

LIPOMAS

FRANK E. ADAIR, M.D., GEORGE T. PACK, M.D., AND
J. H. FARRIOR, M.D.

(From the Mixed Service of the Memorial Hospital)

Lipomas may occur anywhere within the body and may even cause death by growth and pressure in vital regions. Because of their widespread distribution, these tumors must always be considered in the differential diagnosis of somatic neoplasms. According to their location, lipomas may be classified as subcutaneous, intermuscular, and visceral. The majority are situated beneath the skin, but they are not uniformly or regularly distributed (Fig. 1). Lipomas occur frequently on the back of the neck, seldom on the face, scalp, and sternal region. They are numerous on the forearm and rare on the lower legs. The axilla is a common site, but the inguinal region is seldom involved.

Nine of the 134 patients studied in the Memorial Hospital series, had multiple lipomas (6.7 per cent). The largest number found in any subject was one hundred and sixty (Case 1). Four of these fatty tumors were recurrent; three recurred as simple lipomas after probable incomplete removal, and one recurred as a liposarcoma. The largest tumor weighed 13 pounds (Case 2); the second largest weighed 4 pounds; the other lipomas which were excised were relatively small. Only two patients gave significant histories of antecedent trauma, but this point was seldom mentioned in the inquiries. Seven of the 134 patients were negroes (5.2 per cent).

As we shall explain later in more detail, lipomas and neurofibromas have certain similarities. Transillumination has been of some aid in their differentiation, as the lipomas are translucent and the neurofibromas are opaque to transmitted light. The fifteen lipomas of the breast presented special problems in diagnosis. They were usually retromammary and could not be palpated well, and their elasticity simulated the fluctuation of deep cysts of the breast. Lipomas in the mammary fold caused dimpling by their attachment to the skin and in this way resembled somewhat the clinical aspect of sweat gland carcinomas, which occur frequently in this location. Lipomas in the axilla could not always be differentiated from aberrant breast tissue (polymastia) or from sebaceous cysts of the large apocrine sweat glands.

At the Memorial Hospital, lipomas comprise 4 to 5 per cent of all the benign tumors. Among the patients females predominate greatly (73.1 per cent). This greater frequency in females has been explained by their greater tendency to the accumulation of fat tissue. Women are also more concerned than men with the cosmetic aspects of the disease and for this reason may be more inclined to report to the clinic. The average age of the 134 patients on admission was forty-one years; 42 per cent of the cases

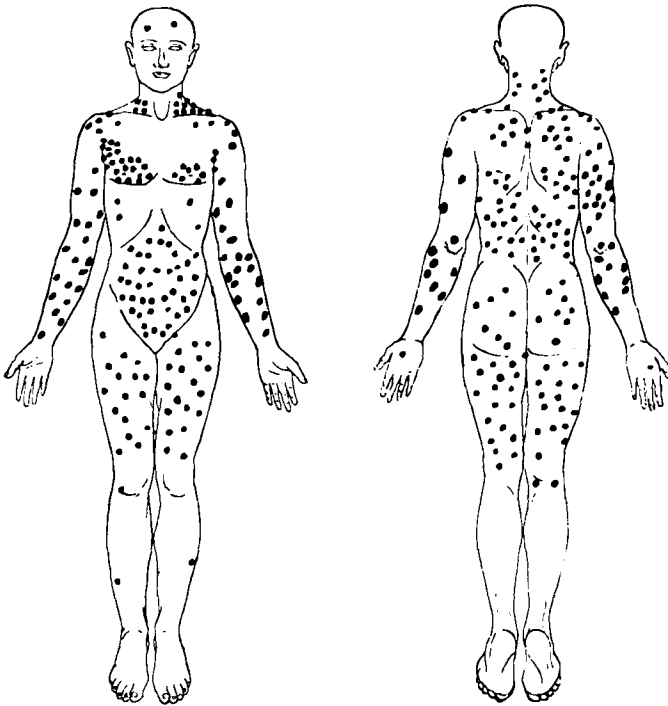


FIG. 1. REGIONAL DISTRIBUTION OF 352 LIPOMAS IN 134 PATIENTS

occurred in the decennium forty to fifty years, at an age when fat usually begins to accumulate. The youngest patient was a boy of five months.

We have found it convenient to adopt the following clinico-pathological classification of lipomas:

(a) The simple, solitary lipoma. This tumor usually occurs at a time in life when the patient is taking on weight. It is soft, lobulated, and located just beneath the integument, to which it is attached, producing the characteristic skin "tug".

(b) The multiple lipomas. These tumors, which we believe

to be neurolipomas, are not congenital but develop during adolescence or later life. They are of firmer texture than the solitary lipoma and are usually not adherent to skin. Because of their symmetrical distribution, they are commonly confused with multiple neurofibromas (Case 1).

(c) Congenital diffuse lipomatosis. This variety of lipoma is confined to one or two limbs and is usually associated with corresponding enlargement of the muscles and bones of the same limb (Cases 3 and 4). It may be coexistent with diffuse cavernous hemangiomas.

(d) Degenerated lipomas. These tumors really do not need separate classification. They represent the large or bulky lipomas

TABLE I
Age and Sex Distribution of Lipomas

Age Period (years)	Cases in Males	Cases in Females	Total
0-4.....	4	—	4
5-9.....	—	2	2
10-14.....			
15-19.....			
20-24.....	1	2	3
25-29.....	2	6	8
30-34.....	2	12	14
35-39.....	5	12	17
40-44.....	8	24	32
45-49.....	6	18	24
50-54.....	4	10	14
55-59.....	2	5	7
60-64.....	2	6	8
65-69.....			
70-74.....		1	1
TOTAL.....	36	98	134

which have undergone certain degenerative changes due to rapid growth or impaired blood supply. The xantholipomas and myxolipomas are well known examples (Case 2).

(e) Liposarcomas. As some of the rapidly growing lipomas have shown malignant qualities, any very cellular lipoma with numerous cells containing only traces of fat should be regarded as malignant and treated as such, especially by complete extirpation. Such tumors, however, are rare.

Among the 134 patients in this series, there were many unusual and interesting varieties of lipomas. Some of these tumors were unique because of their great size. Others were multiple, in

patients with definite familial histories of this tumor. Still others were of peculiar location and bizarre distribution. We have selected four case reports from this group for presentation in detail, with comments.

CASE 1: G. M., a single, white, American male, aged twenty-seven years, applied to the Memorial Hospital on March 14, 1930, complaining of the presence of nodules over various parts of the body.

Family History: His father and mother were living and well. There was no family history of cancer, tuberculosis, or neurofibromatosis.

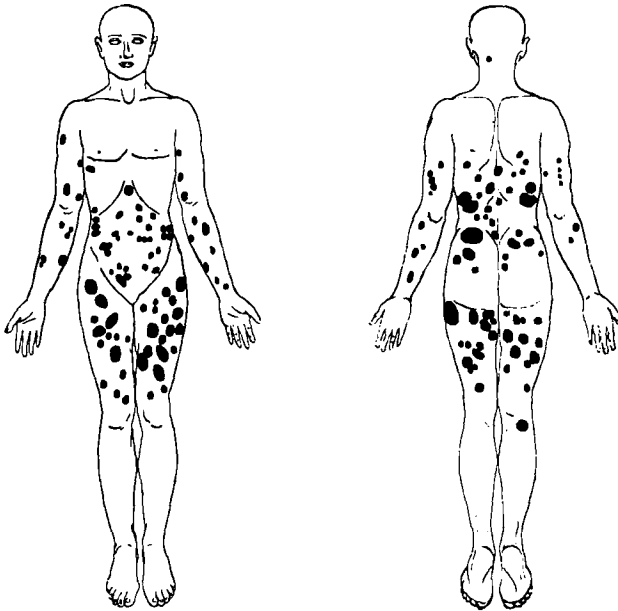


FIG. 2. CASE 1. DISTRIBUTION OF 160 LIPOMAS IN ONE PATIENT

Note the freedom from involvement of the legs, chest, head, and scapular regions.

Past History: The past history was essentially negative.

Present Illness: Five years before, while the patient was rowing on a college crew, he had noticed a small nodule on the front of the right thigh. This mass gradually enlarged and other nodules successively appeared on both thighs, the trunk, and on the arms. New nodules continued to form. They were slightly tender, but the older tumors were asymptomatic and the patient experienced no pain, anesthesia or pares-thesia. There were no symptoms referable to other parts of the body.

Physical Examination: The positive findings were limited to the 160 subcutaneous tumors, which presented a remarkable distribution (Fig. 2). They were flattened and ovoid in shape, and varied from 0.3 to 7 or 8 cm. in diameter. Their consistence varied from soft to quite firm. There was a bilateral girdle distribution in the lumbar region, extending

from the spine to the side of the trunk, on each side, and covering a zone 15 cm. in width. The tumors on the front of the thighs were the largest and extended in a roughly linear fashion from Scarpa's triangle downward. There was one pigmented spot typical of neurofibromatosis; this was a light brown patch, 1 cm. in diameter, on the back of the right hand. There were a few pigmented moles. One of the larger tumors on the left forearm could be turned up on edge, and would remain in that position.

Neurologic Examination (Dr. George Hyslop): "As the nodules appear and grow there is apt to be some sensitivity or itching in them. There is no simultaneous appearance of nodules on both sides of the body, nor are the new ones symmetrically placed as a rule. There is no hearing defect. The well developed nodules are relatively anesthetic. A diagnosis of 'neurofibromatosis' is made."

X-ray Examination: Findings on x-ray examination of the chest were normal.

Clinical Diagnosis: Neurofibromatosis.

Treatment: Forty-three tumors were removed by sharp dissection under local novocaine anesthesia, at varying intervals. The skin overlying these neoplasms was so insensitive to pain that very little novocaine was necessary. All wounds healed by primary intention. Extirpation of these forty-three tumors was not considered a curative measure, since three times this number of tumors remained and new nodules continued to develop. The patient was a well-known athlete and was embarrassed by the knobby outlines of his torso, legs, and arms. The face and neck were exempt.

Pathological Report: On gross appearance, the specimens consisted of flat, lobulated, smooth, encapsulated, yellow, fatty tumors varying from 0.5 to 6 cm. in their greatest diameters. Two gross features which attracted special attention were the light canary-yellow of these lipomas and their comparative dryness, in contrast to the common darker yellow, moist lipomas. The microscopic diagnosis was simple lipoma; some were angiolipomas.

Comment: The multiple symmetrical lipomas are seldom congenital; they usually make their recognizable appearance shortly after adolescence. Although the patient whose case is reported here gave no history of the occurrence of multiple lipomas in his family, we have observed other families wherein lipomas were unquestionably inherited. One woman, aged fifty-three, had 16 discrete subcutaneous lipomas; her two sons were similarly affected (5 and 13 tumors), as was her small grandson. Bonnefous and Valdiguie (2), Cannon (3), Esquier (4), and Leven (8) have also reported cases illustrating the heredofamilial tendency of this neoplasm.

The etiology of multiple symmetrical lipomatosis is obscure. Trauma and endocrine imbalance, particularly of the thyroid

gland, have been suggested as provocative factors, but clinical and pathological studies do not support these theories. Jonathan Hutchinson, in 1884, stated that symmetric lipomatosis was always associated with nervousness and irritability; local pain occurred simultaneously with or even preceded the development of the tumors. Meerbeck, in 1887, cited cases of lipomas in which the tumors contained nerve fibers. Grosch, Madelung, Israel, Baumgartner, Buchterkirch and Bumke have reported multiple symmetrical lipomas associated with local neuropathies, trophic disorders, spinal cord lesions, and other nervous disturbances, suggesting involvement of the central nervous system. Alsberg found several neurofibromas with many lipomas in the same patient and he was able to trace nerve fibers into certain lipomas.

We believe that these multiple lipomas are of neurogenic origin, though we have no histologic evidence available to substantiate this opinion. As Ewing has said: "It has not been possible to establish for lipoma such a relation to the peripheral nerves as exists with fibroma." The multiple tumors show definite gross morphologic differences from the single lipomas in their dryness and light lemon-yellow tint. This light color is attributed to the cellular character of the tumor with the formation of only small quantities of fat. The older, larger tumors assume a deeper orange color. Inasmuch as the tumors are so simply enucleated, the tumor environment has not been studied microscopically as carefully as in the case of neurofibromatosis; in this latter disease, the development of neurosarcomas often furnishes abundant material for post-mortem examination, whereas the multiple lipomas are rarely fatal. The association of the lipomas with nerve fibers in the subcutaneous tissues has been observed. We are not prepared to say whether this relation is causal or coincidental.

We have attempted to draw clinical analogies between multiple lipomas and multiple neurofibromas as follows:

- (a) Both are of multicentric origin.
- (b) The symmetrical distribution of the tumors suggests a disturbance or defect of the central nervous system as a causative factor.
- (c) The multiple lipomas and neurofibromas have a similar regional localization, *e.g.* on the neck, scapula, popliteal space, arms, thighs, and lumbar region.
- (d) Both conditions may be classified as intracutaneous (frequently pedunculated), subcutaneous, fascial, and visceral. The

multiple lipomas may appear in the lungs and liver, where fat is normally absent.

(e) Multiple lipomas and neurofibromas may coexist in the same individual.

(f) The flat, coffee-colored pigmented areas of skin which constitute one of the stigmata of von Recklinghausen's disease are often observed in multiple symmetrical lipomatosis.

(g) There is an undisputed hereditary or familial influence on the genesis of both multiple lipomas and neurofibromas.

(h) Sensory and trophic disturbances are associated with both tumors, as hyperesthesia, pain, hypesthesia, and atrophy of the skin.

(i) Painful scars are frequent following the extirpation of lipomas and neurofibromas.

(j) Both varieties of tumors occur in young adults. Occasionally they are not noticed by the patients until the loss of subcutaneous fat with senescence renders the tumors prominent.

CASE 2: E. D., a single, white, American male, aged forty-five years, applied to the Memorial Hospital on April 1, 1929, complaining of a growth on the anterior aspect of the left thigh and a loss of 40 pounds in weight during the previous year.

Family History: The patient's mother had died of diabetes at sixty years of age and his father was dead of an unknown cause. One brother had died of tuberculosis.

Past History: The patient consumed large quantities of alcoholic beverages. He had gonorrhea in 1914 and probably a chancre in 1924.

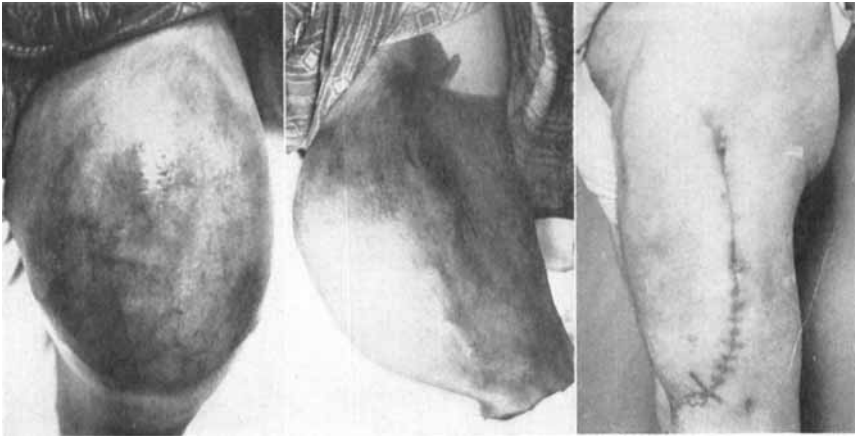
Present Illness: The tumor on the anterior aspect of the left thigh was first noticed about ten years previously. It was thought to be muscular hypertrophy. In 1926 the patient was kicked on the left thigh at about the level of the summit of the present tumor. Local ecchymosis and soreness followed the injury, but no lump or swelling developed. Four months later an elongated swelling appeared on the anterior aspect of the thigh. This gave no pain but continued to enlarge fairly rapidly. Shortly before the date of admission there had been pain over the dome of the growth, at which point an enlargement of the veins and slight increase in local temperature were noticed. The loss of weight during the past year the patient attributed to abstinence from alcohol. His normal weight was 230 pounds.

Physical Examination: The patient was obviously obese but in apparently good general condition. There was a bulky ovoid tumor extending from Poupart's ligament down to about two inches above the left patella. The mass was larger than a football. When the quadriceps muscle contracted, the entire mass became rigid but moved freely over the femur. The Kahn test was four plus. The urine contained granular casts. The blood count was normal. Radiographs of the femur showed no bone

involvement. The left thigh measured 83.5 cm. in its greatest circumference; the right thigh measured 65 cm. (Figs. 3 and 4)

Clinical Diagnosis: Giant lipoma.

Treatment: The entire mass was removed by sharp dissection under general anesthesia on May 3, 1929. The muscles, nerves, and important blood vessels were left intact. A lateral semilunar incision was made from the external abdominal ring to the patella. The tumor lay in close contact with the anterior surface of the femur throughout most of its length. Enucleation was complete, and the capsule of the tumor was broken only in the region of a previous biopsy. (Fig. 5.)



FIGS. 3, 4 AND 5. CASE 2. ANTERIOR AND LATERAL VIEWS OF LEFT THIGH, SHOWING BULKY XANTHOLIPOMA; RESTORATION OF THIGH, SHOWING HEALED WOUND FOLLOWING EXTIRPATION OF TUMOR

The skin had been painted with iodine preparatory to operation before the two preoperative photographs were taken.

Pathological Report: The specimen consisted of a large encapsulated lobular tumor measuring 35 by 20 by 15 cm. and weighing 13 pounds. Cut sections revealed a lobular structure of variable appearance. Some lobules were broken down and cystic, filled with brownish fluid; others were pinkish red and apparently infarcted; there were some fibrin-filled cysts; but the bulk of the tumor was grayish yellow, soft, and of a myxomatous appearance. Gross diagnosis: Xantholipoma possibly myxoliposarcoma. (Fig. 6.)

Microscopically, the structure of the tumor was unusually homogeneous, considering its size. The bulk of the lobules was composed of large, spherical cells with scant intercellular substance. The cytoplasm was foam-like, coarsely granular, and contained numerous vacuoles. In some regions mucinous degeneration was apparent. The histologic diagnosis was benign xantholipoma or xanthomyxolipoma. (Fig. 7.)

Postoperative Course: The wound healed by primary intention. The relaxed tissues, including the quadriceps femoris muscle, regained their

tonus, and the thigh became functionally perfect (Fig. 5). In May 1930 the patient entered the U. S. Naval Hospital, in Brooklyn, where a small recurrent tumor was excised from the left inguinal region. It proved to be a moderately cellular radiosensitive liposarcoma. (Fig. 8.)

During hospitalization the patient complained of rectal pain, tenesmus, urinary incontinence and dribbling. Examination of the rectum revealed a firm spherical tumor, the size of an orange, situated retroperitoneally in front of the sacrum and coccyx. Dr. Bancroft, the consultant sur-

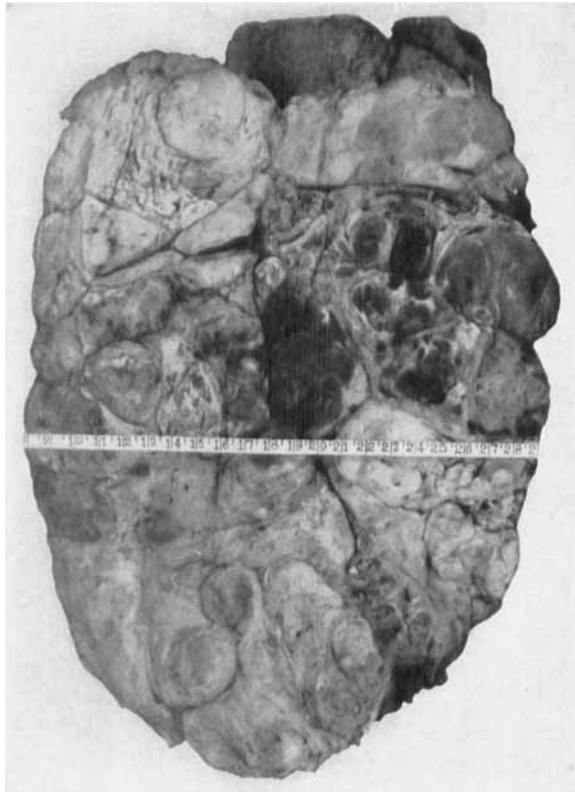


FIG. 6. CASE 2. SECTION OF XANTHOLIPOMA

Some of the lobules are hemorrhagic; some are heavily loaded with xanthochrome.

geon, made the tentative diagnosis of sacral chordoma, but we believe the lesion to have been liposarcomatous secondary to the inguinal recurrence. Neurological consultants made the diagnosis of cerebrospinal syphilis which was confirmed by laboratory tests. The urinary symptoms were due to atony of the bladder associated with tabes dorsalis. In November 1930 a tumor measuring 16 cm. in diameter could be palpated in the upper left abdomen; it displaced the stomach upward and inward causing a filling defect in the region of the pylorus and pars media.

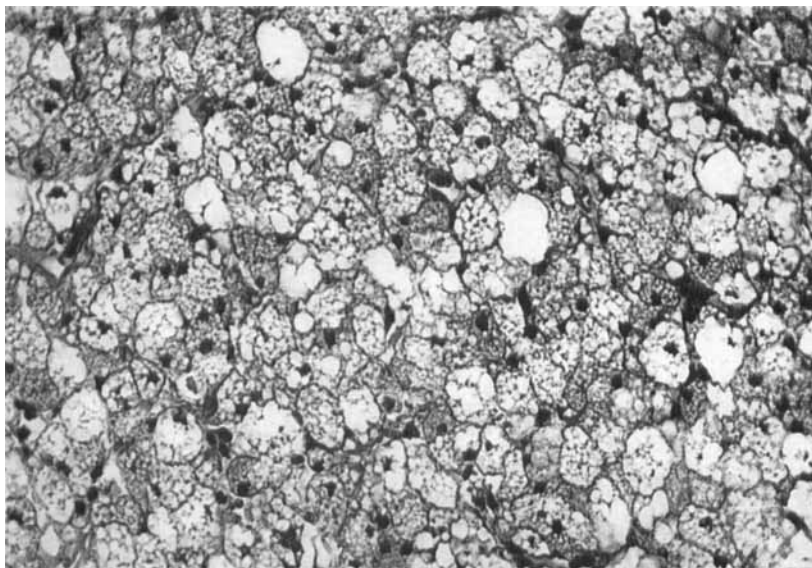


FIG. 7. CASE 2. PHOTOMICROGRAPH OF XANTHOLIPOMA, SHOWING TYPICAL FOAM CELLS

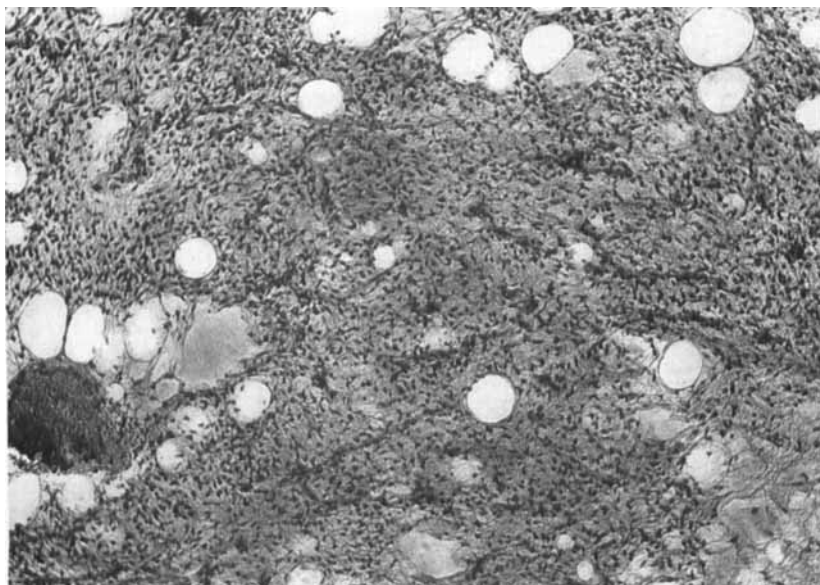


FIG. 8. CASE 2. PHOTOMICROGRAPH OF LIPOSARCOMA RECURRENT AFTER EXCISION OF XANTHOLIPOMA

A series of high-voltage x-ray treatments were given over the left upper and lower abdomen without palliative benefit. The patient died on March 4, 1931. No autopsy was done.

Comment: Several features of this tumor appear unusual and interesting.

1. The large size of the tumor, which weighed 13 pounds. It is true that larger tumors have been reported, but on the whole the lipomas are self-limited in size.

2. The extension of the intermuscular lipoma along the fascial planes to occupy the entire length of the thigh, delimited only by anatomical barriers to its expansive growth.

3. In contrast to other tumors of equal bulk but differing histologically, lipomas may grow to a very large size without undergoing necrosis. The metabolism of the fat cell is low, which enables it to survive the vagaries in blood supply of these large tumors.

4. Xanthomatous and mucinous degenerative changes appear focally in many lipomas as they increase in size. In this tumor such changes were diffuse throughout its entire structure.

5. After ten years of steady continuous growth, a lipoma, originally benign, underwent malignant change.

6. A bulky lipoma, predominantly benign, may have malignant foci where portions of the tumor become more cellular and exhibit sarcomatous structure.

CASE 3: T. G., a white boy, aged eleven and a half years, applied to the Memorial Hospital on Oct. 31, 1929, with a growth on the left hand present since birth.

Family History: The patient's mother had died at forty-three years of age of "heart trouble"; his father was living and well. There was no family history of benign or malignant tumors, tuberculosis, or syphilis.

Past History: The patient was the sixth child and was of normal delivery. He was breast fed. He had had measles and chicken-pox.

Present Illness: The left arm and hand were larger than the right at birth and during childhood had grown more rapidly, thereby accentuating the disproportion. The tumor was most prominent over the thenar eminence, where it attained the size of a lemon. In 1924 this portion of the tumor had been excised at another hospital. It soon recurred and reached such size that it hindered the patient in using his hand. The child had progressed normally in school.

Physical Examination: The patient was a fat white boy presenting the general characteristics of Fröhlich's syndrome (Fig. 9). The skin was fair and of fine texture. There was no pubic hair, and the pubic

escutcheon was distinctly feminine in type. The breasts were well developed. The configuration of the pelvis was feminine, as was the general bodily habitus. The penis was small and the testicles were undescended.

The left hand and arm were considerably larger than the right. The thenar eminence was the site of most marked overgrowth, being the size

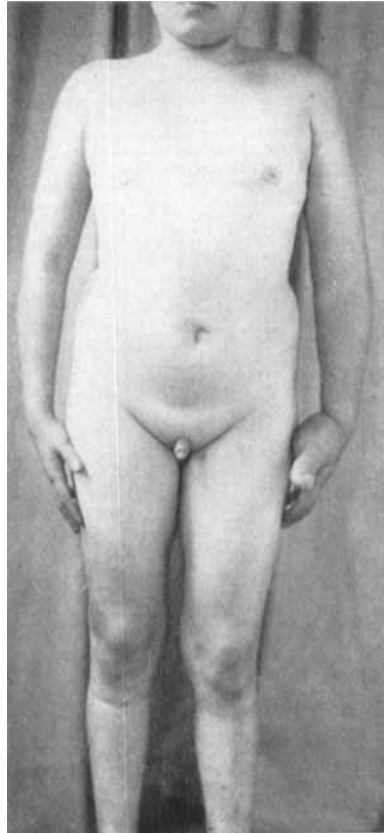


FIG. 9. CASE 3. ASYMMETRICAL LIPOMATOSIS OF LEFT ARM AND HAND ACCOMPANYING FRÖHLICH'S SYNDROME

Note the mammary hypertrophy, the distribution of fat around the pelvic girdle, the cryptorchidism and undeveloped scrotum. The left shoulder, arm, forearm, and particularly the hand are much larger than the right upper extremity. Compare the sizes of the thumbs.

of a lemon (Fig. 10). The thumb and first finger were likewise much hypertrophied. The motion of the phalanges of the first finger was limited, and the finger curved mesially. The tissue composing the overgrowth was soft and uniform in consistency. It transilluminated well. It was not compressible.

The measurements of the arm and hand were as follows:

Parts	Left	Right
Shoulder girdle.....	15.0 cm.....	15.0 cm.
Biceps.....	11.0 cm.....	10.0 cm.
Elbow.....	11.0 cm.....	9.5 cm.
Forearm.....	9.5 cm.....	8.75 cm.
Wrist.....	7.5 cm.....	6.5 cm.
Thenar eminence.....	9.0 cm.....	4.0 cm.
Mid-palm.....	10.5 cm.....	8.0 cm.
Thumb.....	4.0 cm.....	2.5 cm.
Length of arm.....	25.5 cm.....	25.0 cm.

Neurologic Examination (Dr. George Hyslop): "Examination of the cranial nerves reveals nothing abnormal except that the left pupil is slightly larger than the right. No segmental, root, or peripheral weak-



FIG. 10. CASE 3 LEFT HAND, SHOWING LIPOMATOUS ENLARGEMENT OF THUMB AND THENAR EMINENCE

ness is present. The hypertrophy of the left upper extremity includes the shoulder girdle. The sensory findings are normal. Reflexes are normal. The size of the thumb and index finger suggests trophic center disturbance in the cervical sixth and seventh segments on the left side. The over-development of the left upper extremity points in the same direction but might be due to abnormal blood supply only."

X-ray Studies (Dr. Ralph Herendeen): "Films of both arms and forearms do not reveal any bone changes. A film of the left hand reveals considerable deformity and enlargement of the bones of the thumb and index finger. The sella seems small and the posterior clinoid processes slightly enlarged, but these changes may be within the normal."

Clinical Diagnosis: Asymmetrical localized lipomatosis of the left upper extremity.

Treatment: The tumor mass was removed by sharp dissection under general anesthesia.

Pathological Report: There were two portions of tissue. One measured 6 by 1.5 by 2.5 cm. Cut section showed diffuse fatty tissue containing many nerve fibers. A second piece measured 8 by 4.5 by 3.5 cm. and on section showed diffuse infiltration of muscle by fat tissue. Large muscle bundles were divided and isolated by intervening bands of fat. Gross diagnosis: Neurolipomatosis.

Microscopically, the cells were adult fat cells of apparently normal structure. Interspersed in this fat tissue were many nerve fibers, of which some were single and others were in coarse bundles.

CASE 4: D. S., a colored girl aged six years, applied to the Memorial Hospital on Oct. 9, 1929, complaining of an enlargement of the entire right arm.

Family History: The patient was the eldest of four children. The other three were living and well. There was no history of similar disease in the family, nor of tuberculosis, cancer, or syphilis.

Past History: The patient's birth was normal and she had been breast fed. She had pneumonia when two years of age.

Present Illness: The child was considered perfectly normal by her mother until she was one year old. At that time a roughening of the skin of the right arm and a small soft tumor on the posterior aspect of the right shoulder were observed. This tumor grew steadily and progressed down the arm until finally the entire right upper extremity was involved. The mother was of the opinion that the swelling diminished in size at times; these apparent changes had no relation to the position of the arm.

Physical Examination: The child was well developed and well nourished. The pathological findings were limited to the local condition. The right shoulder girdle and entire right arm were involved in a very soft tumor process which was most prominent on the posterior aspect of the shoulder and elbow (Fig. 11). The skin over these areas was roughened and lymphedematous, and contained additional dark pigment. The elbow could not be extended beyond 145°. No bruit could be heard over the tumor. The tumor areas did not decrease in size on elevation of the arm. The affected arm was almost as strong as the left arm. Between the elbow and the wrist there was a large subcutaneous mass with changes in the superjacent skin suggesting keloid formation.

Measurements of the two arms were as follows:

Parts	Left Arm	Right Arm
Shoulder.....	25.0 cm.....	31.0 cm.
Biceps.....	17.5 cm.....	22.5 cm.
Elbow.....	17.5 cm.....	30.0 cm.
Forearm.....	15.0 cm.....	22.5 cm.
Wrist.....	12.5 cm.....	19.0 cm.
Hand.....	14.0 cm.....	16.25 cm.

The two arms were equal in length. The body as a whole, aside from the right arm and shoulder, was symmetrical.

Neurologic Examination (Dr. George Hyslop): "On examination the right scapula appears to be smaller than the left. There are no motor, sensory, or reflex inequalities in the two arms. There is no Horner syndrome. One cannot find in this patient any limited segmental clues except perhaps the right scapula (cervical third and fifth inclusive)."

Roentgen Report (Dr. Ralph Herendeen): "There are considerable enlargement and deformity of the right ulna and lower half of the hu-

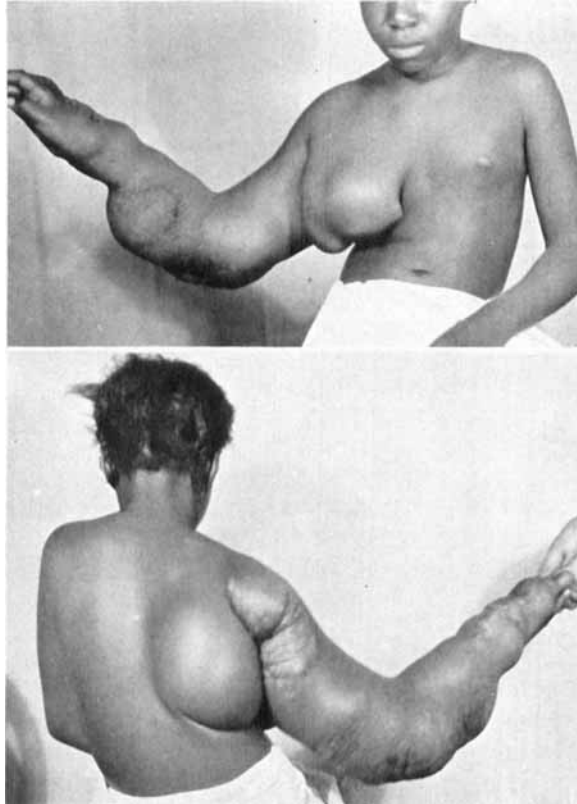


FIG. 11. CASE 4. ASYMMETRICAL DIFFUSE LIPOMATOSIS OF RIGHT UPPER EXTREMITY IN A NEGRO GIRL, WITH LOCALIZED LYMPHANGIECTATIC LIPOMAS OF AXILLA, SHOULDER, AND ELBOW

merus. The radius appears to be uninvolved. The enlargement of the arm and forearm appears to be due largely to the process in the skin and subcutaneous structures. The outline of the muscles suggests that they are uninvolved. The cervical vertebrae show no evidence of a destructive process."

Clinical Diagnosis: The tentative diagnosis was either (a) deep subcutaneous hemangioma or (b) asymmetrical localized lipomatosis.

Treatment: High-voltage x-ray treatments were given, but there was no appreciable change in the tumor following treatment. On Jan. 1,

1930, redundant fat tissue was excised by sharp dissection from the dorsum of the right hand, wrist, forearm, elbow, and shoulder.

Course: Large tender keloids developed in the scars of the operation.

Pathological Report: The specimen consisted of a wedge-shaped piece of skin measuring 13 by 7 cm. with underlying fat tissue measuring 17 by 9 by 4 cm. There were no prominent nerves in the gross section. Microscopically, the cells of the tumor were adult lipocytes with no unusual features. Diagnosis: Diffuse lipoma.

Comment: The white boy (Case 3) had all the anatomical features of Fröhlich's syndrome without the attendant symptomatology, such as polyuria, visual disturbances, headache, and other symptoms of increased intracranial pressure. The condition of dystrophia adiposogenitalis or "adipositas cerebialis," which Fröhlich described in 1901, while accompanied in the greater number of instances by generalized adiposity, may be associated with tumor formation. The tumors are lipomas. They may be symmetrically or asymmetrically distributed. In our patient, the fatty neoplasia was limited to the left upper extremity.

The presence of great numbers of nerve fibers in the lipomatous tissue excised from this patient is strongly suggestive of the relationship of this tumor to the peripheral nerves, *i.e.* neurolipomatosis, but we have no further histologic proof of this hypothesis.

The association of the overgrowth of bone with these tumors—thumb and forefinger in Case 3 and ulna in Case 4—is significant. Similar bony enlargement often occurs with other tumors, particularly the deep hemangiomas, in which case the increased blood supply may be responsible. The neurofibromas likewise are occasionally accompanied by increased growth of the bones, corresponding to their distribution. One of us (G. T. P.) has reported the case of a young boy with unilateral neurofibromatosis of the cranial and deep cervical nerves and cranial hemihypertrophy of the same side (10).

The fatty tumors in the colored girl (Case 4) resemble the type of diffuse lipomatosis which Madelung has called "Fetthals," except that in his description the neck and axilla or both upper extremities are symmetrically enlarged. In our patient, the distribution was unilateral (Fig. 11). This condition has also been called adenolipomatosis, since it occurs in the neck, axilla, and cubital region, but it really has no relation to lymph glands. The brawny thickening in the skin over the elbow and shoulder is a type of elephantiasis molle, which is found so frequently in patients with neurofibromatosis. This association further strengthens our

belief that these lipomas are histogenetically related to the nervous system.

The youngest patient in our series was a male infant, five months old, who had a congenital diffuse lipomatosis involving hip, thigh, leg and, calcaneal region. The diagnosis was confirmed by excision of the calcaneal lipoma. This child also had two superficial cavernous hemangiomas on the same extremity, tumors which are often associated with lipomas.

SUMMARY

1. The salient clinical features of 352 lipomas occurring in 134 patients are reported.
2. A clinico-pathological classification of lipomas is given, with illustrative case reports.
3. Evidence is submitted in support of the theory that multiple lipomas are neurogenic tumors.

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