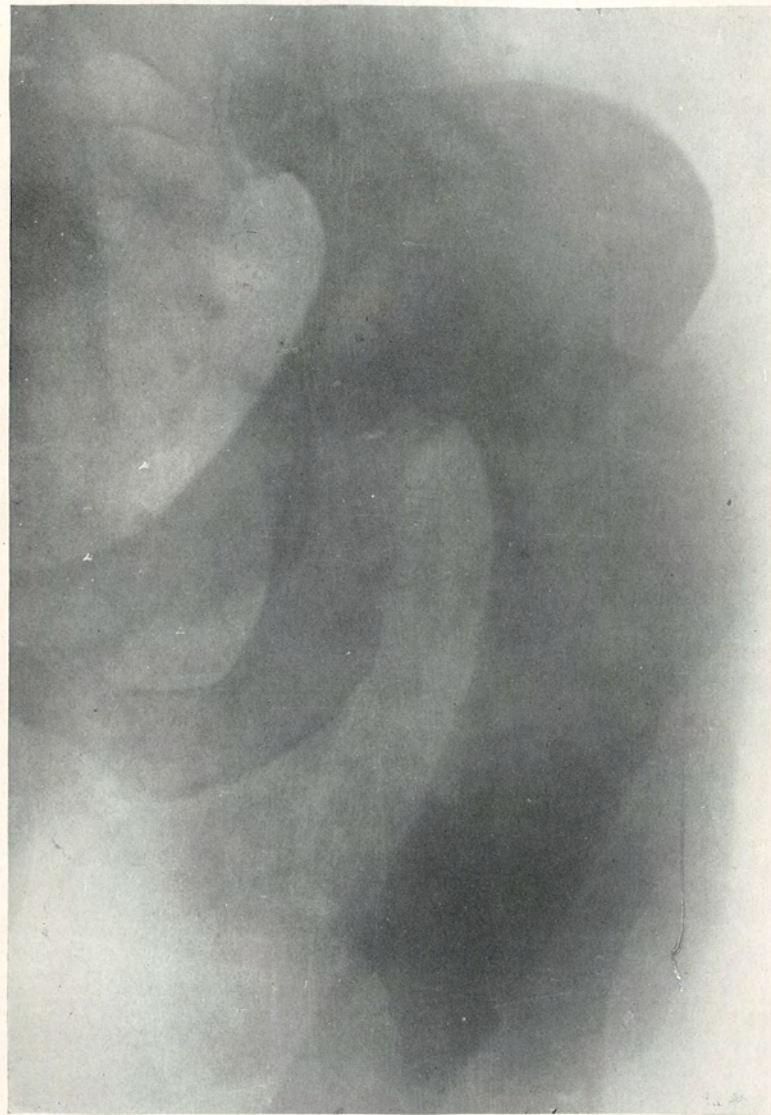


FIG. 3.—Case VII. X-ray No. 5243. Showing dislocation of right hip (posterior).

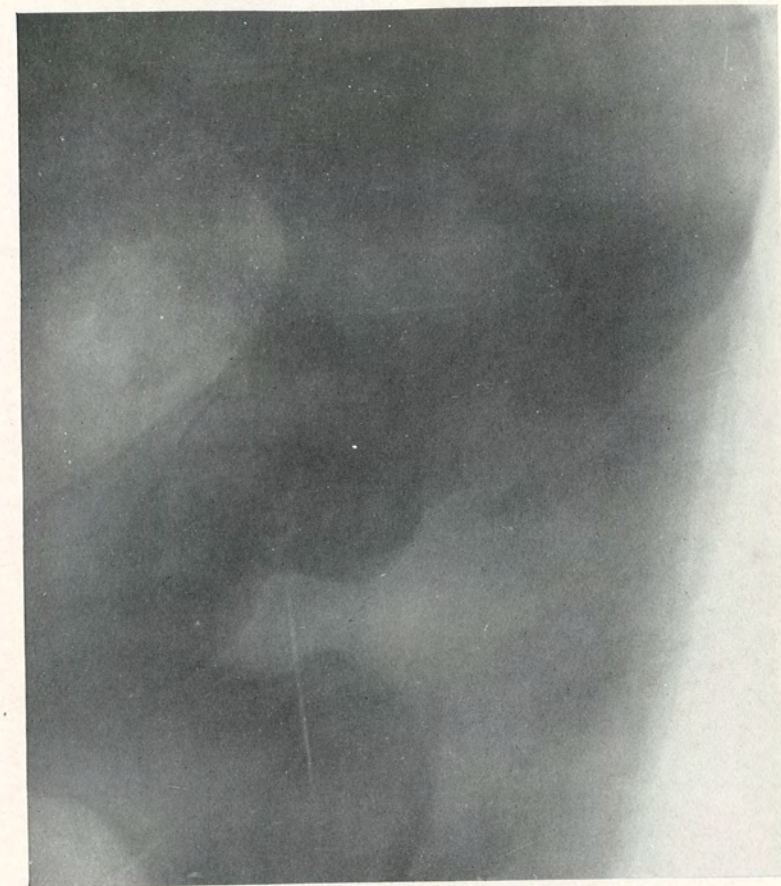


FIG. 4.—Case IX. X-ray No. 8722. Showing anterior dislocation of femur (right).

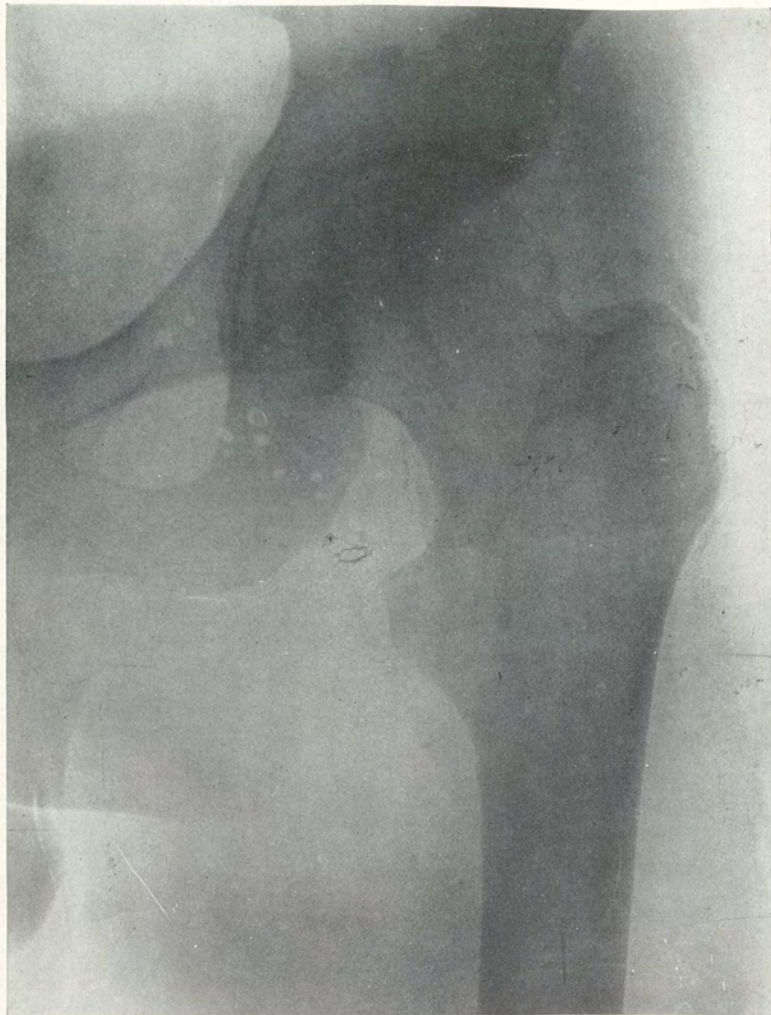


FIG. 5.—Case IX. X-ray No. 257*a*. Showing femoral head in position after reduction.

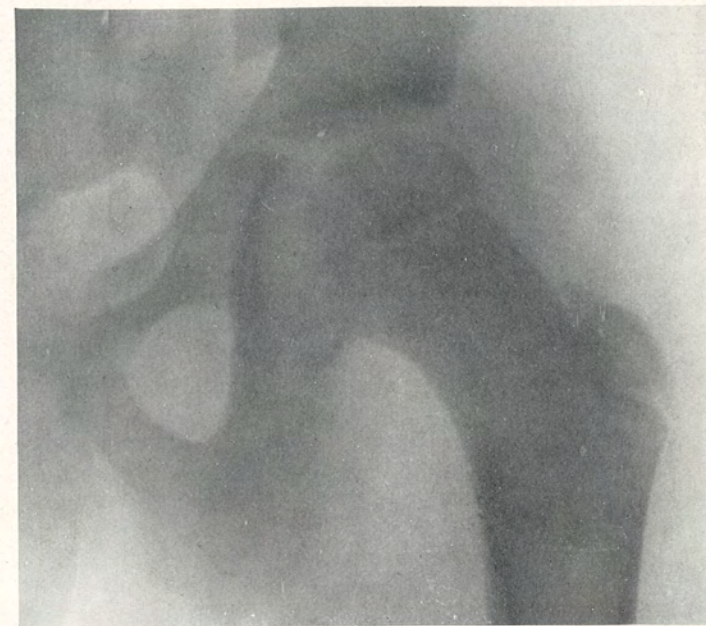


FIG. 6.—Case X. X-ray No. 9437. Showing femoral head in normal position after reduction.

He went to work in three weeks' time. March 21, 1914, ten and a half months after the accident, his hip was in good condition, having no pain at all, and he could go up and down stairs as well as before the accident.

CASE IX.—F. McL., male, age thirty-five, admitted December 8, 1913 (file No. 4974). While working on a roof a heavy gust of wind struck the man, causing him to fall 15 feet. He was brought to the hospital and on examination the left leg was found to be normal. The right leg was flexed, slightly abducted, and appeared lengthened, while the thigh was flexed and could not be straightened. The foot was not everted, probably due to the position of the pelvis. On movement there was severe pain and the head of the femur seemed to be dislocated, but the exact position could not be located, due to the rigidity of the adductors; a large area of ecchymosis was present on the posterior surface of the thigh and there was marked swelling. With the patient standing on the left leg the right was found to be in the position of abduction with the thigh flexed, knee flexed, and the toes resting on the floor in eversion (Fig. 1). X-ray No. 8722 showed an anterior luxation of the right hip. Plate No. 275a shows the hip after reduction. The patient was placed on a hard mattress on his back and ether given. An assistant held the pelvis by downward pressure on the anterior superior spines while the right leg was flexed to a right angle on the thigh and the thigh at right angles to the body. By strong traction upward, together with manipulation of the leg producing slight internal and external rotation of the thigh, and at the same time having pressure made on the great trochanter, the femur head was returned to its normal position with a snap that could be both heard and felt (Fig. 2). The patient was then put to bed with sand bags, one on either side of the affected limb. The following day there was still some pain in the hip but the leg was in good position. On the tenth day after reduction the sand bags were removed and the patient allowed to go about on crutches. Two days later he was discharged in good condition, walking on crutches.

Diagnosis.—Anterior (thyroid) dislocation of the right hip. When seen March 23, 1914, he had returned to work and his hip was as good as before.

CASE X.—J. G., male, age ten, admitted January 22, 1914, having been knocked down by an automobile. Being unable to walk he was brought to the hospital where a dislocation of the right hip posteriorly was found. The right leg was short, adducted and everted, the right foot resting on the heel of the left foot. There was limitation of motion of the right hip and the head of the femur was felt posterior to the acetabulum. Ether was given and the luxation reduced by flexion and traction, the head felt to slip into the acetabular cavity. Sand bags were placed on each side of the thigh. X-ray No. 9437 shows the head to be in its normal position after the reduction. On the sixteenth day the sand bags were removed and 2 weeks later he was discharged in good condition.

Diagnosis.—Posterior luxation of the right hip.

When seen March 23, 1914 (2 months after the accident) he was running about playing with the other boys and had no pain or disability.

In the above series of cases there are 9 males and 1 female; the age ranges from 10 to 61 years, and the time in the hospital varies from 3 to 47 days. As to the types of dislocation there were 2 cases of anterior, 1 each of the pubic and thyroid variety, and 8 posterior cases, 4 being iliac or high, 2 sciatic, while 2 are simply given as posterior. This series confirms the statistical records as to the greater frequency of the posterior type.

There were several methods of reduction used and each proved efficient, except in one case when the Stimson method was employed unsuccessfully for eleven minutes. In one case the method was not stated. The indirect method was used once, circumduction twice (although from the description it may have been the indirect with a wide circle of the knee), and the direct 6 times, one of which was accomplished in the Stimson position.

The mode of treatment following the reduction varied. Four cases were simply kept in bed, 2 had Buck's extension applied for a time following the reduction, and the remaining 4 were kept in bed with a sand bag on either side of the affected leg.

At the time this paper was prepared 8 of the cases could be traced; one died of a fractured skull while in the hospital; another was reported as having numbness and loss of power of the leg, due not only to dislocation of the hip but to fracture of the pelvis and nerve injury as well; the remaining 6 cases are reported as being in good health with no disability from the previously dislocated hip, the time since the accident varying from 2 months to 4 years. With such a record it is concluded that simple luxation of the hip when properly reduced should give no impairment of function.

LITERATURE

- Stimson: Treatise on Fractures and Dislocations, 7th Ed., 1912, Lea, New York, p. 797.
 Cooper, Sir Astley: Treatise on Dislocations and Fractures of Joints, Blanchard and Lea, Philadelphia, 1851, p. 74.
 Chace, A.: New York Med. Jour., 1912, xcv, 171-172.
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 Davis, G. G.: Applied Anatomy, 2nd Ed., 1913, Lippincott, Phila., pp. 512-513.
 Davis: loc. cit.
 Stimson: loc. cit., p. 817; also, New York Med. Jour., August 3, 1889.

DR. P. G. SKILLERN, JR., said that before a traumatic luxation can be spoken of, there are two postulates that must be fulfilled. These are that the capsule must be torn and the articular surfaces separated from each other. In the "central luxation of the hip," referred to by

Dr. Steinke, neither of these postulates is fulfilled. The capsule is telescoped, and the articular surfaces usually remain in contact. The correct term to apply to this injury is "perforating fracture of the acetabulum," and if the head of the femur has entered the pelvic cavity, "perforated fracture." The presence of the femoral caput in the pelvis is merely incidental, it being jammed in *after* the fracture of the acetabulum.

DR. HENRY R. WHARTON remarked that dislocation of the hip is very rare in children, and he could only recall one case in his experience, which occurred in a child about ten years of age from a heavy body falling upon him, resulting in a posterior dislocation of the hip. A complicated dislocation of the hip was brought to the Presbyterian Hospital; the patient was said to have a dislocation of the hip; attempts at reduction were made but the reduction could not be maintained. Examination revealed posterior dislocation with fracture of posterior lip of the acetabulum. In this case he succeeded in getting reduction and then maintained it by putting the patient up in plaster of Paris, with the thigh abducted, while still under the anæsthetic. The patient made a good recovery.

DR. GWILYM G. DAVIS thought that traumatic luxations of the hip are so infrequent that it is a wise thing to record individual cases, particularly as regards the difficulties which are experienced in handling them. One of the cases which was mentioned by the reader, of dorsal luxation, came to the hospital while he happened to be there, and therefore it devolved upon him to look after it; otherwise the resident might have been the only one to have observed it, the chief frequently failing to see luxations, particularly if of the type which is easily reduced. He, therefore, in this case, allowed the house officer to attempt the reduction with the patient on his back, under an anæsthetic. It failed. Then the patient was brought to the end of the bed, which was an iron bed without a footpiece, and allowed the limbs from the hips out to extend beyond the end of the bed. The uninjured limb was held horizontally by one assistant and the other assistant was directed to flex the affected thigh at a right angle to the body and the knee at a right angle to the thigh; the body then was horizontal, the thigh vertical, and the leg horizontal. While one assistant pressed downward on the calf of the leg, a second assistant made pressure on the head and trochanter and it gently sank into its socket. That is the Stimson method and in that case it worked beautifully. Attempts to reduce many luxations are at first unsuccessful on account of the resistance of the muscles; of course this does not apply so much in luxation of the hip where the patient is anæsthetized.

Allis should be given credit for the work which he has done in this line, and particularly for two things; it was he who said that the innominate bone had its anterior and posterior surfaces divided into 2 planes by a line running from the anterior superior spine of the ilium to the tuberosity of the ischium. He also proved the success of the direct method of reducing luxations. His direct method is in the first place to relax all the tissues as far as possible, and then pulling or pushing the head of the bone in the direction of the socket; it is surprising in how many cases this method of reduction will be successful without the employment of great violence.

When it comes to those cases in which difficulty is experienced the most common reason is because the luxation is complicated by fracture. In the present day with the X-ray this point is capable of diagnosis. On one occasion he was present during the attempted reduction of a supposed dislocation by several surgeons; it could not be satisfactorily accomplished and the case was later shown to have had a fracture of the edge of the acetabulum, so that the head would slip out as soon as replaced. When it comes to the shoulder-joint, the fracture will frequently occur close to the joint line and then the fracture and luxation will be confounded and mistaken, one for the other.

DR. J. TORRANCE RUGH mentioned the case of a man who had been thrown downstairs. A dislocation of the hip was diagnosed and attempts made at reduction and a great deal of difficulty experienced in reducing it, but finally the head slipped into the acetabulum and the man was put in bed with extension and sand bags. At the end of about three weeks the head had apparently slipped out of the acetabulum. He was again anaesthetized and attempts at reduction were about to be made when suddenly the man became cyanosed and died. Post-mortem examination revealed that the dislocation had been reduced, and that there was a piece broken out of the neck of the femur and a large mass of muscle tissue interposed between this fragment and both ends of the bone from which it was broken, so that no crepitation was present and no fracture had been diagnosed. Death was due to a blood clot which became loosened in the femoral vein.

Some years ago he had a case of thyroid dislocation which was brought down from the coal regions about four or five weeks after the injury; it was supposed to be a fracture, but the X-ray showed it to be a thyroid dislocation and, at that time, reduction by manipulation proved absolutely impossible, so by the open method the head was reduced and a good result secured.

CHRONIC CYSTIC MASTITIS

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It would serve no useful purpose to review in detail the historical data concerning the progress of knowledge concerning chronic cystic mastitis. The attention of surgeons was first directed towards this disease particularly by Koenig, Reclus and Schimmelbush. About a decade ago, Greenough and Warren in this country published the results of their study upon a large series of cases. In this Academy, Speese and Taylor have reported series of cases and have paid particular attention to the relation of carcinoma to chronic cystic mastitis. Additional interest has recently been given to the subject by the publication of a clinical paper by Judd (*Jour. Mich. State Med. Soc.*, 1914, i, p. 11) and one by MacCarty (*Surg., Gynec., and Obst.*, 1913, xvii, p. 441) upon the pathology, both from the Mayo Clinic. It has seemed worth while to the writer to report the results of eighteen cases operated on in Dr. Frazier's clinic in the University Hospital in which the diagnosis of chronic cystic mastitis was made by the pathologist with occasional reference to the occurrence of epithelial hyperplasia. I have excluded those cases diagnosed as chronic cystic mastitis and carcinoma; they have been included with the cancers, and the early cases were reported to this Academy in 1909 by Dr. Speese (*ANNALS OF SURGERY*, 1910, li, 213).

It is not necessary to discuss the changes occurring in the normal breast at the time of involution, nor is it necessary to dilate upon the fact that this disease is believed to be due to certain abnormal changes occurring at this time.

The term chronic cystic mastitis is open to certain objections and that this has been realized by various writers is evident by the fact that there are twelve synonyms for the disease, no one of which seems perfectly satisfactory.

When examined grossly these breasts show an increase in the fibrous tissue generally throughout the entire gland, but more dense in certain areas or about certain lobules. It varies from white to gray in color and in many cases is of cicatricial consistency. Cysts are present in every case, occasionally in microscopic dimension only, but as a rule varying in size from a few millimetres up to several centimetres. They contain fluid varying in color from clear watery fluid through all shades

of yellow and green up to black. Histologically, the fibrous tissue is found increased, especially that derived from the interlobular connective tissue; a round-cell infiltration is frequently observed; the large ducts are occasionally compressed; the acini in the lobules vary considerably in size and their lining epithelium shows various stages of proliferation. It is this variation in the epithelium which has given rise to much discussion and which at times suggests or indicates the histologic picture of cancer. To discuss the matter in the language of Greenough or of Warren we see two types of the disease, those in which the changes are distinctly cystic with flattened, atrophic epithelium and those in which proliferation is a characteristic feature with varying degrees of hyperplasia of the epithelium, even to the formation of adenomatous areas. MacCarty calls attention to the fact that the secretory cells of the primary acinus, composed of one row of columnar or cuboidal cells, rests upon another row of cells almost invisible in the normal breast but prominent when there is a chronic inflammatory reactive process present, and which corresponds to the so-called *stratum germinativum* of the skin and constituting the germinal cells of the epithelium of the breast. These will be referred to as the outer cells and the first mentioned as the inner cells. When both are present he terms the histologic picture a primary epithelial hyperplasia; the inner cells disappear and there remain only the hyperplastic cells of the outer row. This condition will be referred to as secondary epithelial hyperplasia, and he states that it may be frequently seen in chronic cystic mastitis and may or may not be malignant. When the cells of the outer row appear in the periacinal stroma, the condition may be spoken of as tertiary or migratory hyperplasia and is, of course, carcinoma. MacCarty believes that we should determine the percentage of cases of secondary hyperplasia which will remain well or will recur after the removal of the primary gland itself without the removal of the lymphatic gland, muscles and large amounts of skin.

I have examined the slides of 14 of our cases for the purpose of classifying them according to the MacCarty scheme. In nine the hyperplasia was of the primary type, *i.e.*, the growth was benign. In the tenth case the patient was operated on three times, twice in the left and once in the right breast, and in all three neoplasms primary hyperplasia only was found. In the eleventh case the mass in the left breast was excised subcutaneously and revealed the secondary type of hyperplasia, while a growth in the right breast removed two years later was of the primary type. In another case the right breast was removed in 1904 and showed primary hyperplasia. Six years later a mass was

removed from high in the upper outer quadrant, the remains of the breast, and showed a secondary hyperplasia. In two other cases the secondary type of hyperplasia was encountered. Of the four secondary hyperplasias, *i.e.*, the type which may or may not be carcinomatous according to MacCarty, three of the patients were traced and reported cured five years, four years, and three years, respectively, after operation. Of the ten primary hyperplasias, eight have been traced and all reported cured. The tertiary hyperplasias or carcinomas are not reported because we include them under the cancers.

While this series is entirely too small to draw important deductions, it is interesting to note that the average age at operation of the patients with primary hyperplasias was thirty-six; of the secondary hyperplasias, forty-one.

The clinical features of this disease are well known by most surgeons, although it has been my experience that most men in general practice have rather vague ideas upon the subject, and this cannot be wondered at considering the confused nomenclature and varied descriptions of the pathology. The malady affects the breasts of women at an average age of forty years, may involve one or occasionally both breasts, is associated with a certain amount of pain, occasionally referred down the arm, and upon examination a rather vague mass is felt, containing one or more hard nodules, and which is not adherent to the skin or to the underlying pectoral fascia. Examination of the axilla rarely reveals any enlargement of the nodes there. In Judd's recent paper he reports 218 cases of chronic cystic mastitis, eleven occurring in males, of which 85 per cent. occurred during the "cancer age" (30 to 60 years). The greater number of cases gave a history of having had previous mastitis and nearly all of them complained of pain. In our series pain was the exception rather than the rule, and 89 per cent. were between 30 and 60 years.

TABLE I
AGE INCIDENCE

AGE INCIDENCE	Cases
Between 10 years and 20 years.....	1
Between 20 years and 30 years.....	2
Between 30 years and 40 years.....	5
Between 40 years and 50 years.....	9
Between 50 years and 60 years.....	1

The youngest, fifteen years (male); the oldest, fifty years. Average age, thirty-eight years, eight months. Married, fifteen; single, two; male, one. Ten had borne children; four were childless. The menstrual history was of no importance in any case.

In the family history the occurrence of cancer was noted in five instances, tuberculosis twice, and in one of these both tuberculosis and carcinoma were present in the family history. Only two patients of the eighteen stated that they had injured the breast and both ascribed the mass to the injury. In only one case was there a previous history of acute mastitis and in this patient there was also a history of trauma. Four of the patients, at least, were ptotic.

The duration of the disease was very variable and any statements on this point would be inaccurate because often the patient would state that the "lump" had been present for a few weeks or months when it probably had existed for a longer period. One patient had only noticed the mass for three days and immediately came for operation. Another had noted the mass for five years and still another stated that she had had masses in the breasts ever since she was a little girl.

Of these 18 patients a definite, satisfactory letter has been received from 15, and in all of them cure has evidently occurred. The period of cure varies from eight months to nine years and seven months and may be tabulated as follows:

TABLE II
INCIDENCE OF CURE

	Cases
Eight months to three years.....	4
Three years to six years.....	5
Six years to ten years.....	6
Not traced	3

Treatment.—In discussing the treatment of chronic cystic mastitis we are confronted by the statistics of 295 cases collected by Speese (*ANNALS OF SURGERY*, 1910, li, 213) in which the diagnosis of cystic mastitis was made and the subsequent pathological examination revealed carcinoma in 15 per cent. In 1910 Dr. Taylor (*ANNALS OF SURGERY*, 1910, lii, p. 253) reported before this Academy 26 cases in which the diagnosis of chronic cystic mastitis had been made of which 50 per cent. showed carcinomatous degeneration. We are also confronted with the statement from the Johns Hopkins Clinic that if we remove a mass from the breast which upon microscopic examination turns out to be carcinoma, the patient will almost inevitably die within the three-year limit even though the secondary complete operation is performed a few days later. On the other hand, Judd from his experience with 218 cases reports that in 211 a conservative operation was performed and in none of the cases was there found evidence of malignant degeneration. In the remaining seven cases of doubtful malignancy the radical operation was performed. It is not stated in his report whether this

examination was made from frozen section at the time of operation or whether it was made later, but both Judd and MacCarty state that in the experience of the Mayo Clinic the removal of the mammary gland preceding an immediate radical operation has not been associated with earlier recurrence than has been found after a primary radical operation. In the discussion (*ANNALS OF SURGERY*, 1910, lii, 253) before this Academy in 1910, Dr. Taylor stated that, as a rule, he would remove the whole gland in a case of carcinoma except that the muscle is allowed to remain unless the tissues of the breast appear macroscopically uncertain. Gibbon would practise complete removal only when the disease had existed for a long time, where there were multiple cysts or where there was recurrence, after operation. Ross removed the gland subcutaneously and Rodman was partial to Warren's operation if there were a competent pathologist at hand to make a frozen section report. The plan of treatment recently suggested by MacCarty deserves consideration. He believes that in the doubtful cases in women near or over thirty-six years of age, they should have the entire mammary gland removed for immediate examination. If primary or secondary hyperplasia be present nothing more should be done; if tertiary hyperplasia be present a radical operation should be performed. In doubtful patients near or under thirty-five years of age a wide section of the gland should be removed, and if primary hyperplasia be present nothing more should be done; if secondary hyperplasia be present the remainder of the gland should be removed, and if tertiary hyperplasia be present the radical operation should be performed. Judd slightly varies this procedure and advises, in women under twenty-seven years of age, partial excision preferably by the Warren method; in those between thirty and forty years he believes that the radical operation is the surest method but prefers for cosmetic reasons to practise partial excision and to abide by the decision of the pathologist, doing a radical operation at the time if necessary. In patients between the ages of forty and sixty a radical operation should be performed but the muscle need not be removed in definite benign conditions.

In our own series of cases, resection of a portion of the gland was performed seven times; in one of these the breast was completely amputated and the axilla dissected out because of apparent recurrence two months later and we were fearful of carcinoma; no microscopic evidence of carcinoma, however, was found in either specimen, but unfortunately the patient has not been traced. In a second case the resection was followed two and a half years later by a subcutaneous excision of the entire breast for apparent recurrence. This patient

returned a little later for a similar condition in the opposite breast which was also excised subcutaneously. She reports herself at the present time as being entirely well, and, curiously, on January 31, 1914, gave birth to a daughter, at which time the tissues over the chest were tender and there was a slight discharge from the nipple. Excision of the breast was performed in the remaining eleven cases, in one being accompanied by a dissection of the axilla, and in another a radical operation was done two years after the excision. Both these cases have been traced and are perfectly well. One patient who had both breasts operated on with a complete amputation on one side and a subcutaneous excision on the other much prefers the former operation, stating that the remaining nipple is quite tender.

I have called particular attention to these recent statements of Judd and MacCarty, because every one is familiar with the older literature and perhaps even the new does not offer anything in the way of progress. There have been a number of papers written upon malignant degeneration or carcinomatous changes in chronic cystic mastitis and Judd makes the statement that chronic cystic mastitis is a precancerous condition. No one has ever seen the direct transformation, however, and it is only by tracing the border-line cases, the secondary hyperplasias of MacCarty, that we are able to determine in just what cases a radical operation should be done and in which cases a conservative one performed. There is no reason why chronic cystic mastitis could not be produced by the pressure of the carcinoma cells together with the fibrous hyperplasia that always accompanied this disease, and therefore a result, not a cause, of the cancer. It may be coincident.

The two diseases are closely interwoven, however, and any tendency to conservative treatment in women over thirty years of age is to be deprecated.

In conclusion I wish to express my indebtedness to Dr. Frazier for permitting me to collect and report his cases as well as for the privilege of using his wards for my own patients and in some instances for operating on his patients. I have had six patients suffering from chronic cystic mastitis operated on in other hospitals and Dr. Frazier has had a number of cases in the Episcopal Hospital, but we have thought it best only to report the series in the University Hospital.

DR. CHARLES H. FRAZIER said that Dr. Müller and he had been going over the results of this series, during the past year, and they had come to the conclusion, that in the future they would adopt the radical method rather than the conservation operation, that is, the complete removal

and not the partial resection of the breast. He did not believe there will be much dissent on the part of surgeons as to the adoption of this general principle, though there may be some dispute as to whether the breast is removed subcutaneously with conservation of the nipple, or whether the breast together with the nipple is removed through an oval incision. As a matter of convenience the latter procedure will be preferred and may be in many respects the most satisfactory. As a general principle, the surgeon inclines to the operation which involves the least mutilation, and he had always thought, particularly where the breast on the other side was not very large, that the patient would be better satisfied if the nipple was not removed. For this reason in many of his cases the nipple has not been removed and a subcutaneous purse-string suture is introduced to prevent the nipple flattening out and becoming adherent to the chest wall. But in this connection it is interesting to hear that the patient who had the nipple conserved on one side and removed on the other preferred the latter procedure. While as a matter of routine frozen sections are made at the time of operation, the limited time afforded for the examination and the limited area of tissue investigated has led him to place little reliance upon the pathologist's report from the frozen section. If upon further study carcinoma is discovered, a secondary operation is performed for the removal of the pectoralis major and the other steps incident to a radical operation.

DR. J. S. RODMAN said that during the last five years he had seen a good many of these cases of chronic cystic mastitis, perhaps between 50 and 60. The recent paper by McCarty is exceedingly interesting from the pathological stand-point; its chief importance is perhaps to correlate the clinical results with laboratory findings as has been pointed out. In the series of cases which the speaker had seen at his father's clinic the majority of those presenting small shot-like cysts with inky black fluid proved to be the ones that were the most prone to undergo malignant change. There have been 6 instances of double cystic mastitis where operation first on one side was done, the patient returning later for operation on the other gland.

There are one or two little points of interest in the diagnosis of this disease. The superficial veins of the breast are rather apt to be prominent, and there is apt to be considerable pain at various times, particularly at the menstrual periods, at which time the patient also complains that the breast appears to be larger than at other times. As to the treatment of chronic cystic mastitis, his father was now of the opinion that the best operation, particularly in women of the cancer age, is to do the complete operation for cancer. He feels that removal of the

muscle makes so little difference to the patient that it should always be done. On the other hand, in very young women it is worth while to take a chance with the less complete operation, the resection being according to the plastic plan of Warren. As to the frozen section, they always use it and had come to depend a good deal on it, in spite of the fact that in three instances which he could recall the frozen section has been wrong. If the diagnosis of general cystic mastitis is returned, the gland is sacrificed, provided the woman is over thirty-five years of age.

DR. GEORGE P. MÜLLER (in closing) said that the 18 cases reported by him were diagnosed in the laboratory as chronic cystic mastitis and not as carcinoma with chronic cystic mastitis. They have had 40 or 50 cases during these 10 years which were diagnosed clinically as chronic cystic mastitis but in which the laboratory examination revealed carcinoma. These are filed under the cancers. In none of the cases traced has there been any development of cancer; there has been a recurrence of cystic nodules when partial resection had been done and some of these required a second operation. One cannot say in all cases of chronic cystic mastitis from the clinical examination alone whether carcinoma is or is not present. It can only be done by the most careful microscopic examination. Last year Syms reported, before the New York Academy of Surgery, a case operated on for chronic cystic mastitis but in which later examinations revealed carcinoma; Hartwell and Lee reported similar cases. For this reason he believed that complete amputation of the breast and a dissection of the axilla is indicated in all women over thirty years of age; in acute appendicitis we know that most of the patients will get over the attack under non-surgical treatment but we never know in the individual case before us whether he will get well or progress to gangrene, etc. It is so in chronic cystic mastitis; we do not know whether the breast contains cancer or not. He also wished to refer to the frequent criticisms of the laboratory diagnosis by surgeons of little pathologic experience. Microscopic diagnosis is not any more exact than a clinical diagnosis. It is a matter, to some extent, of personal equation or of the experience of the examiner, and while the pathologist makes less mistakes than the clinician, yet he is more frequently criticised than the latter.

INDICATIONS FOR AND VARIATIONS IN THE TECHNIC OF ECK FISTULA

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THE production of an artificial communication between the vena cava and portal vein for the relief of certain pathological conditions was first described by Eck in 1877 and therefore bears his name. He suggested the operation especially as a remedial measure in cases of cirrhosis of the liver with abdominal ascites. He never attempted the operation on man, however, as his mortality with animals was rather high. Numerous technics have since been elaborated, several of which are quite uniformly successful. Probably the best known of these is the one described by Carrel and Guthrie, which with slight modifications has been used in all our experimental work.

The operation has been performed twice on man. The first was by Vidal in France, the report of which he published in *La Semaine Medicale* in 1903. The patient had cirrhosis of the liver, and was apparently benefited by the operation, but died four months later from an "endovascular infection of enteric origin."

The second operation was performed by P. Rosenstein, who reports it in the *Zentralblatt für Chirurgie*, Leipsic, February 28, 1914. His case also had cirrhosis of the liver with marked ascites, necessitating frequent tapings. He first tried omentopexy, but without gaining any relief. He next performed an Eck fistula operation which he says only gave temporary relief, tapings having to be resumed a short time after. He next tried drainage into the urinary bladder through a valvular opening. This, he reported, gave almost complete relief. He does not describe his technic for the Eck fistula and it is very possible that the portal pressure was not sufficient to keep the anastomotic opening patent. We have observed this in dogs when the portal was not ligated above the anastomosis. It is also possible that the communication between the portal and vena cava was not sufficiently large. In one of our dogs this mistake occurred and when the animal was killed about three months afterwards, a marked dilatation of the vessels in the entire portal system with compensatory circulation was found, although the anastomosis was still patent. The opening practically always contracts to a certain extent and in his case, while it appeared sufficient at first, may have contracted below the physiological limit for adequate

functioning. We have also observed this in our experimental animals. Several surgeons, especially in this country and in Italy, have opened the abdomen with the expectation of performing an Eck fistula, only to find the adhesions so dense around the hilus of the liver and the portal vein and vena cava that the operation could not be performed. Dr. Frazier and I recently opened an abdomen with the object of performing an Eck fistula, but the adhesions throughout the entire abdomen were so extensive that it was impossible to reach any of the larger veins.

Experimental work on dogs and cats has amply proved the procedure feasible, and that comparatively little danger exists in the operation itself. The animals remain healthy, usually gain in weight as normal animals should, and at least when on a normal mixed diet show no toxic symptoms whatever.

Indications for Eck Fistula.—Cirrhosis of the liver with ascites, for which condition the operation was first devised, still offers the principal field for its employment. Those cases with an alcoholic history and without serious changes in other organs are probably the most favorable for this procedure. In those cases in which an attempt at compensatory circulation exists, shown by the so-called "caput medusæ" and by enlargement of the œsophageal and hemorrhoidal veins, the operation is particularly indicated, since the greatly enlarged veins, particularly in the œsophagus, are prone to rupture at any time. This is so often fatal that indications for its relief completely overshadow those for the simple improvement in the ascites. The operation of Eck's fistula offers, at least theoretically, the most promising relief for the impending œsophageal hemorrhage, in fact offers the only immediate relief from danger. But it would be much better to operate in the early stages, when ascites is the only complaint, than to wait for the most serious of the sequelæ.

The Talma-Morison operation of epiploexy or omentopexy offers in the early stages of hepatic cirrhosis a simple method for the relief of ascites and in many cases has afforded marked improvement, some even claiming a cure of the ascitic condition. It is certainly a question in the early stages, which operation, epiploexy or Eck's fistula, should be the choice. The mortality from the former has been very high, but principally, I think, because it was performed too late in the disease, considerable shock resulting from the extensive irritation of the peritoneum. The mortality from the Eck fistula operation should be small, especially if done early, as there is actually very little trauma to the peritoneum. The two cases in which it was performed suffered no ill

effects from the procedure. Omentopexy affords very little relief in the late stages when the œsophageal varices have formed, so that in this condition we can offer little hope except by an artificial, direct anastomosis between the portal and caval systems.

Cirrhosis due to stasis in the hepatic veins, so-called nutmeg liver, the liver of chronic congestion, is often associated with ascites, but in this case neither omentopexy nor Eck fistula could be expected to afford relief since the trouble lies, not in the portal, but in the vena cava itself. The pressure in the latter is so high that stasis occurs in all its tributaries, and the flow through the portal is more or less dammed back. These cases are usually associated with marked valvular lesions in the heart and no surgical procedure except drainage of the ascites can be offered.

In Banti's disease we apparently have a primary splenomegaly with a secondary cirrhosis of the liver. In this condition Eck fistula should give complete relief from the portal obstruction and resulting ascites. A fourth class of patients which could be materially helped by Eck fistula are those suffering from thrombophlebitis of the portal vein. The etiology of this condition varies considerably, but probably most cases are due to syphilis and to primary or secondary cryptogenic pyogenic infections. The vein shows a phlebosclerosis upon which thrombi form, more or less occluding the lumen. Occasionally complete obstruction occurs and unless canalization soon takes place the portal obstruction proves fatal. The splenic veins are also involved in many of these cases. Indeed, Warthin considers this the primary factor in the etiology of Banti's disease. Obviously, the classical Eck fistula operation could not be done in these cases, since the portal may be more or less diseased for the greater part of its length. In this class of cases we would make the anastomosis between one of the larger mesenteric veins and the vena cava or if more convenient on one of the common iliacs. Certainly omentopexy in this condition could not be expected to give the relief which a modified Eck fistula would afford.

Those cases of ascites due to nephritis or serious cardiac lesions would not be benefited by either omentopexy or Eck fistula, repeated tapings or drainage into the parietal tissues being the only surgical measure advisable.

Technic of Eck's Fistula.—A simple method for lateral venous anastomosis which did not involve an exposure of the opened vessels was described by Sweet in 1904. In his method a posterior row of sutures approximating the portal and vena cava is laid, similar to the posterior row in a gastro-enterostomy. Two needles bearing a fine

platinum wire are then passed through the lumen of the vessels from above downwards, the position of the wire determining the location and size of the anastomotic opening. The anterior layer of sutures is then placed, completely closing, except at the lower end where the wire emerges, the space through which the anastomosis will be made. The wire is then connected to a special holder and an electric current passed through it. Careful traction is now made, and the wire, acting as a cautery, rapidly cuts a communication between the two veins. When the wire emerges at the lower opening a very little blood escapes, which is immediately controlled by tying the last suture. This effectually closes the lower opening.

Bernheim in 1912 published a technic quite similar. Instead of employing the electric cautery he used a special type of scissors armed with a guard. Previous workers, including Eck and Pawlow, have used practically the same method, with the exception of the guard on the scissors. Bernheim claims that with these special guarded scissors it is impossible to injure the outer walls of either vein, and the size of the cut can be made with mathematical exactness.

It is interesting, when we consider that in this operation no attempt, other than the exclusion of the air, is made to prevent clotting, that no thrombus occurs. The volume and rapidity of the blood stream seem to be sufficient to prevent any accumulation of erythrocytes upon the thin layer of fibrin which always forms on the cut edges. This is one factor strongly in favor of the operation on man, since it minimizes the greatest danger of the operation, that of thrombosis.

The operation as described by Carrel and Guthrie is essentially as follows. The vena cava and portal vein are isolated, their lumens closed above and below the site of anastomosis by ordinary serrafins, spring-jawed clamps or tape, and an incision made in each vessel, parallel with its longitudinal axis. Guthrie states that "the openings in the vessels should be in width about one-third the diameter of the vessel, and in length about one and one-half times the diameter of the vessel." But it is usually not necessary to actually cut away any of the vessel wall, the natural contraction of the circular fibres after the longitudinal incision allowing sufficient width. It is, however, essential that the openings in the corresponding veins should be the same size and shape, else considerable difficulty will be experienced in their proper approximation. The isolated portion of each vessel is thoroughly washed out with liquid vaseline. Two stay sutures are then placed, one at each end of the oval openings, so that the vessels are accurately approximated, the knot of the suture being outside in the

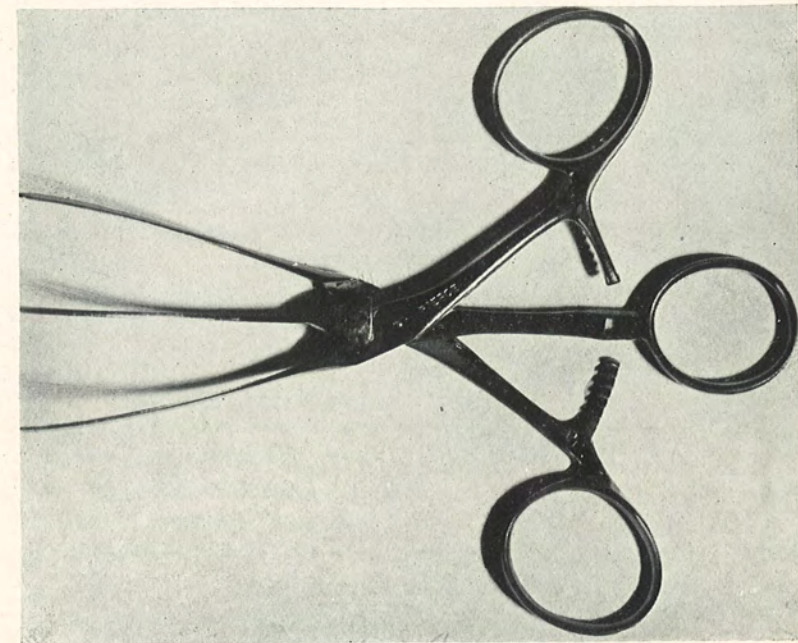


FIG. 1.—Author's three-bladed, spring-jawed blood-vessel clamp, opened.

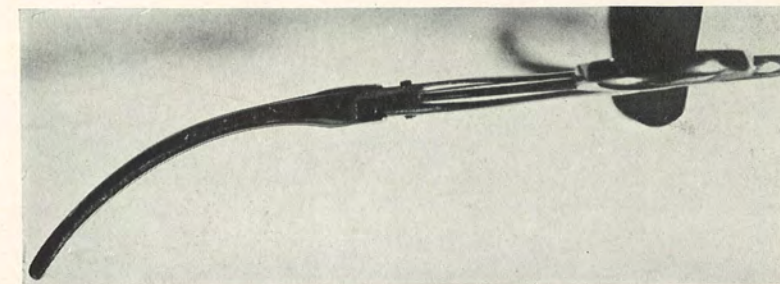


FIG. 2.—Showing curve of blades.

angle formed by the two vessels. A third suture may be placed through the two posterior walls for traction, but should not be tied. One of the stay sutures then re-enters the vessel through its wall and a continuous over-hand suture joins the posterior edges. It is then passed through the vessel wall and tied with the second stay suture. The anterior wall is closed in a like manner. Very fine straight needles with 000 silk are used, and the stitches should be placed about one-half millimetre from the cut edge and about one-half to one millimetre apart.

The modifications in this technic which we adopted consisted only in the manner of procuring temporary hæmostasis and in the type of needle used. To do away with the time-consuming isolation of the vessels which consisted in freeing them for the entire length of the clamped-off portion, the clamping or tying of their tributaries and the application of the four serrafins, we used, after the first few operations, a pair of curved spring-jawed forceps designed by Dr. Sweet. These are practically diminutive intestinal clamps. It was found advisable to cover the blades with gauze or cotton cloth to prevent their slipping from the veins. These forceps are easily and quickly applied by simply raising the vessel with the fingers and clamping it lengthwise, the curve of the blades and their length giving ample room for the incision. Since difficulty was sometimes experienced in maintaining the parallel position of the two clamps I had a three-bladed clamp made which resembles the ordinary gastro-enterostomy clamp except in size. The application of this clamp is very simple. The portal and vena cava are lifted with the fingers and caught between their respective blades. We have found this clamp perfectly satisfactory in animal work.

The other modification of Carrel's technic was in the use of curved needles instead of straight. We had the Kirby No. 16 needles shortened by about half and curved. The sutures could thus be much more easily placed, especially near the ends of the opening.

The variation in the above technic necessitated by different pathological conditions consists only in the choice of vessels used. When the portal is thrombosed or otherwise diseased, or when adhesions prevent access to the upper vena cava, it will be found perfectly possible to make the anastomosis elsewhere. Normally, in the human a large mesenteric vein is found lying just above the common iliacs. If the mesenteric vein is not of sufficient length to be easily approximated to the iliac the former may be ligated near the mesenteric base, divided, and turned downward. We have performed this modification on the dog and found it satisfactory. In the same way the mesenteric vein could be anastomosed to the lower vena cava. If an operator should

fear to use the iliac, I think it would be possible to bring up the saphenous vein, as is sometimes done for drainage of ascites, and anastomose the mesenteric vein to it.

Conclusions.—From a rather extensive use of the Eck fistula in dogs we consider the operation safe, entirely compatible with a normal life, and simple of execution. We prefer the modification of Carrel's technic.

In cases of liver cirrhosis with ascites and in cases of thrombosis or other obstruction to the portal circulation, we consider the operation advisable, especially so where œsophageal varices exist. In the latter condition, at least, it should prove much superior to omentopexy.

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DR. J. E. SWEET was somewhat inclined to disagree with Dr. Peet's view of von Eck's work; von Eck succeeded in having a dog live over a year, and that was 38 years ago.

The operation is perfectly feasible and the results are entirely compatible with life, except in one point; the animals he had had living a long period, the longest being 3½ years, died of evident cirrhosis of the liver. Nevertheless, the operation is indicated for cirrhosis of the liver; it is certain that there is no other definite relief for the back

pressure in this condition. About a year ago last fall, he worked out on the cadaver a method of doing the Eck fistula, consisting in the anastomosis between some of the radices of the portal vein and the iliac, and found it was very easily accessible and easy of accomplishment. Thereupon, Dr. Edward Martin and he, in his service at Blockley, attempted it twice. It seemed that the indications were perfectly clear in each case; in the first they opened the abdomen supposedly for cirrhosis of the liver, but found this diagnosis to be incorrect, there being a condition of syphilis of the liver and spleen. The Talma operation was performed. In the second case they were unable to exactly determine the condition but it was also thought to be syphilis.

DR. CHARLES H. FRAZIER referred to his own experience with omentopexy. His first Talma operation was analogous in one respect to his first Edebohls's operation, both were suitable cases and in both the results were extraordinarily brilliant. The patient was a middle-aged man, alcoholic, with marked cirrhosis of the liver and with no organic changes in the kidney or heart. Although he had to be tapped two or three times after operation, from that time on for five years, when he lost track of him, the ascites did not return. He had performed the Talma operation on four or five cases since then, but in none of these did he now recall, has there been any striking relief for the condition for which the operation was performed.

With regard to the indications for, or the preference for, the Eck fistula over the Talma operation, it seemed to him that in suitable cases they would be justified in recommending the Eck fistula, provided it can be done by those experienced in blood-vessel surgery. In the case of a young woman, from whom he had removed the spleen a year ago for Banti's disease and who had developed secondary changes in the liver with marked ascites, after careful consideration, they decided to make an Eck fistula, but at the operation the adhesions were so abundant and of such character, that they could not expose vessels suitable for anastomosis. As to the operation requiring the hands of a surgeon experienced in blood-vessel surgery, he had had the opportunity of assisting Dr. Peet several times in Eck fistula operations on animals and had been surprised to find with what facility the operation is performed by experienced hands. In the human subject as in dogs, it ought to be attended with no shock and with no infection. The operation is of short duration and the mortality should not be higher than that of the Talma operation, which necessitates so much intentional trauma of the peritoneum.

DR. ASTLEY P. C. ASHHURST asked if experimental surgeons have

succeeded in producing ascites by obstruction of the portal vein. Theoretically, this will produce enlargement of the veins in its distribution on the mucous surfaces of the gastro-intestinal canal, but will not produce ascites. Hale White, Rolleston, A. O. J. Kelly and others have maintained that a patient with uncomplicated cirrhosis of the liver never lives long enough to be tapped more than once; in other cases the ascites may be due to changes in the peritoneum, perhaps tuberculous, or possibly syphilitic, or due to some other infection. Therefore, the establishment of an Eck's fistula seems an irrational procedure for the relief of ascites; and the relief of the ascites, which sometimes follows epiploxy, probably is not due to the establishment of a collateral circulation, but to the trauma to the peritoneal surfaces which is an essential part of Talma's operation. The indication for the establishment of a collateral circulation is gastro-intestinal hemorrhages, and not ascites alone.

OSTITIS FIBROSA CYSTICA

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ACUTE intraosseous diseases of the long bones possessing a more or less clear etiology and definite clinical characteristics, present little or no difficulty in diagnosis, prognosis or treatment. With the quite multitudinous variety of affections of a chronic nature that may involve the same structures, the conditions and problems with which the surgeon has to deal are wholly changed. That quite different and definite pathological entities, some requiring little or none and others very extensive operative procedures, may be represented by essentially like clinical phenomena, is well known. This necessitates the most searching and scientific analysis of this group of cases, not simply from the academic standpoint but as an insurance of the ultimate welfare of the patient, for we must rely entirely upon exactness of diagnosis for a guide to the proper prognosis and treatment.

Upon a broad morphological basis we may subdivide the chronic intraosseous affections into:

1. Those dependent upon infection.
2. The purely metaplastic processes.
3. The neoplastic, which are either benign or malignant.

In the first group we encounter tuberculosis, lues and chronic osteomyelitis, primary or secondary, either diffuse involving large areas or circumscribed in the form of an abscess, the so-called *ostitis aluminosa*. The last group is represented chiefly by the sarcomata which vary greatly in their malignancy, and by the more rare and benign growths, *enchondromata*, *myxomata* and *fibromata*. In the second group or metaplastic type the one of chief importance is dependent upon that peculiar metamorphosis of a part or a whole of a single or many bones of the skeleton into fibrous tissue with a decided tendency to the formation of cysts.

Although previous to 1876 sporadic cases of bone cysts had been reported from autopsy findings, it was not until this date that Virchow definitely drew attention to their occurrence. Thirteen years later Hirschberg first observed and described *ostitis fibrosa*, but looked upon

it as a late stage of osteomalacia with the formation of cysts. Its identity as a separate disease was not established until 1891, when von Recklinghausen published his monograph. From this time until within the last few years little but academic interest was shown. In 1902 Koch collected 23 cases, while Heinecke, in 1903, published the report of the first case of bone cysts in which radiographic pictures were made. This was followed by the collection and study of 43 cases by Muller in 1906. Pfeiffer's paper appeared one year later and Bloodgood's in 1910 with analysis of 69 cases reported up to that date. Now that the radiograph has enabled the discovery of its rather frequent occurrence, we can no longer neglect its consideration in the study of many cases of obscure intraosseous lesions. It is with the hope of adding slightly to the slowly accumulating knowledge in regard to bone cysts that the report of our cases is made.

That a cyst of bone may result secondarily from any of a number of primary pathological changes is of course patent and is recognized by all writers on this subject. In reviewing the cases of bone cysts found in the literature, one sees that much confusion has arisen from this intermingling of secondary cystic changes or degeneration in other processes with those cases of true simple cysts. According to Silver, "the term 'bone cyst' should be used in a more specific sense to include those cases within the bone of a cavity filled with fluid as the most prominent symptom and in which no other definite disease can be discovered either from examination of the cystic contents or of the surrounding bone." Assuming that this restriction is reasonable and correct, we must exclude from the true bone cysts those dependent upon or secondary to:

1. The liquefaction of subperiosteal hæmatomata which have become included by a surrounding shell of reactionary *ostitis*.
2. Cysts occurring occasionally in callus.
3. Those resulting from the breaking down of neoplastic growths, sarcoma, myeloma, fibroma, myxoma and *enchondroma*.
4. Those appearing at times in Paget's disease and arthritis deformans.
5. Cystic changes in osteomalacia.
6. *Echinococcus* cysts.
7. Dentigerous cysts.
8. Cysts accompanying von Recklinghausen's disease or general *ostitis fibrosa*.

No sharp distinction can of course be made between the latter and the cysts under discussion, except that of its limitation to one bone in

which the cyst formation is the prominent change while in general osteitis fibrosa they are of minor importance.

The essential underlying process leading to the production of cysts is osteitis fibrosa of the type limited to a part or whole of a single bone. Although the nomenclature would place it among the inflammatory types of intraosseous affections, it cannot essentially be regarded as such, various opinions to the contrary, notably Bloodgood, who states, "I agree with all the more recent writers that the disease is an inflammatory one, in which the medullary tissue is replaced by a new formation of connective tissue with or without cyst formation and that the term osteitis fibrosa is not an inappropriate one, although it would appear that the term chronic osteomyelitis fibrosa cystica or solida would describe the condition more fully." Murphy is also of the opinion that it is an inflammatory process. While it may be a metaplastic process dependent upon a foregoing inflammation of a chronic attenuated character, in itself it has none of the earmarks which we associate with inflammatory changes. Its almost invariable situation at first in the centre of the bone, always at first a medullary occupant, its equal expansion in all directions with no sign of surrounding regeneration or thickening or active periosteal overgrowth, and the preservation of the latter in unbroken outline even when the periosteum is in direct contact with the cyst wall, all argue against our concept of osseous inflammation. On the other hand, the pathological picture of osteitis fibrosa is a strong witness for its metaplastic nature. The metamorphosis of the marrow into masses of fibrous tissue with subsequent degeneration of these fibrous masses into serous, mucoid or fatty material, portions showing cartilage or bony formation, all you will note of the same embryological type, corresponds perfectly with the changes in true metaplasia. This similarity has been well brought out by Freiberg.

The process usually shows a single cyst, of varying sizes, often egg shaped, with or without a lining membrane, the surrounding bone the seat of osteitis fibrosa. Cysts may, however, be multiple, unilocular or multilocular, the walls smooth or deeply ridged. Their contents have almost invariably been serous or blood-stained serous fluid. The cyst of the fifth metacarpal bone reported by McDill last October, when opened, discharged stringy mucopus. This cyst was not obviously one of those under discussion, occurring in a woman of sixty-five and apparently secondary to chronic osteo-arthritis. It should not be placed among the primary bone cysts.

The presence or absence of a lining membrane, except the greater

possibility of secondary neoplastic change, is apparently of little practical importance while it is possible that the lining is an asset acquired during the later life of the cyst. Engel's case of multiple cysts in which the smaller and presumably the younger cysts did not possess a lining while the larger ones were lined by a membrane of some thickness is suggestive, while even more convincing is the case reported by Silver where at a second operation for recurrence of a cyst of the upper end of the femur, in a boy of four years, a distinct lining membrane was found where at the previous operation twenty months before, the most careful examination failed to reveal any but a smooth, bony wall.

My first case which I am enabled to report through the kindness of Dr. Frazier, is also illustrative of the lining membrane being an acquisition of the more mature cysts.

M. T., male, aged twenty, Polish, was admitted to Dr. Frazier's service at the University Hospital, October 1, 1913. A miner by occupation, two weeks previously he had been struck on the dorsum of the first metacarpal of the left hand by a piece of falling rock. This caused a slight wound $\frac{1}{2}$ cm. in length which bled profusely and had continued to bleed at each dressing, being controlled with difficulty up to the time of admission. Fifteen years previously, or at the age of five, there had been noticed a swelling at this spot which increased gradually but without pain or interference of function. Between that time and the date of migration to this country, three years ago, two operations had been performed for this swelling. What was done or the nature of the process was unknown to the patient, who was very illiterate and from whom a detailed history could not be obtained. The wounds, however, always healed quickly and there was little or no change in the progress of the enlargement following these procedures. There had never been any pain and up to the last two weeks no tenderness or lameness. The patient had never been ill and absolutely denied venereal infection. Nothing was discoverable upon a general physical examination. There was no increase in leucocytes and the blood Wassermann was negative. Upon local examination, there was considerable swelling over the whole region of the metacarpal, which was enlarged, irregular in outline but smooth, except at the point of injury, where it was thought sharp edges of bone could be felt at the junction of the distal and middle thirds of the bone. The wound was slight, surrounded by quite an area of pigmentation and several enlarged veins. Only one scar was discoverable which was parallel with the long axis of the bone and $2\frac{1}{2}$ cm. in length. The wound bled extremely freely and upon probing, bone was easily felt at the bottom. Temperature was 98.6° ; pulse 72, respirations 20.

The clinical diagnosis was chronic osteomyelitis with possible incomplete fracture at the site of the injury. The radiograph, however, was somewhat disconcerting (Fig. 1). It shows the whole bone tremendously enlarged, affecting all but the epiphysis. There is apparently no thickening of the periosteum which appears intact. The rarefaction or honeycombed appearance of the entire diseased area was remarkable, while no distinction between medulla and cortex

remained. This picture is more suggestive of a specific origin of the condition. Through the kindness of Dr. Frazier, on October 15, under gas-ether anaesthesia, I exposed the bone by a longitudinal incision $2\frac{1}{2}$ cm. in length with the wound at its centre and excising the old scar. Upon exposure, the periosteum was intact, but as soon as this was incised, the hemorrhage was profuse and continued to ooze from the bone. The exposed bone was extremely rarefied, fragile and consisted of many small liquified areas surrounded by the thin fragile shells. The contents of the cells was for the most part a thin gelatinous substance, but at places free blood and active bleeding was encountered. Bearing in mind the presence of enlarged veins over the site of the tumor, the radiographic picture and the gross appearance of the bone, I was inclined to think that the process was neoplastic rather than inflammatory. I therefore enlarged the incision and excised the bone *in toto* with its periosteum. The joint surfaces were uninvolved, but the surrounding tissues were like the bone the seat of greatly increased vascularity. Hemorrhage was controlled with difficulty and the wound closed without drainage, the hand dressed in extension. With the exception of some slight superficial infection, the wound healed without reaction.

The pathologic histology proved all previous diagnoses erroneous. The excised bone was 8 cm. in length, the external surface rough and irregular, containing in some places normal periosteum, but for the most part this covering was thickened with fibrous tissue and contained many points of calcification. The articulating ends of the bone were normal in appearance, their surface smooth and regular. Section in the longitudinal axis revealed a surface presenting a honeycombed appearance, the structure being made up of a trabecular bone formation containing many minute cavities and a few larger ones about the size of peas. The contents of these cysts was putty colored, soft in consistency, and in some places yellowish in color, evidently containing fat.

Microscopic examination of this putty-like material revealed a few fat droplets and a homogeneous structureless substance. Section of decalcified bone showed a dense fibrous overgrowth associated with many bone trabeculae. The compact bone itself showed evidences of rarefaction and cyst formation, the Haversian canals being dilated beyond their normal calibre and in many free blood was seen. Some of the larger of the cysts are lined with a cellular formation which resembles recently formed granulation tissue, in that it consists of many leucocytes, embryonic connective tissue and new blood-vessels. The ground substance of the decalcified bone consisted in part of cartilage, of true bone and of areas in which the transition between cartilage and bone was apparently taking place. The gross and histological picture corresponds to the disease described as *ostitis fibrosa cystica*.

On the third day following operation, the temperature was normal and remained so thereafter. On November 5, or twenty-one days later, a section of rib 6 cm. in length was transplanted by Dr. Frazier to take the place of the excised bone. Fig. 2 shows this graft in position one week later. Again the wound healed *per primam*. The patient was discharged from the hospital on December 1. He could move the forefinger at the metacarpophalangeal joint through an arc of 35° . Efforts have been made to get into touch with this patient to learn the later results, but so far I have been unsuccessful.

Reported cases show that simple cysts may be located in nearly every bone of the body, even the skull, although I have not found any mentioned as occurring in the ribs or vertebrae, and but one case has been previously mentioned where the metacarpal bone was affected. Bloodgood, in a review of 65 cases of simple cysts, found none. Muller did not find any of this bone. Pfeiffer records one which is also mentioned in Silver's list. McDill's case, already mentioned, cannot be admitted because, from its contents, it was undoubtedly of infectious origin. In 50 cysts collected by Muller, 38 per cent. were in the femur, 22 per cent. in the tibia and 16 per cent. in the humerus, the three bones most frequently affected. Bloodgood reverses this order and places the humerus first and tibia last. Of Pfeiffer's 49 cases, 19 were in the femur, 14 at the upper end, 12 of the tibia with 9 at the knee, and 10 of the humerus with 8 at the shoulder. Silver in a very thorough review of the literature up to 1911, collected 97 true bone cysts. Of these, 31 were in the femur, 25 in the humerus, and 15 in the tibia.

Since Silver's paper, six cases besides the three to be reported tonight, have been put on record. Canaguier reports one of the upper end of the humerus, Ashhurst one in the same position, Murphy reports two of the humerus, both at the shoulder, one at the upper end of the tibia, and one of the femur at the hip. The case of multiple cysts reported by Percy is not admitted because more than one bone was involved. So, also, McDill's case for the reasons already given. This brings the list of true bone cysts reported up to the present up to 103, of which 32 are of the femur, 29 of the humerus, and 16 of the tibia. To this number I wish to add the following case, which occurred on Dr. Frazier's service at the University Hospital in September, 1911.

C. S. (Univ. of Penn. Hosp., No. 10124), male, aged fourteen, was admitted to the hospital on account of pain and tenderness in the right thigh above the knee. Twenty-one months previously he had fallen while sliding on the ice, hurt his right thigh, and had some pain and limping, lasting but a few days. One month later he fell again, was picked up unable to walk and taken to a hospital, where he was treated for a fracture of the right femur about three inches below the trochanter. He was in the hospital for three weeks and was discharged with the limb in a cast. This was removed at the end of another two weeks. After a period of some disability and limping, he had no further pain or tenderness, although he noticed that the right leg was slightly shorter than the left. On the day of his admission, he was running when without any apparent cause the right leg suddenly gave way and he fell in a heap. He had considerable pain localized to the site of the old fracture which was marked by a lump on the outer side of the thigh. Family and personal history were absolutely good and there was no suspicion of lues. General physical examination showed a normal healthy boy of fourteen.

The right thigh at the juncture of the middle and upper thirds showed a well marked outward angulation with projection of a hard, rounded, irregular bony mass the size of a large orange. On slightest movement he complained of severe pain running through the tumor, but no crepitus or preternatural mobility could be elicited. There was a shortening of one inch between the tip of the great trochanter and the external malleolus on the affected side. There was distinct eversion of the right foot which the patient could not correct. The patient later stated that the tumor on the outside of his thigh had been present with gradually increasing size ever since his first accident.

The radiograph (Fig. 3) shows the large cyst surrounded by normal appearing bone situated at the site of the former fracture and a second incomplete fracture breaking in to the cystic cavity. For seventeen days the limb was kept in extension with side splints which resulted in a reduction of the shortening to one-half inch. In the meantime, however, the radiograph had shown the presence of two other cysts of almost the same size and separated from the first by thin bony partitions. On October 7, under gas-ether anaesthesia, the patient was operated upon by Dr. Muller. Through a longitudinal incision directly over the tumor, the bone and site of fracture were exposed, the cysts opened, curetted and allowed to fill with blood clot. The walls of the cavities were smooth and lined with a thin membrane resembling newly formed granulation tissue in that it was soft and easily bled. The wound was closed without drainage, while the Buck's extension and side splints were reapplied. The wound healed perfectly, convalescence was normal, and on November 18 the patient was discharged with good functional result and legs of equal length. Fig. 4 is a reproduction of the radiogram taken one month after operation, and shows union at the point of fracture with beginning obliteration of the cysts as evidenced by the decreased translucency. Fig. 5 is the radiogram taken two months after operation, showing still further reduction of the cysts.

It is, of course, questionable whether or not the *ostitis fibrosa* was present previous to or resulted from the trauma of the first accident. From the comparatively slight traumata to which the limb was subjected in all three injuries, it seems more probable that the process had already begun prior to the injury 21 months before.

The cysts almost invariably occur in the metaphysis, near the epiphyseal line, but practically never invading the epiphysis itself. Situated most frequently in the upper or lower one-third of the shafts of the long bones of the extremities, it is five times more frequent in the proximal than in the distal ends, while in the humerus and femur it is situated at the shoulder or hip seven times to once at the elbow or knee.

Ostitis fibrosa, the underlying or primary stage of cystic disease, is undoubtedly an affection of the developmental age of bone. Thus in childhood and adolescence by far the greater number of cases come to notice. In Pfeiffer's 49 cases, 70 per cent. occurred prior to twenty years of age, and 85 per cent. before thirty. This is comparable to



FIG. 1.—*Ostitis fibrosa cystica* of second metacarpal bone.



FIG. 2.—Same as Fig. 1, after excision, showing transplant in position one week later.

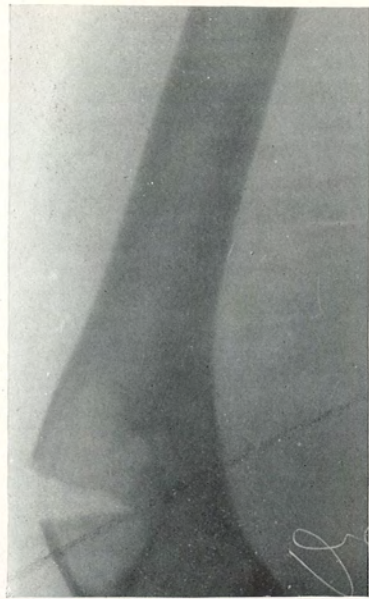


FIG. 3.—Radiograph of Case II on admission. Shows the largest of the cysts and line of spontaneous partial fracture.

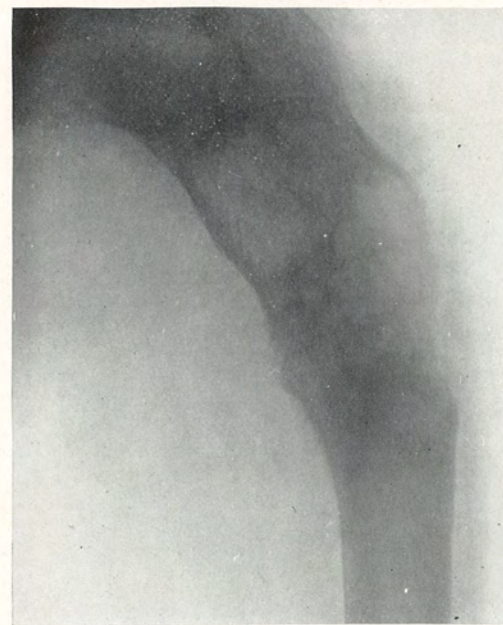


FIG. 4.—Radiograph in second case, male aged fourteen. One month after operation. Cavity filled with clot. Shows union of fracture and beginning obliteration of cysts. Shows other cysts.

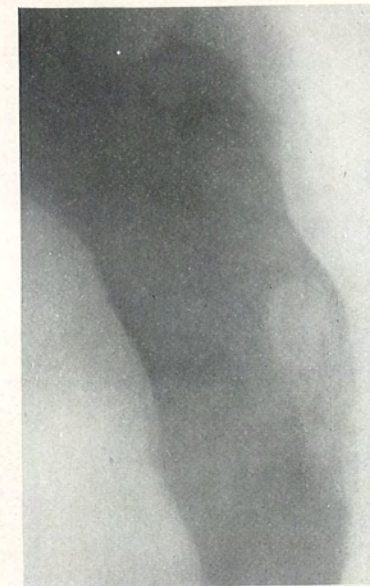


FIG. 5.—Second case two months after operation. Shows almost complete resolution and obliteration of cavities.

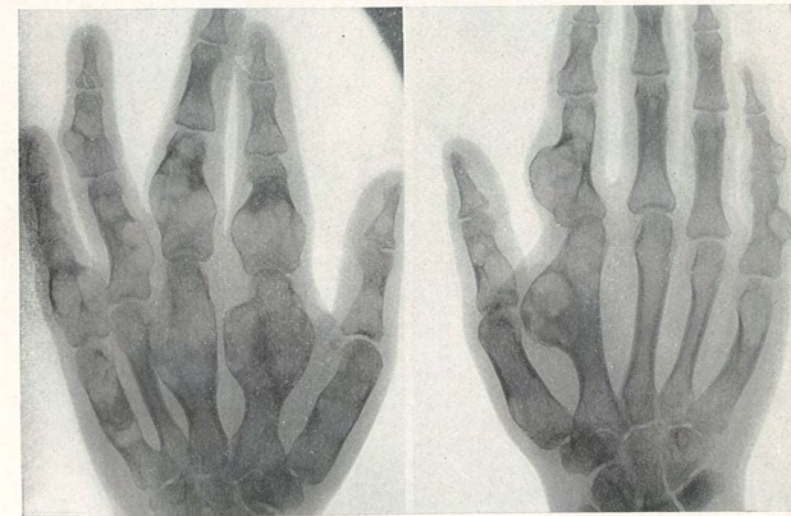


FIG. 6.—Multiple enchondromata of both hands, showing cyst formation in first and second phalanges of fifth finger, right hand. Female, aged eighteen.

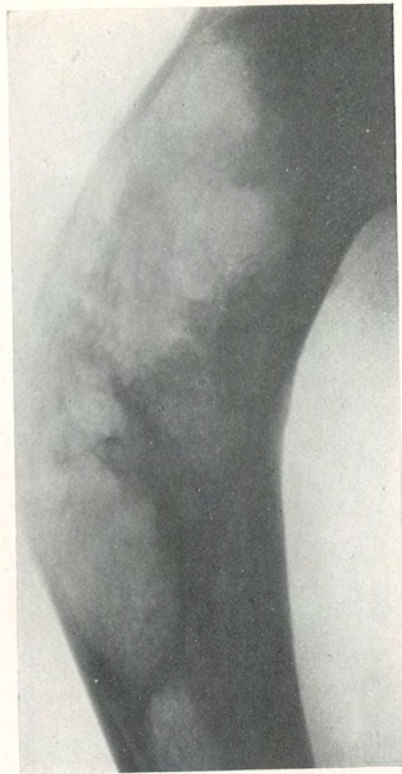


FIG. 7.—Radiogram in case of osteitis deformans of femur. Note great thickening and overgrowth of bone with rarefaction and eburnation occurring simultaneously. Male.

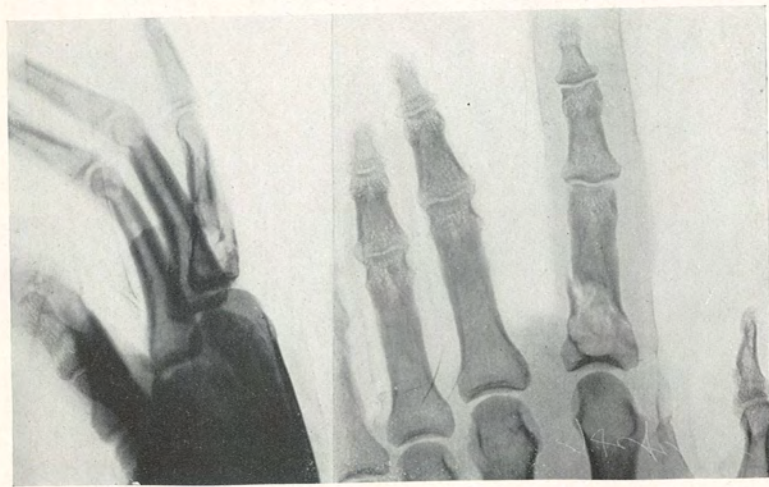


FIG. 8.—Radiograph in Case III. Fracture at site of cyst in base of proximal phalanx of index finger.

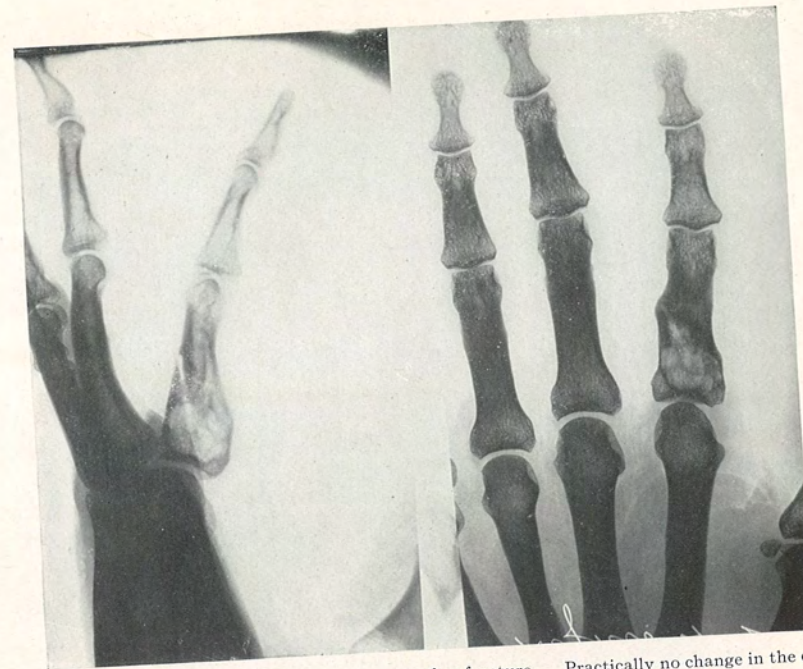


FIG. 9.—Radiogram of Case III taken two years after fracture. Practically no change in the cystic condition but perfect union of the fracture. Male, aged thirty-eight.



FIG. 10.—Osteomalacia. Female, aged one year. Shows cystic changes. Note involvement of epiphyses and of left tibia.

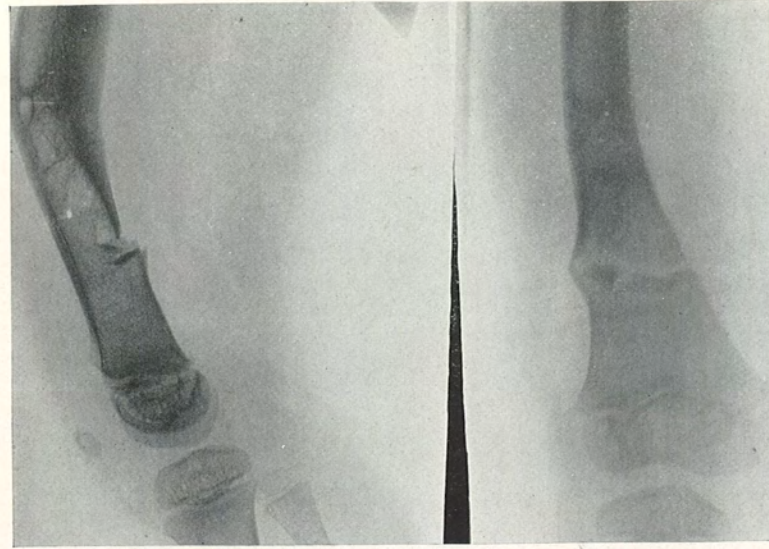


FIG. 11.—Osteomalacia. Discovered accidentally after radiograph for incomplete fracture caused by stumbling. Note compensatory hypertrophy of femur, bracket formation. Female, aged three.



FIG. 12.—Specific dactylitis. Involvement of epiphysis.

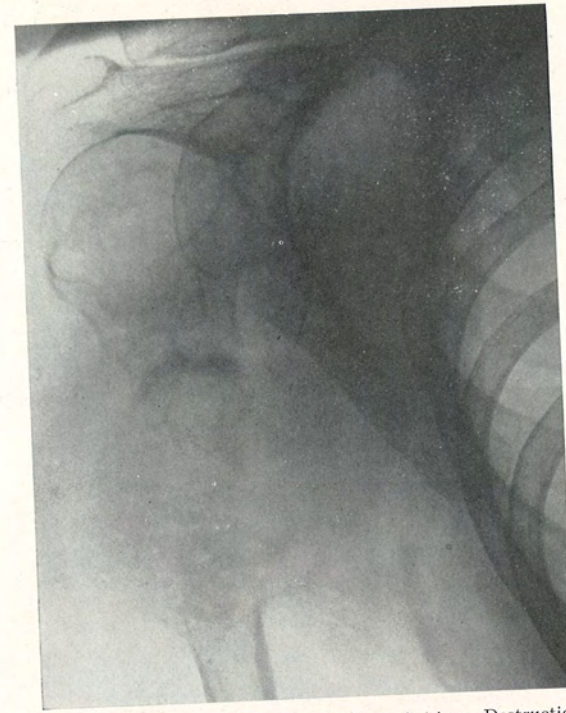


FIG. 13.—Medullary sarcoma upper end of humerus, with softening. Destruction of bone, fracture and involvement of soft tissues.



FIG. 14.—Radiogram of sarcoma of tarsus with beginning cystic changes in the centre.

Muller's series in which 67.5 per cent. were before twenty and 82.5 per cent. before thirty. In tabulating 97 cases, Silver found 67 per cent. between two and one-half and twenty years, while 77.3 per cent. were before thirty. Lack of detail in the reports of many cases probably places many of them at a much later age than they should be. The disease is so insidious, giving little or no disability and few symptoms, that it may be overlooked for many years. The youngest case reported was in a child of two and one-half—Silver had a case with onset at three years—while the average age of the 106 cases on record including the three reported here is twelve and one-half years. One sex is equally affected with the other.

The etiology of the benign bone cysts remains shrouded in obscurity. Various opposing theories without confirmatory evidence have been proposed. Thus Virchow believed them due to the softening of cartilaginous tumors. While cystic degeneration does undoubtedly occur in chondromata, they cannot be considered identical with the cysts we are now dealing with. As Bloodgood states, "Cartilage is never present in sufficient quantity to justify the conclusion that the cyst is due to the liquefaction of a primary or original area of cartilage." Fig. 6 shows the radiogram of the hands of a patient, 18 years of age, suffering from chondromatous growths. They are identified chiefly from their multiplicity, their preference for the epiphysis and the peculiar mottled appearance so well illustrated in this specimen. Two of the growths, on the fifth finger of the right hand, have undergone cystic change.

Beneke likens these cysts to the apoplectic cysts of the brain, the hemorrhage, caused by an initial trauma, for some reason or other is neither absorbed nor does it become organized. Others, notably Lubarsch, and Röpke, believe that they result from infection. They have found organisms in the cyst contents. Von Recklinghausen in 1911 stated that most benign cysts were due to *ostitis fibrosa*, the solitary cysts to a localized form of this disease. As to the cause of *ostitis fibrosa*, von Recklinghausen believes that trauma or some mechanical factor is the important agent. Boit considers that it may result from various causes, infectious, metabolic, traumatic, toxic or perverted internal secretions. Rehn likens it to the snuffle disease of hogs, an overdevelopment of a normal process, while Bockenheimer believes *ostitis fibrosa* and Paget's disease one and the same, pathologically. Fig. 7 shows the radiogram of a case of *ostitis deformans* in a male well within the age of the occurrence of *ostitis fibrosa*. One notes at once the difference between this process and the latter, the extreme rarefaction

without the clear picture of cyst formation, the areas of rarefaction going hand in hand with areas of bone proliferation and eburnation, great thickening of the periosteum on the inner side and obliteration of the marrow cavity with true bone formation.

The balance of evidence is undoubtedly in favor of trauma as the initial factor in most cases. Thus in the 97 cases collected by Canaguier, the author states that trauma was known to precede the cystic formation in about two-thirds of the cases. Its occurrence during the developmental age when the bones are more susceptible to traumatic influences, and when repeated traumata are most frequent, their situation in the long bones which bear the brunt of blows and falls, and at positions in these bones receiving the balance of strain and where the cancellous tissue is most pronounced, all favor this explanation.

Benign cysts of bone like other chronic intramedullary diseases, have little symptomatology of their own, until they have progressed to the stage of causing interference in function, deformity, encroachment upon more sensitive structures, as the periosteum, causing pain, or so weakening the bone as to permit fracture from slight trauma. They may exist for years without giving any noticeable symptoms and be discovered accidentally by the radiograph. Most commonly the initial symptoms are local swelling or deformity. Pain is not a prominent symptom, when occurring is usually slight, often varies with atmospheric conditions, the so-called rheumatic type. When severe, some other condition should be suspected. Silver mentions pain as the initial symptom in 25 per cent. of his cases.

Fracture is the chief feature if not the most common symptom of cyst, as it is frequently the reason for seeking surgical aid. Fracture usually occurs spontaneously or by slight trauma and may recur with good healing in the intervals several times. Thus in a case recorded by Murphy in a boy aged twelve, with a cyst in the upper extremity of the humerus, the initial symptoms were slight variable lameness and tenderness, followed during the course of a year and a half by four incomplete fractures from slight traumata. In the 49 cases collected by Pfeiffer, pathological fracture occurred in 20. The following case is illustrative of the often symptomless course of this disease prior to fracture. I am indebted to Dr. G. V. Janvier, of Lansdowne, Pa., for opportunity of studying this case.

J. H., aged thirty-eight, a janitor. In May, 1912, he was holding a horse by the halter. The horse suddenly jumped, causing a sudden tightening of the man's grip in the halter ring, when he felt the index finger of his right hand suddenly give away. Pain, tenderness and disability were so great that he

consulted his physician, Dr. Janvier, who diagnosed fracture of the proximal phalanx and referred the patient to Dr. Pancoast for radiography. The radiogram (Fig. 8) shows an oblique splitting fracture of the phalanx running upward and forward through a cyst and entering the joint. This was the first evidence that a cyst existed. The patient had never to his knowledge injured this finger, had never had any pain, stiffness or tenderness in this hand and had always been in excellent general health. The fracture was reduced, kept on splints for three weeks, healed perfectly, and since then he has experienced no pain or tenderness. There is limitation of motion in flexion, this function is capable through an arc of only 45 degrees. This is probably due to involvement of the joint in the fracture. At present there is only slight enlargement of the bone. Fig. 9 shows the condition as it exists at present, perfect union with very little change in the cyst itself. Fractures involving cysts almost invariably undergo perfect union. Egg-shell crackling when the cyst has become so large as to be covered only by the thinnest shell of bone is sometimes encountered.

As stated in the beginning of this paper, the diagnosis of the benign cysts from other more malignant growths requiring vastly different treatment, is of essential importance. The characteristics distinguishing these benign lesions are their latent and long continued growth, with few or no subjective symptoms, their age of onset, their position most often in the extremities of the humerus, femur or tibia, never invading the epiphysis or joint, the frequency of spontaneous fracture, and the characteristic radiographic picture. The latter usually shows "a uniform, often egg-shaped, expansion of the bone, which gives the impression of having started from the middle and expanded equally in all directions; the central portion is definitely translucent to its very circumference, but mottled in varying degrees depending on the varying thickness of the cortex, the presence of ridges, or multiplicity of cysts; the cortex is thinned and narrow, but well marked and regular; the epiphyseal line is not involved."

From most other diseases of a benign nature the radiographic picture will differentiate. Figs. 10 and 11 show rarefaction and cystic change in osteomalacia, Fig. 11 disclosing a pathological fracture and the first intimation that other disease existed. Fig. 12 is of a specific dactylitis, showing overgrowth and thickening of the entire phalanx, distinctly different picture from that of *ostitis fibrosa*, which never shows bone proliferation and the enlargement takes place only from the expansion of a cyst if present.

The lesion of prime importance in the diagnosis is sarcoma and particularly the benign medullary sarcoma or myeloma. While the latter is still intramedullary, it may be impossible from the radiogram of differentiation from *ostitis fibrosa cystica*. Its more destructive rather than

expansive character, the early appearance of pain and interference of function, the more rapid growth, its irregular progression, indefinite outlines, its opacity, its early rupture through the periosteum and the involvement of surrounding parts, will usually aid in the diagnosis. Bloodgood states that no case of the more malignant forms of sarcoma of bone has come under notice after the process had been present more than two years—while in the benign bone cysts the symptoms bringing the patient to the surgeon are of much longer duration or unnoticed until the time of fracture. Figs. 13 and 14 show the characteristic appearance of sarcoma in the radiogram, Fig. 13 of the upper end of the humerus with destruction of bone, pathological fracture and invasion of the soft structures of the shoulder. Fig. 14 shows the growth involving the tarsus with cystic degeneration in the centre. The differing appearance of enchondromata has already been mentioned. Ostitis aluminosa has its own characteristics, the irregularity and moth-eaten appearance of the walls, the surrounding condensing ostitis, the usual periostitis and the probable presence of sequestra.

Appearances of a like nature, plus the history and the Wassermann reaction, usually serve to distinguish a centrally placed gumma. It should be remembered, however, that at times even with all the facilities of modern diagnostic methods and long experience, a correct diagnosis is impossible prior to exploratory incision which should be done in all cases of doubtful nature, hence the necessity on the part of the operator of having the necessary pathological training in recognizing these conditions microscopically.

The treatment of benign cysts is either watchful waiting, or operative. The former is rarely justified unless the diagnosis is absolutely assured. If the expectant treatment is adopted, proper support to the bone, the correction of any deformity, and the use of methods for stimulating bone production should be employed. Cysts have healed or disappeared without operative interference, some without but most of them after pathological fracture with drainage of the cyst contents into the tissues and very probably the filling of the cavity with blood and serum from the line of injury.

The operative treatment has varied, all with good results, from simple puncture and injection to excision of a whole or part of the diseased bone. Von Mikulicz aspirated a cyst through a small opening in the shell and injected iodoform emulsion with good results. Until recently the more popular treatment seems to have been exposure of the bone, crushing in the wall of the cyst to promote regeneration, and

curettement of the cavity, the remaining excavation may be allowed to fill with clot, or is packed with bone chips, Moorhof's bone wax or bismuth paste. Since the more frequent use of autogenous bone grafts, resection or excision of the diseased area has been more frequently done. Thus Murphy has resected in three cases, twice the upper end of the humerus and once the upper end of the tibia, and replaced the excised portions with tibial grafts. In a cyst of the femur at the hip, after thorough curettement, he placed a tibial graft in the remaining excavation. Canaguier resected the upper end of the humerus and grafted the tibial crest. Both operators have had uniformly good results. Ordinarily, however, except in the small bones of the hands or feet and in the hands of most operators, resection is not justified if the diagnosis is certain.

Conclusions.—1. Benign bone cysts are much more common than formerly supposed.

2. Limited as true simple cysts, they are distinct entities, most probably dependent upon a localized ostitis fibrosa.

3. The cyst is neither concomitant nor dependent upon other diseases.

4. They adhere more to the metaplastic picture than to the inflammatory or neoplastic, although they may result secondarily from a chronic attenuated inflammatory process.

5. Their etiology, unknown, seems in the large percentage of cases to be associated with trauma during the susceptible growing period of life.

6. They have little or no symptomatology prior to the stage of bone weakening, permitting spontaneous fracture or fracture from slight trauma.

7. Their chief importance lies in our ability to differentiate between them and other more serious lesions, mainly sarcoma, therefore recognition of their possibility, a careful history, local examination, with proper interpretation of the radiogram, are of the utmost importance.

8. The healing of fractures occurring at the site of cysts is uniformly good and may result in cure of the cyst.

9. Operative treatment, unless one can be quite sure from constant watching that the diagnosis is correct, is always justified.

10. Although in selected cases and in the hands of experienced operators, resection with autogenous grafting has resulted favorably, curettement, crushing in of the walls and primary closure of the wound have been almost universally sufficient to procure a cure.

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DR. GWILYM G. DAVIS said that once, years ago, he operated on one case of cyst of the lower end of the ulna by curetting and it has remained well. The subject is comparatively clear when there is a single cyst of the bone, but it becomes more obscure when it is one in which the outlines are not so circumscribed and the tissues become, so to speak, rarefied; in other words, instead of being in two or three large vacuoles, there is a more disseminated rarefaction and also when it advances a little further and involves the outer edge with a possible involvement of the periosteum. Take the cases, for instance, of Paget's disease, of ostitis deformans. They seem to be closely allied to ostitis fibrosa. He remembered reading two or three years ago the report of an Italian case of Paget's disease limited to a single bone like the femur, and he thought, in Dr. Henry Ling Taylor's book on orthopædic surgery, there is an allusion to Paget's disease being limited to more or less distinct bones and not being a general affection. In such a case it would be pretty hard to make a diagnosis not as to the condition exactly, but to classify it; these cases seem to shade one into another all the way from the simple single cyst to the rarefaction of Paget's disease.

A REVIEW OF 100 CONSECUTIVE OPERATIONS FOR GOITRE
 WITH ESPECIAL REFERENCE TO THE TREATMENT
 OF HYPERTHYROIDISM

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It is a rather significant fact that with the exception of Halsted, of Baltimore, no notable contributions on the surgery of the thyroid gland have been made by surgeons of the Atlantic seaboard towns. That this should have been so from the earliest days in the development of the surgery of the thyroid gland, I attribute to the geographical distribution of goitre, which is not so prevalent on the coast, but might be said almost to be endemic in regions following the great lakes from western New York and northern Pennsylvania into the territory of the great northwest. It is with some hesitation, therefore, that I venture to discuss the goitre question, and yet we are confronted sufficiently often with complicated problems to warrant a frank exchange of opinions.

Briefly, the review is based upon a group of 103 consecutive operations. I find there were 81 thyroidectomies, and 17 ligations of vessels, and 5 operations for thyroglossal cysts; more specifically there were 34 simple goitres, 29 adenomata, 1 sarcoma, 2 carcinomata and 32 hyperplastic (exophthalmic) goitres. There were 17 ligations, 8 of one and 9 of two vessels. Of the thyroidectomies, there were no fatalities, save one in the case of a large vascular sarcoma in a boy of 11 years. Of the ligations there were two fatalities in patients who, according to our more enlightened conception of the limitations of surgical therapy, would be now regarded as inoperable, at least in the acute phase at which the operation was performed.

Pathogenesis.—As to the pathogenesis of goitre of the endemic variety, there has been a popular belief for many years that in some way drinking water played an important part. This belief, based at first upon purely hypothetical grounds, is receiving more and more substantial support from thorough scientific investigations, the most recent and the most convincing of which is that of Allison, who maintains that the disturbance of thyroid function is derived from a chronic intestinal toxæmia.

The etiology of Graves's disease—true exophthalmic goitre—has provoked much discussion, and the most fascinating theory comes from Crile, who believes it to be a disease of the motor mechanism, which may be induced by overstimulation of the nervous system, in time causing an overproduction of thyroid secretion. To quote Crile's own words: "Graves's disease is not a disease of a single organ or the result of some fleeting cause, but is a disease of the motor mechanism of man, the same mechanism that causes physical action and that expresses the emotions; its origin is in phylogeny, and its excitation is through some stimulatory emotion, intensely or repeatedly given, or some lowering of the threshold of the nerve receptions, this establishing a pathologic interaction between the brain and the thyroid."

There is little or no speculation on the part of those writing from the Mayo Clinic as to the factors which lead up to the definite pathologic changes which uniformly occur in exophthalmic goitre. It is regarded as a form of thyrotoxicosis in which the toxin, whatever may be its nature, acts directly on the more vital organs, more notably the central nervous and vascular systems, and that the clinical picture is made more complex by the interaction of those organs, whose functions have been directly disturbed by the toxin (Plummer). The most persistent and consistent opponent of thyroid hypothesis is Marine, whose work, because of its thoroughness and exhaustiveness, is always worthy of mention. Marine (*Journal of the A. M. A.*, lx, p. 325) believes that the thyroid hyperplasia of exophthalmic goitre behaves toward iodine as does any other thyroid hyperplasia of any animal thus far investigated. He even goes so far as to say that no specific or constant changes in the thyroid of exophthalmic goitre have as yet been demonstrated, that the iodine so far as it is at present known is identical with those iodine relations given to other clinical associations, and that the thyroid of exophthalmic goitre has no different pharmacological action on animals or therapeutic on myxœdema or toxic action on patients with exophthalmic goitre than thyroid preparations of other clinical associations with like iodine contents. These statements provoked a sharp criticism from C. H. Mayo, who insisted that Marine's observations lead him to conclusions not supported by surgeons of the present day. In further controversion of Marine's theory, Plummer stated (1) that hyperplasia of the thyroid never existed without a production of thyroid secretion in excess of the demands of the individual; (2) that exophthalmic goitre is a clinical entity associated with a definite pathological process in the thyroid; (3) that if hyperplasia of the thyroid is of a sufficient degree or extends over a long enough period,

exophthalmos is almost sure to develop; (4) that no matter how intense the intoxication from an adenomatous or colloid group not associated with hyperplasia, exophthalmos will not develop.

Classification.—For a proper understanding of the goitre question, especially with relation to the indications for operation, one must be familiar with various pathologic processes and with their clinical expressions. No more beautiful and convincing example of the advantages of the closest coöperation between the clinical and pathological departments can be found than in the extraordinary accuracy with which the diagnosis and prognosis of clinical manifestations of thyroid lesions can be substantiated and foretold by the pathologist's report. The pathologist's study of the thyroid gland has proven beyond a peradventure of doubt that exophthalmic goitre is represented by certain definite essential lesions in the thyroid gland. A few years ago there was, however, some confusion as to what constituted true Graves's disease or exophthalmic goitre, and Kocher maintained, and with some justification, that American writers were not discriminating enough in their classification, in that they include all types of hyperthyroidism with their cases of the true exophthalmic type. This criticism has borne fruit in the elaborate combined pathological and clinical studies of Wilson and Plummer, who, as a result of the studies of the material from St. Mary's Hospital, have elaborated a classification which bears the closest scrutiny and satisfactorily provides for the group of doubtful cases that were neither simple nor exophthalmic goitres. This classification divides all goitres, excluding those of a purely inflammatory or malignant nature, into 4 groups:

Group I. Non-hyperplastic atoxic—the ordinary colloid goitre or adenoma.

Group II. The non-hyperplastic toxic, representing 57.2 per cent. of the total number. There are two significant facts associated with this group. First, that 23.3 per cent. of the non-hyperplastic group presented some toxic symptoms, and, second, that there was an extraordinary difference between the average age at which these non-hyperplastic-toxic goitres appeared and the hyperplastic-toxic goitres of the exophthalmic type. In the former the average age was 22 years, in the latter 32 years. A still further distinction between these two groups is the significant fact that in the non-hyperplastic-toxic group (the simple goitre and the adenoma with toxic symptoms) the evidence of intoxication did not show itself until an average age of 36.5 years, that is, 14 years after the onset of the goitre, whereas in the true

exophthalmic type, the hyperplastic-toxic, the toxic symptoms appeared on an average within a year.

Group III. The hyperplastic-toxic represented 42.8 per cent. of the total number of specimens, and of these 99.2 per cent. had toxic symptoms. To this group belong all the cases of true exophthalmic goitre.

Group IV. The hyperplastic-atoxic, comprising but 1 per cent. of the total hyperplastic specimens, may represent a slight margin of error.

This classification, which conforms with extraordinary mathematical accuracy to the clinical syndromes of goitre, should, I believe, be adopted and serve as a working basis in the elaboration of our plan of treatment. In an analysis of my own records, I find that 35.7 per cent. belonged to the non-hyperplastic-atoxic group, 31.6 per cent. to the non-hyperplastic-toxic group and 32.6 per cent. to the hyperplastic-toxic group (see Table I).

TABLE I

Pathological diagnosis	Non-hyperplastic non-toxic	Non-hyperplastic-toxic	Hyperplastic-toxic	Total
Simple	20	14	..	34
Adenoma	12	17	..	29
Carcinoma	2	..	..	2
Sarcoma	1	..	..	1
Exophthalmic . . . . .	..	..	15	15
Ligation cases . . . . .	..	..	17	17
Total	35	31	32	98

Symptomatology.—The clinical picture of thyrotoxicosis has been so frequently described as to permit of no amplification. The relative frequency of the various symptoms is expressed in tabular form and calls for no especial comment. Mention might be made of an unusual phenomenon in one of the series—a periodic swelling of the upper lip synchronous with exacerbations of the disease and the development of a Bell's palsy. Whether the former was the outcome of some vasomotor disturbance of sympathetic origin is an interesting question. The Bell's palsy may have been incidental or perhaps toxic.

Surgical Aspects.—With these introductory remarks, I come to the consideration of the surgical aspects of goitre and will discuss the surgeon's responsibility with reference to these various groups, and first of all with reference to the non-hyperplastic, non-toxic type. By way of preface, I think one can truthfully say that goitre may be treated by both non-surgical and surgical measures. We must remember too that in the

life history of simple goitres there are certain structural changes which take place spontaneously, perhaps physiologically, as in pregnancy and menstruation, that is, without artificial measures, during which periods the gland may increase in size temporarily only later to diminish to one of inconspicuous dimensions. We should warn the practitioner against the effect of the administration of iodine or thyroid extract, either of which may induce toxic symptoms in a hitherto benign condition, a condition which Kocher styles as "iodine Basedow," an artificial Graves's disease evoked by the administration of iodine in nervous patients affected with goitre. If the treatment is persisted in the patient may die under the same circumstances as in spontaneous Graves's disease.

TABLE II
SHOWING SYMPTOMS IN TOXIC CASES

Pathological diagnosis	Cerebral symptoms	Vasomotor disturbances	Mental irritability	Tachycardia	Tremor	Exophthalmos	Cardiac insufficiency	Loss in weight and strength	Diarrhoea	Edema	Headache	Jaundice	Vomiting
Non-hyperplastic-toxic (simple)	1	2	10	10	9	3	10	3	1	1	2	..	..
Non-hyperplastic-toxic (adenoma) . . . . .	..	8	17	17	4	..	17	6	2	2	1	1	..
Hyperplastic-toxic . . . . .	..	4	15	15	6	14	10	5	6	2	2	2	2
Toxic cases in which ligation was performed	1	6	1	17	10	16	12	7	9	3	1	..	6
Total	2	20	59	59	29	33	49	21	18	8	6	3	8

When consulted by the patient with simple goitre, colloid or adenoma, as to the propriety of operation, I present the situation somewhat as follows: that the operation is peculiarly free from danger, that the patient must decide for herself whether the swelling is enough of a personal annoyance to warrant its removal, that there is a tendency in a considerable number of cases for simple goitres to undergo certain changes which will affect the heart and nervous system, and eventually lead to permanent damage of the heart, kidneys, and liver; that in exceptional instances in later life goitres become cancerous. This, to my mind, is a fair presentation of facts based not only on my own experience, but on the statistics of large groups of cases. As to the risk of operation, there were no fatalities in my own series of partial thyroidectomies; in larger series we find the mortality in 561 cases, in the Clinic of the St. Mary's Hospital in 1913, to be 0.18 per cent. Of the

chances of a thyrotoxicosis developing in simple goitres, the statistics from my clinic give a percentage of 41.1, while from the Mayo Clinic the percentage was 23. To put it in another way, one in four or one in three patients with simple goitre will develop a symptom-complex which in many respects, both as to the clinical picture and as to the gravity of the disease, is so closely analogous to true exophthalmic goitre as to be almost indistinguishable. With the exception of three or four of the true exophthalmic type, one of the most gravely sick in my entire series belonged to this group.

The patient (file No. 14421), referred to me by Dr. A. R. Johnson, of New Bloomfield, Pa., was forty-six years of age; 14 years ago the goitre first appeared, but there were no associated symptoms until 9 years later, when she developed shortness of breath, tachycardia, palpitation, diarrhoea, loss of weight and strength, and nervousness. The patient was emaciated, extremely nervous, her heart was dilated, the pulse was most irregular, and tachycardia extreme. She was given a short course of preparatory treatment, the left lobe was removed, and the superior thyroid artery ligated on the opposite side. Apart from an attack of acute dilatation of the stomach her convalescence was uninterrupted. The histological study showed no evidences of hyperplasia, the pathological diagnosis being colloid goitre with evidence of hemorrhage into the interstitial tissue and between the glandular acini.

Finally, as to the incidence of malignant degeneration of simple goitres, this is an important phase of the subject because, when malignancy can be recognized by the physical signs, the tumor has attained the inoperable stage in most cases. In my records there were five cases of malignant disease; three of these were recognized clearly as such before the operation, and the remaining two were recognized in their incipiency only by the microscope. One of these (File No. 25777) was found in an adenoma removed from a patient thirty-six years of age, who had had a goitre since she was eighteen, and began to develop symptoms of hyperthyroidism 14 years later, for the relief of which the operation was performed. The second case (File No. 14422), referred to me by Dr. William Glosser, of Williamsport, Pa., developed a goitre at the age of twenty-one, after the birth of her child, and from that time to the present she has had some disturbance of her circulatory and nervous system. The right lobe was removed and the pathologist reported adenoma with beginning malignant degeneration. The incidence of carcinomata is, therefore, a matter which must not be overlooked in the argument for or against operation.

In discussing the selection of cases of the toxic group for operation, I will include both those of hyperplastic and those of non-hyperplastic

origin, for while the higher percentage of more serious cases will be found in the hyperplastic group, cases equally as serious but in smaller numbers will be found in the non-hyperplastic. We must assume at the outset that in most cases the toxic goitres run an essentially chronic course, to be sure with considerable variations and more or less frequent explosions, and that it has its fatal tendencies. That the mortality is high in unoperated cases is usually not appreciated by the general practitioner. In one family under my observation the elder daughter (File No. 521) developed exophthalmic goitre and the physician and consultant strongly opposed operation. She died four years later at the age of 30—death was sudden and the doctor pronounced the cause of death as "apoplexy." Two years after that her younger sister, who had symptoms of hyperthyroidism (File No. 6650), was referred to me by the same physician for operation. The lesson had been learned, though at the cost of a human life.

For the sake of convenience we may distinguish between cases of a moderate severity and those of a more serious nature. Our advice to the cases of moderate severity depends upon their financial and social status. If conditions are such as to make it impossible to undergo an adequate course of treatment with the necessary physical and mental rest and perhaps change of environment, and if it will be necessary for the patient to return immediately after her treatment to conditions of employment which would predispose to relapses, we strongly urge immediate operation. In a number of mild cases, prolonged courses of treatment under competent physicians had been ineffectual and operation had to be resorted to. There have been no deaths in this series, and the results have been almost uniformly satisfactory.

As to the cases of more grave character, our plan has been not to give an opinion until the patient has been under observation for a week with absolute rest. Many of these cases come from a distance, are fatigued by travel, and are in a state of nervous excitement at the time of the first examination. They are put to bed and the condition of the cardiovascular system carefully studied. Usually within a week the condition will improve sufficiently to justify operation, or at least to determine with greater intelligence the mode of treatment to be adopted.

What should be considered contra-indications to operation? Kocher (*Brit. Med. Jour.*, October 1, 1910) regards chronic nephritis, enlarged thymus, and glycosuria as contra-indications, and in his writings lays great emphasis upon lymphocytosis and a decrease in the polynuclear cells as an index of the gravity of the case. In the blood analysis of my cases, I have not been able to confirm this statement. The follow-

ing summary is taken from my records and, for the sake of comparison, the cases have been divided roughly into two groups, the grave and the moderate, in accordance with the clinical picture:

Highest of grave cases	55
Highest of moderate cases	38
Lowest of grave cases	15
Lowest of moderate cases	21
Average of grave cases	30.2
Average of moderate cases	27.6

From these it will be seen that the degree of lymphocytosis did not bear any constant relation to the severity of the case or to the prognosis. The condition of the myocardium has served for me as the most reliable guide.

The acute exacerbations, the explosions of hyperthyroidism, should be regarded as a positive contra-indication. A dilated heart, failure of compensation, poor muscular sounds, are the danger signals, and will determine whether operation must be deferred or altogether abandoned. Had I recognized this condition and observed this stricture, I would not have operated when I did on one of my two fatal cases.

The patient (File No. 10286) was forty years of age, the symptoms were only of six months' duration, the heart action was extremely irregular (delirium cordis) and the heart dilated, tachycardia was marked, the vessels of the neck pulsating, restlessness extreme, the urine contained albumin and granular casts, the legs were cedematous, and there was some ascites; the hæmoglobin was 75 per cent. and there was a lymphocytosis of 27; respirations were rapid, and the thymus gland was enlarged. This was a case running an acute course, with a dilated heart, failure of compensation, chronic nephritis and an enlarged thymus. Both superior thyroid arteries were ligated under local anæsthesia preceded by scopolamine and morphine; the patient died 5 hours after the operation. This happened two years ago. To-day, the operation, if performed at all, would have been deferred until the patient's condition had improved, one instead of two vessels would have been ligated, nitrous oxide anæsthesia would have supplanted local, and anoci-association would have been included in the preparation.

In the non-toxic varieties, our technic comprises the Kocher collar incision, separation in the midline of the sternohyoid and thyroid muscles, the high division of one pair or the other, if necessary, the removal of one or one and a part of another, always leaving the posterior capsule *in situ* to avoid removal of the parathyroid glandules (subcapsular lobectomy). The muscular layers including the platysma are closed with interrupted catgut sutures, and the skin with horsehair.

Drainage is the rule. In the toxic variety, the patients are admitted to the hospital with the understanding that if an operation seems advisable full consent is given to perform it at such time as the surgeon thinks best. Thereafter the subject of operation is never discussed in the presence of the patient or nurses; the patient is put to bed immediately, given seven minims of tincture of belladonna t. i. d., and an ice-bag applied to the neck or precordium and the formula for stealing the gland according to Crile's technic adhered to closely. This includes a rectal irrigation at 7.30 A.M. daily, a hypodermic of sterile water at 8 A.M., an "inhalation treatment" at 9 A.M. by the anæsthetist, and breakfast at 9.30. On the morning of the operation, an enema is given at 7.30 A.M., scopolamine gr. 1/200 at 8, morphia sulphate gr. 1/6 at 8.45, and at 9 the anæsthetist begins with the inhalation treatment and substitutes nitrous oxide, under the influence of which the patient is brought to the operating room.

I am thoroughly convinced of the advantages of anoci-association, although my practice of it is limited to the avoidance of harmful psychic stimuli before the operation. The infiltration of the wound with cocaine, quinine, and urea has seemed to complicate wound repair, and I believe can be dispensed with as relatively unimportant. At least since I have abandoned it the immediate results have been equally good, and the cosmetic effect better. While the elimination of harmful psychic excitation should be taken into consideration, is it not true that after the patient's confidence is thoroughly won, the mere thought of operation begins to lose its terror and thus the surgeon's personality counts as a factor in the working out of anoci-association? In one case I tested out the patient before the operation (File No. 24984). The superior thyroids and one inferior thyroid had been ligated at two sittings at intervals of several months. On her third admission the patient was sent for in the course of the morning clinic; I discussed the treatment in her presence before a group of students, told them what had been done for her, how much she had been improved, that further treatment would be required. The patient, during the months of her struggle for health, had come to place implicit confidence in me. I watched her carefully during this discussion and observed that she was comparatively calm and that her pulse was not accelerated by the ordeal. When asked whether she would like us to go on with the next stage of treatment, she expressed her readiness, climbed on the operating table, and I at once removed one lobe under nitrous oxide anæsthesia. She has finally recovered her health, and when last seen her pulse was 68 on sitting and only 80 after exertion—a complete transformation from

her former debilitated state. This is an example of what I mean by the application of psychic influence in the treatment of Graves's disease, which unquestionably is a factor of great importance.

With reference to the advantages of scopolamine in all cases, I have been a little skeptical. At least in some cases it seemed to have a disturbing rather than sedative action. In two cases particularly the pulse was accelerated, and the patients became extremely restless and in one instance delirious. In this case, the operation was postponed because of this extreme excitation; at the time set for the operation two weeks later the scopolamine was omitted and this condition of excitation did not occur. In most of the toxic cases and in all the more serious ones, nitrous oxide anæsthesia has been used, and I believe to advantage. The choice of operation must be left to the individual judgment of the surgeon. My rule has been to err always in favor of conservatism, to choose in doubtful cases ligation rather than lobectomy, one vessel rather than two, or in the more serious cases injection of boiling water rather than ligation. While I have had no experience with the latter I am convinced from the reports of Porter (*Jour. Mich. State Soc.*, February, 1913) of its usefulness. The only two cases which died in the hospital as the result of operation were double ligation, and in looking over the records, I can clearly see the wisdom of substituting boiling water injections at least as a preliminary treatment for ligation. I have practised ligation 17 times in 14 patients. In 9 both superior arteries were ligated, in 3 the right superior, in 4 the left superior, and in 1 the left inferior. Five patients were operated upon twice and one three times, as follows:

First operation	Second operation	Third operation
1. Ligation right superior thyroid	Lobectomy.	
2. Right lobectomy	Ligation left superior thyroid.	
3. Ligation both superior thyroids	Ligation left inferior thyroid	Right lobectomy.
4. Ligation both superior thyroids	Right lobectomy and ligation of left superior pole.	
5. Ligation right superior thyroid	Ligation of left superior thyroid.	
6. Ligation of both superior thyroids	Right lobectomy and ligation of left superior pole.	

Halsted's (*Trans. Am. Surg. Assn.*, 1913) preference of ligation of the inferior over the superior thyroid artery deserves consideration, and while from the purely technical consideration and the cosmetic effects he has made out a strong case in favor of the inferior thyroid, I

still favor the superior thyroid, because of the greater facility of including in the ligature not only the vessels but the nerves, a technical point of which Crile has explained the importance.

Results.—Of the 103 operations, there were 80 thyroidectomies with no deaths. Of 3 thyroidectomies for malignant disease, there was

TABLE III
FINAL RESULTS IN 37 CASES PRESENTING TOXIC SYMPTOMS WHICH HAVE BEEN RECENTLY HEARD FROM

Pathological diagnosis	Entirely well	Greatly improved	Moderately improved	No improvement	Total
Non-hyperplastic-toxic (simple).....	2	1	2	..	5
Non-hyperplastic-toxic (adenoma).....	5	5	2	..	12
Hyperplastic toxic.....	5	7	1	..	13
Toxic cases in which ligation was performed....	3	3	1	..	7
Total.....	15	16	6	..	37

one death, a sarcoma in a boy eleven years of age. Of the 17 ligations, there were two deaths, both true exophthalmic goitres, one an acute case of six months' duration already referred to, the other a case in the terminal stage of the disease.

TABLE IV
SYMPTOMS IMPROVED SINCE OPERATION IN 30 CASES RECENTLY HEARD FROM

Pathological diagnosis	Mental irritability	Palpitation	Ocular disturbance	Weight	Strength	Diarrhoea	Dyspnoea
Non-hyperplastic-toxic (simple)	4	2	..	4	4	..	3
Non-hyperplastic-toxic (adenoma).....	9	9	1	7	7	..	2
Hyperplastic-toxic.....	11	9	10	10	10	4	7
Toxic cases in which ligation was performed.....	4	3	4	4	4	4	3
Total.....	28	23	15	25	25	8	15

The end results in the toxic cases were in accordance with those recorded from other clinics. Of the patients heard from, 90 per cent. had fully recovered or were greatly improved and of the latter a number had been operated upon within the last year. The complete-

ness of the cure does not depend entirely upon the successful removal of the gland. Two other factors must be considered: first, the care of the patients after the operation which should, whenever possible, free the patient from physical and nervous strain for periods varying from several months to two years. Unfortunately, the social status of the patient may make it impossible to provide these conditions sometimes. This must be borne in mind by the practitioner into whose hands the patient falls after operation, and the completeness of the recovery will depend upon his appreciation of the need of this after-treatment and whether the circumstances permit of its enforcement. Second, the existence of chronic visceral disease at the time of the operation must be taken into account. Some of these patients are physical wrecks with organic lesions of heart, kidney, and other organs, from which complete recovery is impossible. As Kocher (*Brit. Med. Jour.*, February 17, 1912) has said, if all cases were operated upon within a short time after the outbreak of the disease, they would probably all be cured and to this might be added that the mortality, low as it now is in all cases, would be reduced to that of as common a procedure as herniorrhaphy.

The general practitioner has every right, if he so chooses, to try nonsurgical means in the early stages of the disease before the myocardium or kidney or nervous system is permanently damaged. But if he fails to arrest the disease and does not advise operation in the curable stage, he should be just as severely censured as the practitioner who fails to call for surgical aid until his patient with acute appendicitis has developed peritonitis, or one with a callous ulcer of the stomach, carcinoma. The conditions are quite parallel. The extraordinary recuperative power of patients with Graves's disease is amazing, and in most cases, sick as they are at the time of operation, they will almost uniformly be restored to perfect or reasonably good health.

DR. GEORGE P. MÜLLER believed that too much emphasis is laid upon the preliminary medical treatment of exophthalmic goitre by most of the writers and text-books on the subject. It seemed to him that those cases seen early, before the so-called four cardinal symptoms are present, when mental irritability, general nervousness, loss of weight and strength and tachycardia may be the chief evidences of hyperthyroidism, may be completely cured by non-operative measures, of which rest is the key-note of treatment. In cases in which the diagnosis is established, it is an absolute waste of time in trying the so-called medical treatment for the three or four months advised by most writers.

STATED MEETING, HELD MAY 4, 1914.

DR. G. G. ROSS in the Chair

UNUNITED FRACTURE OF THE NECK OF THE FEMUR, TREATED BY BONE-TRANSPLANT

DR. ASTLEY P. C. ASHHURST presented a man, thirty years old, who in August, 1913 (seven months after injury), came under his care at the Orthopædic Hospital, in Dr. Harte's service, and was found to have an ununited fracture of the neck of the right femur. He was unable to walk without crutches, on account of pain and weakness; he could stand alone, and even bear momentarily all his weight on the injured limb, but the hip grated, and the trochanter slid up and down on the pelvis. There was shortening of an inch and three-quarters. A skiagraph showed an ununited fracture at the base of the neck, oblique, and the longer fragment belonging to the head of the bone and the front of the neck (Fig. 1).

The patient was referred to the Episcopal Hospital (there being no vacant bed at the Orthopædic Hospital), and admitted to Dr. Frazier's service. Operation was done by Dr. Ashhurst on August 22, 1913.

1. An incision was made downward for $3\frac{1}{2}$ inches from the anterior superior spine of the ilium, passing between the sartorius and tensor fasciæ femoris, and then between the ilio-psoas and rectus muscles. The capsule of the hip joint was then opened and detached widely from the anterior intertrochanteric line, exposing the line of fracture, which was bevelled at the expense of the posterior surface of the neck, and extended anteriorly to the extracapsular region of the great trochanter. Only fibrous union was present, and the fragments were easily pried apart with a bone elevator. The fractured surfaces were then freshened. It was now found that by outward rotation, followed by longitudinal traction and finally by inward rotation, the fragments were jammed together in good position. The wound was then temporarily packed with gauze.

2. A bone peg (Fig. 2) was removed from the crest of the left tibia by means of the speaker's circular saw (Fig. 3); the dimensions of this peg were four and a half inches long, and one-half by three-eighths by three-eighths of an inch thick (11.5 cm. long, and 1.5 cm. by