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TUMOURS OF THE HAND

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Incidence

A SERIES of 300 hand tumours was seen in 3 years in an Orthopædic Department dealing with 3,500 cases each year, an incidence of about 3%.

Of these 60% were ganglia and 10% epidermoid cysts. The remaining 30%, i.e. 88 cases, were made up of 27 other different diagnoses (Stack, 1960). Only 46 were true neoplasms, 44 benign, and 2 malignant, the remainder being pseudo-tumours or lump-forming entities of various types. Previously published series have contained large numbers of cases of cancer of the skin, due probably to the fact that the authors have been specialists in this field, and have had difficult and rare cases referred to them.

Ætiology

Five-sixths of the tumours, made up of ganglion, epidermoid cyst, synovioma, pyogenic granuloma, all have some connection with trauma as an ætiological factor.

Symptomatology

Patients report to hospital with hand tumours because they are unsightly, or painful, or because they interfere with function. Fear of cancer may also cause a patient to come; reassurance will produce great relief.

Diagnosis

Diagnostic points are dealt with in detail under the headings of the various tumours. In general, however, due to the firm palmar skin, and strong sheets of fascial tissue dividing the hand into compartments, the ordinary physical signs of the soft tissue tumours are difficult to elicit. It is often difficult to arrive at an accurate diagnosis before operation.

Treatment

The treatment of any hand tumour which is causing the patient symptoms, or anxiety, is in general by excision. Small and superficial tumours can be excised under local anæsthetic, but it is wiser in most cases to use general anæsthesia and the tourniquet, in order to visualize the tumour sufficiently to avoid the danger of recurrence from incomplete removal.

This particularly applies to ganglia, which freqently arise from a very deep layer, and to synovioma which tend to burrow widely.

Many tumours are closely associated with nerves, causing pain and pressure symptoms (Seddon, 1952; White and Hanna, 1962).

Skin

Pseudo-tumours. Epidermoid Cyst.

These cysts lie close to the skin, usually on the palmar surface of the hand or fingers. They are spherical or ovoid, and are firm. Fluctuation is difficult to elicit. Pressure near the cyst causes the skin over the surface to blanch. A scar in the skin can usually be found and the cyst will probably be tethered to this scar.

The lesion commonly occurs in people whose work renders them liable to injury. A perforating or crushing injury can cause the damage, as well as a laceration. Since women started playing a greater part in industry, the frequency of its occurrence among them has grown.

The cyst has a tough, intensely white wall, about 1 to 2 mm. thick. The contents resemble the material in a sebaceous cyst, except they are less greasy and more gritty and have a crystalline sheen.

Microscopically, the wall is surrounded by compressed fibrous tissue, and consists of squamous epithelium without papillæ, and with laminated keratin lying within the cyst. The soft material in the centre is about half protein, and half cholesterol, with some fat and fatty acids.

King (1933) considers that they should be named Epidermoid Cysts, rather than Dermoids, because whole skin is not involved in their formation, which would occur much more rapidly if it were. He thinks that they are probably due to the epithelialization of a hæmatoma or an inflammatory focus by cells from a sudoriferous gland lying in the connective tissue below the skin, and involved in the damage. This process may take some time to start, and this may be the cause of the long latent period between the injury and appearance of the cyst.

Complications.—The cyst may rupture. This can lead to discharge of the contents on the surface, and reformation of the cyst, or to a discharging

sinus. The discharge may take place subcutaneously, in which case foreign-body reaction will develop around the discharged material.

Infection is a very common complication, and the cyst may involve a phalanx with erosion of bone.

Sebaceous Cysts

This type of cyst is very rare in the hand, and can only occur where there are sebaceous glands in the hair-bearing areas on the back of the hand and fingers.

Mucus Cysts

These arise in the neighbourhood of the nail, on the back of the distal segment. They are practically confined to females between the ages of 45 and 60. They are 4 to 12 mm. in diameter, contain syrupy fluid and have a thin transparent covering (Mason, 1937).

Gross (1937) considers that they arise by myxomatous degeneration of the corium. They should be treated by total excision and skin grafting, and unless this is done carefully they are liable to recur.

Malignant Tumours of Skin. Squamous Carcinoma

This is the commonest malignant tumour of the hand, usually arising from a pre-existing lesion on the back of the hand. Exposure to sunlight, particularly at high altitude, predisposes to freckling and keratoses. The lesion may also arise on the sites of radiological or thermal burns, or on areas of chronic irritation due to chemical and physical agents, or chronic dermatitis.

The growth may arise as a crack or fissure or a reddish indurated nodule. Crusting and ulceration develop later (Fig. 1).

The lesion usually grows slowly until the edge of the predisposing lesion is reached, after which it is more likely to grow more rapidly, and to metastasize to the regional lymph nodes.

Biopsy is a safe procedure, provided the growth has not spread beyond the edge of the pre-existing lesion. Microscopically, the lesion is typical of squamous epithelioma with keratinized cell-nests and prickle cells.

Treatment.—Irradiation. Because the area is already damaged, irradiation may precipitate further primary growths and is therefore contra-indicated. A sufficient dose to destroy the growth, may well damage the skin and the underlying tendon and bone.

Surgical excision. A bloodless field should be used, but the limb should not be previously exsanguinated with a rubber bandage, because of the danger of precipitating metastases.

An area of at least 1 cm. all round the lesion should be excised. The dissection should go down to the tendon layer, and deeper if the tendons are involved. The defect should be repaired with a split skin graft. Block dissection of the regional lymph nodes may be occasionally necessary if the growth has reached beyond the confines of the original lesion.

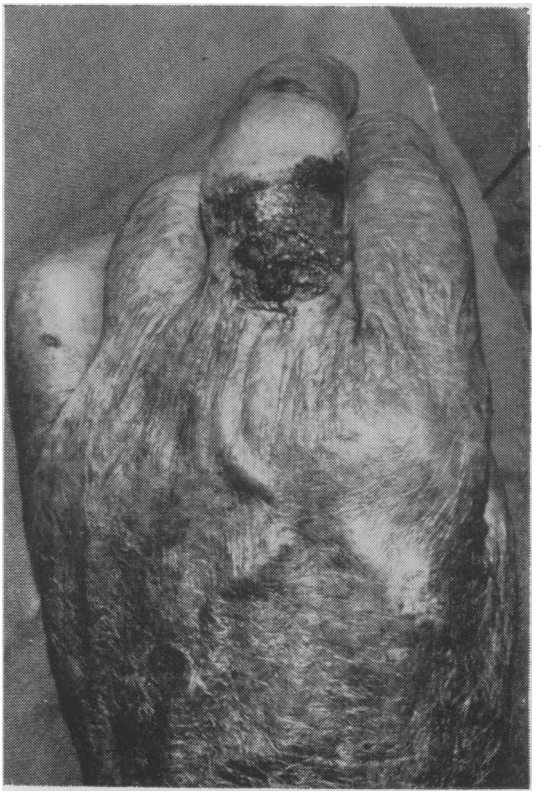

FIG. 1.—Carcinoma of skin, dorsal surface of middle finger.—*D. Walker.*

Carcinoma of the Nail Bed

Carcinoma also arises in the nail bed, and tends to be more malignant.

Melanoma

The hand is a classical site for melanomata. Any pigmented tumour which has recently appeared, or in which there has been recent change, increase in size, crusting, ulceration or bleeding should be viewed with suspicion. The junctional nævus, that is the smooth flat hairless type, which shows variability of pigmentation is likely to become malignant after puberty (Cade, 1957; Lewis, 1956, a valuable review).

Subcutaneous Tissue

Pseudo-Tumour. Foreign Body Reaction

The subcutaneous tissue reacts to the presence

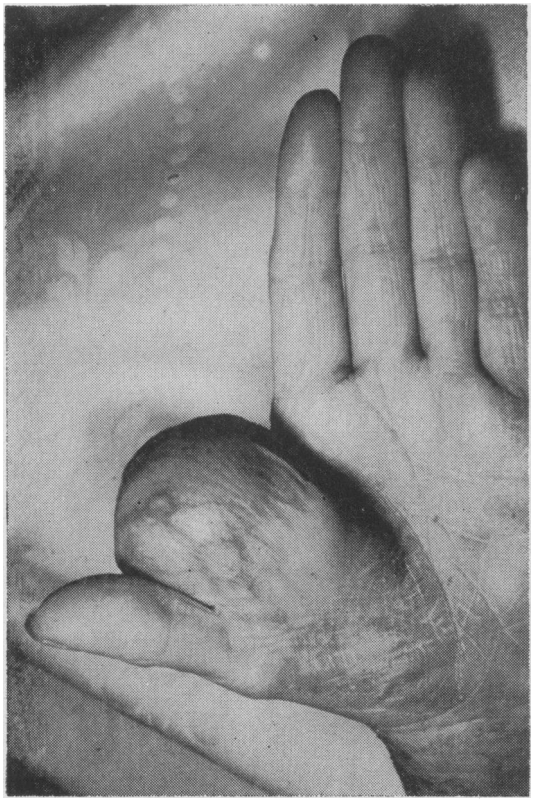

FIG. 2.—Hæmangio-leio-myoma.—*G. Osborne.*

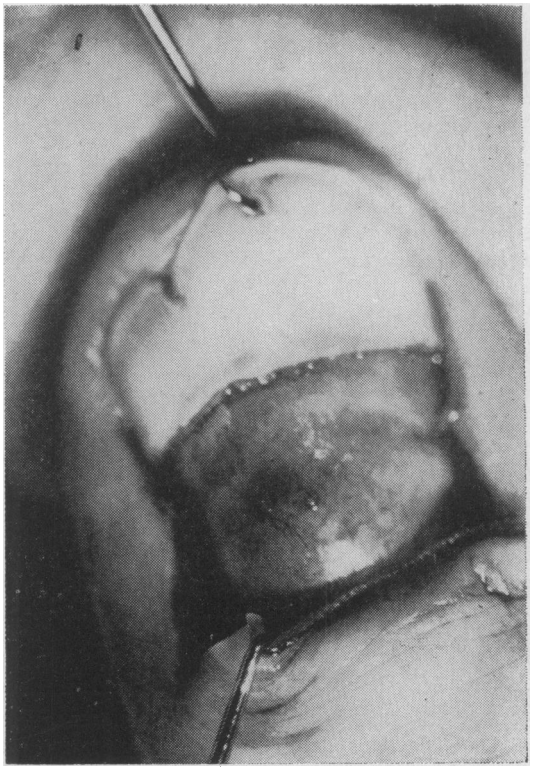

FIG. 3.—Glomus tumour of nail bed.—*R. G. Pulvertaft.*

of foreign bodies, such as splinters of wood, glass or metal, by producing granulation tissue and fibrosis around it, giving rise to a tumour.

Small fragments such as sand or powdered grit are embedded in fibrous tissue, whereas a larger piece will lie in a cavity.

Paraffin or grease injected accidentally under high pressure can produce these tumours also.

The barbers' or milkers' nodules which may become an abscess or a sinus, containing pieces of hair, are a specialized form of this condition.

Fibroma

Fibromata are rare in the hand. They are benign and grow slowly. They are firm and elastic, and mobile.

They may be confused with the following:—

Heberden's nodes, the fibro-osseous nodules occurring in osteoarthritis of the interphalangeal joints.

Dupuytren's Contracture, the first sign of which is often a small discrete nodule of fibrous tissue fixed to the skin of the palm of the hand (Hueston, 1962).

Knuckle Pads. These are fibrous nodules arising in the deep fascial tissue binding down the skin creases over the proximal interphalangeal joints. They are of the same ætiology as Dupuytren's Contracture.

Lipoma

This is relatively rare in the hand. It is also more difficult to diagnose than elsewhere as the firmness of the skin and fasciæ modify the normal characteristics. Lipomata frequently produce pain and weakness in the hand because of pressure on nerves (White, 1962).

Sub-fascial lipomata sometimes spread widely along fascial planes, expanding where the tissue is lax. They are not truly infiltrative. They require wide exposure and excision, and they are liable to recur.

Vascular Tissue

Tumours of vascular tissue are very variable, and difficult to classify. A simplified study of the problem is made by Weisman (1959). Out of his classification, the following are mentioned, as they are fairly frequent surgical problems. There are many other rarer varieties.

Congenital, or developmental vascular hamartoma

1. Port-wine stain, capillary hæmangioma,

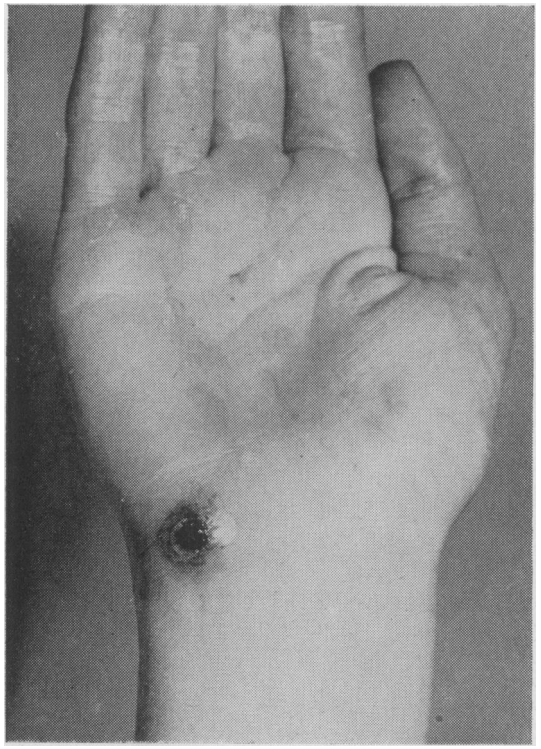

FIG. 4.—Pyogenic granuloma.

usually small and consisting of an irregular meshwork of endothelium lined channels.

2. Strawberry nævus, or hæmangioma simplex.

3. The cavernous hæmangioma, usually an encapsulated lobulated tumour, deep to the skin, but giving the overlying skin a bluish appearance.

4. Diffuse hæmangiomatosis, widespread unorganized overgrowth of fully differentiated vessels. These may be very difficult to eradicate.

5. Glomus tumour. The normal neuro-myo-arterial glomus is a specialized anastomotic system whose function is to control the arterio-venous circulation in the digits and to regulate the local and general temperature of the body. The vast majority of them are in the hands and feet, with a predeliction for the nail beds.

Around the central anastomotic channels are grouped a mass of glomus cells, and it is from these that the glomus tumour develops (Fig. 2). These lesions are commonest in the nail beds, and in females. Spasmodic attacks of severe pain occur after pressure over the tumour, or after changes of temperature. Treatment is by excision. They are resistant to local anæsthesia.

Neoplastic Tumours of Blood Vessels

Benign and malignant varieties from endothelial cells, smooth muscle cells, and pericytes are all very rare, except the benign hæmangioleiomyoma, which is itself infrequent (Fig. 3).

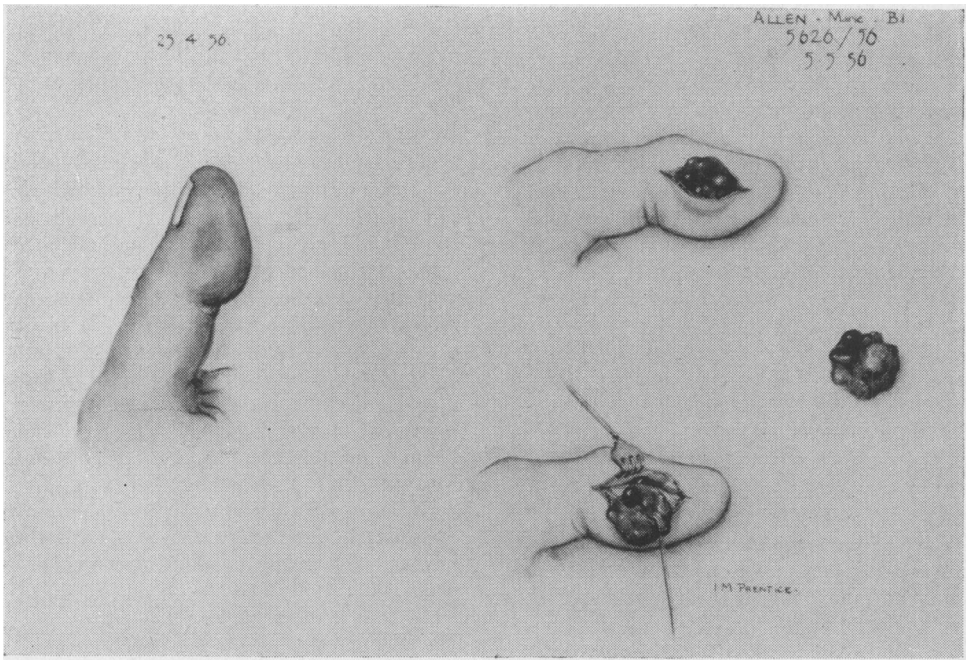

FIG. 5.—Benign giant-cell synovioma.

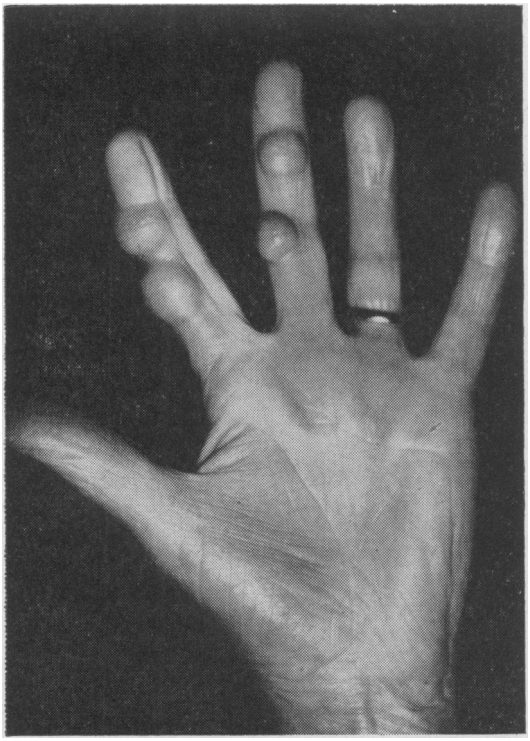

FIG. 6.—Multiple 'Xanthoma'.—*R. G. Pulvertaft.*

Traumatic

The various types of aneurysm, traumatic, arterio-venous, and true and false aneurysm are found.

Inflammatory

The pyogenic granuloma. This is found most often on the volar surface of the hand and fingers. It occurs when infection follows an injury in which there is some loss of skin, which is thicker here than elsewhere, or when the skin apposition is not fully obtained, or is prevented by infection. A granulation grows through the opening in the skin, and spreads out like a mushroom above it. Epithelialization cannot occur. This lesion can be readily cured by the daily application of silver nitrate until the granulation is below the skin surface, and the epithelium can grow across it (Fig. 4).

Nerve Tissue

Pseudo-tumours. Traumatic Neuroma

This may arise in a nerve at the site of an injury. There is always a stump neuroma at the point of section in amputations, consisting of an overgrowth of all the elements of the nerve.

Pain and tenderness may be present, particularly if the neuroma is involved in the scar tissue. The neuroma should be carefully dissected, and the freshly cut end buried more deeply in soft tissue.

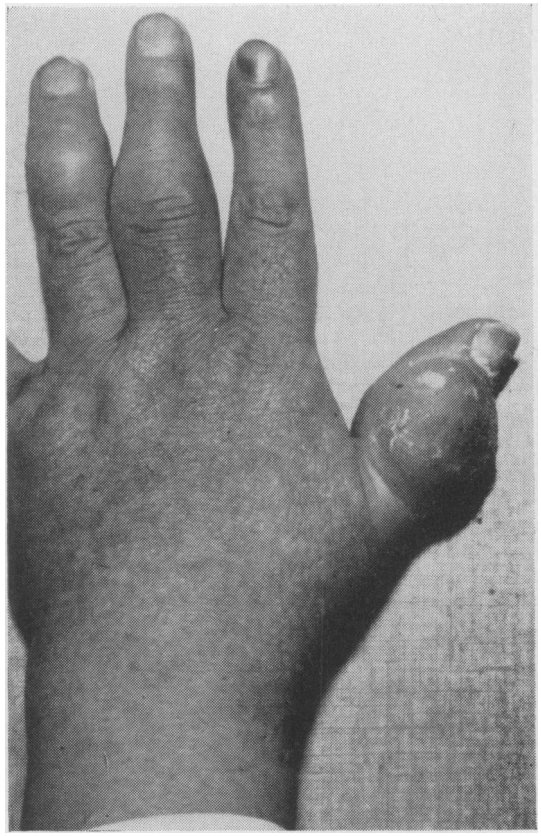

FIG. 7.—Gout.

Nerve Cell Tumours

Neurofibroma. This is a benign neoplasm of nerve tissue, and also involves all the elements of the nerve in the process. It may be solitary or associated with von Recklinghausen's disease. There may be considerable disturbance of function.

Neurilemmoma. This is also known as perineural fibroma, or neurinoma. It is believed to arise from the Schwann cells of the neurilemma. This tumour lies in the course of the nerve, and is often acutely tender. The nerve bundles are not involved in the process, but fan out over the tumour, which can be shelled out of the nerve through a longitudinal incision in the perineurium.

Section shows whorls of spindle cells as in a fibroma, but typically there is palisading of the nuclei. Cystic degeneration may occur.

Synovial Tissue

Pseudo-tumours. Chronic Tenosynovitis

Swelling in the hand can be produced by

inflammatory swelling of the tendon sheaths. Compound palmar ganglion due to tuberculous disease is not now as common as it used to be. Chronic non-specific inflammation can also produce swellings, particularly on the back of the hand.

A good result can be obtained in the majority of cases by careful dissection, with cleansing of each individual tendon in turn.

Benign Tumour of Synovial Tissue

Benign Giant Cell Synovioma (Fig. 5). This is the commonest true neoplasm occurring in the hand. It has many names, but the name Xanthoma which it is commonly given should be reserved for the xanthofibromatous deposits which are found in cases of xanthomatosis due to high blood cholesterol (Fig. 6).

The tumour is found most commonly in women between the ages of 20 and 40. It occurs most freqently in the fingers, arising from tendon sheaths on the volar surface, and near the joints on the dorsum. It varies from a few millimetres to 4 centimetres in size, and is nearly always lobulated.

It is a soft solid in consistency, but is often misdiagnosed as cystic because it is very mobile. It burrows widely, and may extend right round a phalanx, or under a tendon. It is often closely associated with digital nerves, and may be very tender.

The benign giant cell synovioma is usually a soft greyish colour, but shows red and yellow areas on both cut and uncut surfaces. The lobules are encapsulated, but not the tumour as a whole. The lobules may burrow under tendons, or into bone, but the tumour is not truly infiltrative.

These features make operative removal very difficult, and there is a high recurrence rate after operation, though the tumour has never been reported to become malignant.

Microscopically, the tumour is partly encapsulated, and the bulk of it is greyish white, and consists of spheroidal cells, intersected by collagen trabeculæ of varying thickness. Nuclear pleomorphism is present, due to developing fibroblasts. A variable number of mitoses is seen.

Characteristically there are multinucleate giant cells. Synovial clefts without an epithelial lining are another feature of the tumour. These are not artefacts, are always present, and are thought to represent an attempt to reproduce synovial tissue.

The reddish areas of the tumour contain variable amounts of blood and hæmosiderin, and are thought to arise from repeated minor trauma to the tumour, with subsequent phagocytosis.

Yellow areas are also seen, and in these are large groups of foam cells, containing cholesterol.

Stewart (1948), Wright (1951), and Willis (1953) are all convinced of the neoplastic nature of this lesion, but Fisk (1952) is of the opinion that these tumours result from trauma, and represent a form of villonodular synovitis.

Tumours Arising from Joints

Pseudo-tumour. Ganglion

These are the commonest lumps in the hand, comprising about 2 out of every 3. They are difficult to classify exactly, as they arise from joint capsules, ligaments, and tendon sheaths, and tendons. It has been suggested that they are neoplastic, but the most widely held view is that put forward by Ledderhose (1893), that they arise by degenerative processes in the connective tissue around joints and tendon sheaths. King (1932) of Melbourne, agrees with this idea, except that he regarded the contents as a mucinous secretion. De Orsay (1937), however, has shown that the chemical nature of the contents corresponds more closely to a degenerative myxoid material. It is quite possible that this degenerative process is initiated by trauma or overuse.

The clinical features of the ganglion are too well known to require repetition, but an excellent description is given by Carp and Stout (1928). McEvedy (1962) has made a recent review of the treatment.

There are five main types.

1. The common dorsal ganglion of the wrist, overlying the dorsal carpal ligaments opposite the proximal pole of the capitate bone. This ganglion does not communicate with the wrist joint.

2. Ganglia often arise from the volar ligament of the wrist joint, in close association with the radial artery, which may even run across the ganglion, causing it to be bilocular. When on the ulnar side of the joint, compression of the ulnar nerve may occur (Seddon, 1952).

3. The ganglion of the tendon sheaths, often misdiagnosed as a sesamoid bone. This arises from the front of the fibrous flexor tendon sheath opposite the neck of the metacarpal, or the middle of the shaft of the proximal phalanx.

4. Ganglia occasionally arise in association with tendons and joints on the dorsum of the fingers. These are often lobulated, and tend to be more fibrous than those in other situations.

5. Rarely ganglia arise in tendons, often but not always in association with rheumatoid arthritis.

Microscopically, the ganglion shows compressed fibrous tissue without epithelial lining, and containing myxoid material.

Pseudo-tumour. Gout

Gouty tophi occur in the hand, especially in long standing cases. They may lead to gross

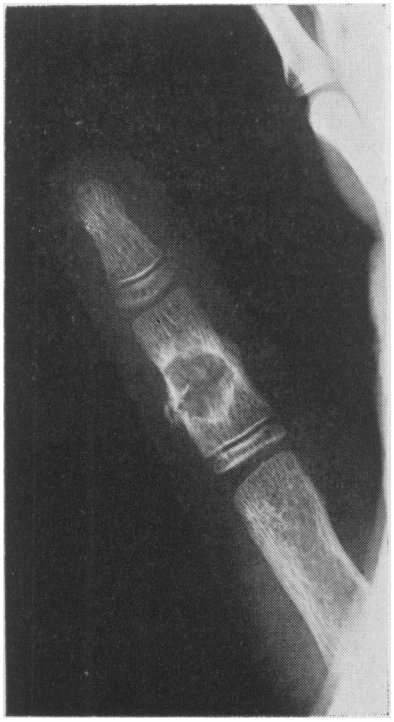

FIG. 8.—Chondroma of phalanx, with pathological fracture.—*N. Capener.*

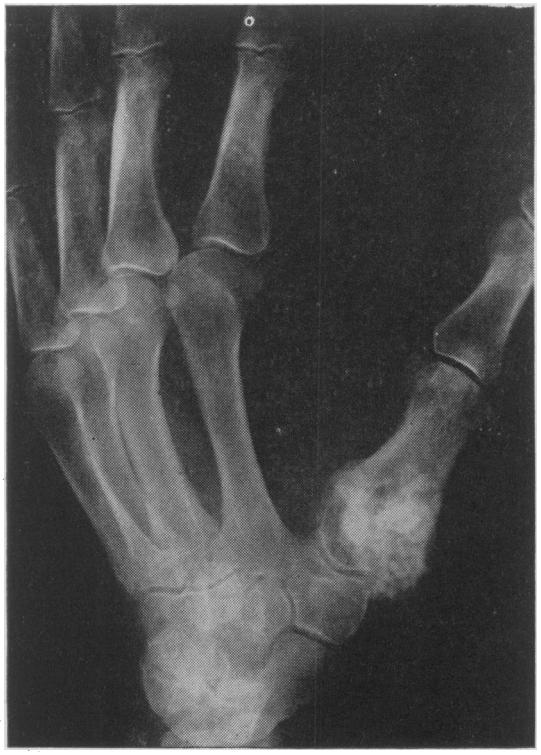

FIG. 9.—Osteogenic sarcoma.—*W. Rentoul.*

destruction of tissue, with interference with function (Fig. 7).

Surgical treatment gives excellent results. The early lesions can be removed. They are to some extent encapsulated and easier to remove. Extensive lesions can also be improved. The extended skin over them does retract after removal of the swellings. Breakdown after excision is to be expected, and after further discharge of material the lesions usually heal well (Woughter, 1959).

Very large lesions often become infected, and continue to discharge crystalline material, but even these can be improved by surgery.

Bone

Pseudo-tumours. Carpal Bossing

A prominence may develop over the base of the third metacarpal and the capitate. This causes some pain, and there may be a bursa overlying the lump. Sometimes it is a little painful. Treatment is seldom necessary, and recurrence is the rule after attempted removal (Larson, 1958).

Exostosis. This is rare in the hand, but may follow trauma. Subungual exostosis occasionally occurs. Multiple exostosis also occurs in the generalized disease.

Benign Tumours of Bone

Enchondroma or solitary benign enchondroma of bone (Jaffe and Lichtenstein, 1943) is the commonest bone tumour in the hand. It must be distinguished from the exostosis, or ecchondrosis, and also from Ollier's disease in which there are multiple lesions.

There may be a swelling, which is perhaps tender, or there may be a pathological fracture (Fig. 8).

The X-ray appearance is of a translucent area in the shaft of a phalanx. Trabeculation may be apparent, and there may be areas of ossification. The cortex is thinned, and sometimes expanded.

A great deal of the granular cartilaginous material can be curetted out of the cavity, which should be cleaned out as well as possible. The cavity may be packed with bone chips, but ossification does occur in the hæmatoma, even if the cavity is not packed.

Microscopically, the material is cartilage with mature looking cells, with mucoid degeneration, but without conspicuous mitoses. There are sometimes areas of ossification.

Osteoid Osteoma, is occasionally seen. This condition is painful, especially at night, and is

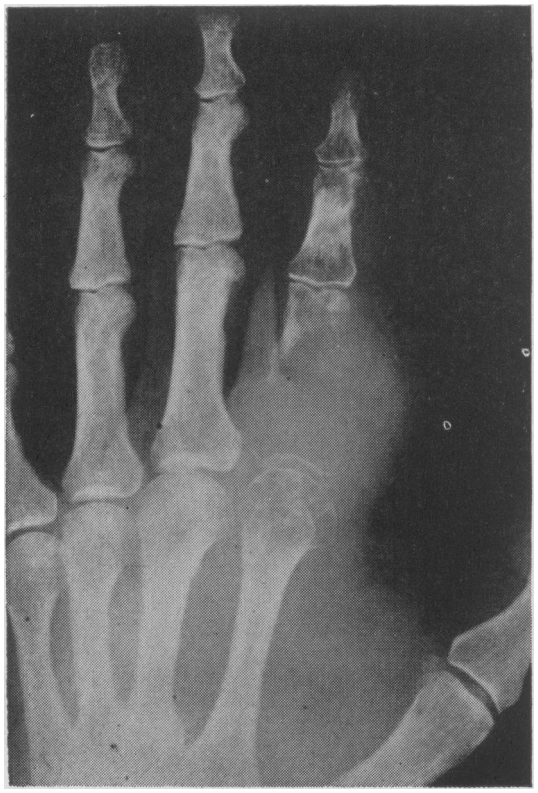

FIG. 10.—Secondary deposit from carcinoma of the thyroid.—*R. G. Pulvertaft.*

relieved by aspirin. The usual site is in the phalanges, but it has also been reported in the metacarpals and carpals.

The condition is cured by surgery, provided that the central sclerotic nidus is removed.

Malignant Tumours

Osteoclastoma. This is a rare condition. The appearance is similar to that of the chondroma, with a translucent area, cortical thinning and expansion of bone. Trabeculation occurs though this is usually less marked than in other sites in the body.

Osteoclastoma usually occurs in the metacarpals, and the chondroma in the phalanges.

The treatment is by careful excision, and replacement by bone grafting.

Osteogenic Sarcoma is also rare. This tumour occurs in metacarpals and phalanges, and sometimes at the site of a pre-existing osteochondroma.

It presents as a painful swelling, and the X-ray shows bone destruction, and new bone formation, often sclerotic in character (Fig. 9).

The tumour should be treated by amputation of the ray, finger and metacarpal. Curiously the prognosis is much better than for the osteogenic sarcoma in the rest of the body, Carroll (1957) reports a 50% survival rate for over five years, and three cases of which the author has knowledge have all survived five years.

Secondary Carcinoma. This occurs occasionally in the hand (Fig. 10).

Cases of secondary carcinoma from the lungs, involving the distal phalanges have been reported, and there is a danger of their being incised in mistake for a pulp infection.

REFERENCES

(including other valuable papers on the subject)

BUNNELL, S. (1956): 'Surgery of the Hand'. Third edition. Philadelphia: Lippincott.

CADE, S. (1957): Malignant Melanoma, *Brit. med. J.*, **i**, 119.

CARP, L., and STOUT, A. P. (1928): A Study of Ganglion, *Surg. Gynec. Obstet.*, **47**, 460.

CARROLL, R. E. (1953): Osteoid Osteoma in the Hand, *J. Bone Jt Surg.*, **35A**, 888.

—— (1957): Osteogenic Sarcoma in the Hand, *Ibid.*, **39A**, 325.

VAN DEMARK, R. E. (1955): Tumours of the Wrist of Anomalous Muscle Origin, *Ibid.*, 1284.

DE ORSAY, R. H., MACRAY, P. H., and FERGUSON, L. K. (1937): Pathology and Treatment of Ganglion, *Amer. J. Surg.*, **36**, 313.

FISK, G. R. (1952): Hyperplasia and Metaplasia in Synovial Membrane, *Ann. roy. Coll. Surg. Engl.*, **11**, 157.

GAISFORD, J. C. (1960): Tumours of the Hand, *Surg. Clin. N. Amer.*, **40**, 549.

GROSS, R. E. (1937): Recurring Myxomatous, Cutaneous Cysts of the Fingers and Toes, *Surg. Gynec. Obstet.*, **65**, 289.

HICKS, J. D., RANK, B. K., and WAKEFIELD, A. R. (1955): A Study of Pigmented Skin Lesions, *Aust. N.Z. J. Surg.*, **25**, 1.

HUESTON, J. T. (1961): Multiple Painless Glomus Tumours, *Brit. med. J.*, **i**, 1210.

—— (1962): 'Dupuytren's Contracture'. Edinburgh & London: E. & S. Livingstone.

JACOBSON, S. H. (1958): Early Juxta-Cortical Osteosarcoma, *J. Bone Jt Surg.*, **40A**, 1310.

JAFFE, H. L., and LICHTENSTEIN, L. (1943): Solitary Benign Enchondroma of Bone, *Arch. Surg.*, **46**,480.

KERIN, R. (1958): Metastatic Tumours of the Hand, *J. Bone J. Surg.*, **40A**, 263.

KING, E. S. J. (1932): The Pathology of Ganglion, *Aust. N.Z. J. Surg.*, **1**, 367.

—— (1933): Post Traumatic Epidermoid Cysts of the Hand and Fingers, *Brit. J. Surg.*, **21**, 29.

LANSCHE, W. E. and SPJUT, H. J. (1958): Chondrosarcoma of the Small Bones of the Hand, *J. Bone Jt Surg.*, **40A**, 1139.

LARMON, W. A., and KURTZ, J. F. (1958): The Surgical Management of Chronic Tophaceous Gout, *Ibid.*, **40A**, 743.

LARSON, R. L., LAZCANO, M. A., and JANES, J. M. (1958): Carpal Bossing, a Common Clinical Entity, *Proc. Mayo Clin.*, **33**, 337.

LEDDERHOSE (1893): *Dtsch. Z. Chir.*, **37**, 102.
LEWIS, C. W. D. (1956): Melanoma and Melanosis, *Ann. roy. Coll. Surg. Engl.*, **19**, 156.
MCEVEDY, B. V. (1962): Simple Ganglia, *Brit. J. Surg.*, **49**, 585.
MACOMBER, W. B., WANG, M. K. H., and SULLIVAN, J. G. (1959): Cutaneous Epithelioma, *Plast reconstr. Surg.*, **24**, 545.
MASON, M. L. (1937): Tumours of the Hand, *Surg. Gynec. Obstet.*, **64**, 129.
—— (1954): Tumours of the Hand, *Minn. Med.*, **37**, 600.
MATHER, G. (1957): Calcium Metabolism and Bone Changes in Sarcoidosis, *Brit. med. J.*, **i**, 248.
PACK, G. T. (1939): 'Tumours of the Hands and Feet'. London: Henry Kimpton.
POSCH, J. L. (1956): Tumours of the Hand, *J. Bone Jt Surg.*, **38A**, 517.
SEDDON, H. J. (1952): Carpal Ganglion as a Cause of Paralysis of the Deep Branch of the Ulnar Nerve, *Ibid.*, **34B**, 386.
STACK, H. G. (1960): Tumours of the Hand, *Brit. med. J.*, **i**, 919.
STEWART, M. J. (1948): Benign Giant Cell Synovioma, and its Relation to Xanthoma, *J. Bone Jt Surg.*, **30B**, 522.
WALKER, D. (1962): Carcinoma of the Hand. Personal communication. (In the press, *Plast. reconstr. Surg.*).
WEISMAN, P. (1959): Blood Vessel Tumours of the Hand, *Plast. reconstr. Surg.*, **23**, 175.
WHITE, W. L. and HANNA, D. C. (1962): Troublesome Lipomata of the Upper Extremity, *J. Bone J. Surg.*, **44A**, 1353.
WILLIS, R. A. (1953): 'Pathology of Tumours'. Second edition. London: Butterworth.
WOUGHTER, H. W. (1959): Surgery of Tophageous Gout, *J. Bone Jt Surg.*, **41A**, 116.
WRIGHT, C. J. E. (1951): Benign Giant Cell Synovioma, An Investigation of 85 Cases, *Brit. J. Surg.*, **38**, 257.