TUMOURS OF THE HAND*

BY

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The small number of papers published on the incidence of hand tumours, mostly from America, differ considerably, and suggest that selection has varied according to the specialized units in which the authors worked. For example, Mason (1954) gives a high incidence of malignant tumours, whereas the clinical impression in this country was that malignant tumours of the hand were uncommon. Therefore it was thought that it would be of value to analyse a series of hand tumours in order to make a practical estimation of the proportion of each type.

This paper is based on an analysis of 300 tumours of the hand presenting consecutively over a period of three and a quarter years in a casualty and an orthopaedic department of a big general hospital. All localized swellings that occurred below the level of the radio-carpal joint are included as being in the hand. Warts alone have been excluded, since these cases were usually sent direct to the skin department.

Of the 300 cases 61% were ganglia of various types, 10% were epidermoid cysts, and 29% comprised no fewer than 27 other diagnoses (see Table). There were 46 neoplasms (44 benign and 2 malignant), one secondary chondrosarcoma, and one melanoma.

Tumours of the Hand. 300 *Consecutive Cases*

Type	1st 100	2nd 100	3rd 100	Total
Ganglion of carpus	39	41	42	122
,, ,, hand	16	23	22	61
Epidermoid cyst	13	7	9	29
Tumour of skin	7	1	4	12
Fibroma	1	1	1	3
Melanoma	1	—	—	1
Mucous cyst	1	—	1	2
Secondary neoplasm	1	—	—	1
Xanthofibroma	1	—	—	1
Papilloma	2	—	—	2
Sebaceous cyst	—	—	2	2
Subcutaneous tumour: Lipoma	4	—	1	5
Tumour of tendon sheath	5	3	2	10
Synovioma	5	3	1	9
Fibroma	—	—	1	1
Tumour of vessels	3	4	2	9
Haemangioma	1	3	2	6
Traumatic aneurysm	1	—	—	1
Organized haematoma	1	—	—	1
Thrombophlebitis migrans	—	1	—	1
Tumour of nerve	2	5	1	8
Neurofibroma	1	2	—	3
Neurinoma (neurilemmoma)	—	2	1	3
Stump neuroma	1	1	—	2
Tumour of bone	4	5	6	15
Enchondroma	1	1	4	6
Osteochondroma (and exostosis)	3	1	1	5
Osteophyte	—	1	—	1
Multiple exostosis	—	2	1	3
Miscellaneous	7	11	11	29
Foreign body fibrosis	1	3	5	9
Pyogenic granuloma	—	2	4	6
Tenosynovitis	3	2	1	6
Dupuytren	1	2	—	3
Rheumatic nodule	1	2	1	4
Calcinosis	1	—	—	1

Some of the figures for individual tumours, analysed in the text, are based on more cases than occurred in the consecutive series of 300 cases.

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Ganglion

The common clinical features of the ganglion are too well known to need repetition. The figures in this series correspond closely with those given by Carp and Stout (1928). Women comprised 74.4%, the large majority of them aged between 15 and 45. The two main reasons why the patient reported were aching pain and the cosmetic appearance. Fear that the swelling is a cancer often causes the patient to seek advice.

There are five main types of ganglion in the wrist and the hand.

1. *Common Dorsal Ganglion of the Wrist.*—This usually overlies the dorsal carpal ligament opposite the proximal end of the capitate bone, on which there is a prominent tubercle. It arises from the ligament, and it is probable that the constant friction of this tubercle against the ligament has something to do with the frequency of the ganglion in this position. I have completely excised this ganglion in some cases by dissecting off the ligament and been successful in leaving the synovial membrane intact.

2. *Arising from Volar Ligament of Wrist-joint.*—In this position the ganglion is in close relation with the radial artery, which is often palpable running across the ganglion and sometimes causes it to be bilocular.

3. *So-called "Sesamoid" Ganglion.*—This is often mistaken for a sesamoid bone in association with the metacarpophalangeal joints. It arises in fact from the fibrous flexor tendon sheath, opposite the neck of the metacarpal or the middle of the shaft of the proximal phalanx. The sheath is firmer and inflexible here, whereas over the joints it is much more lax since it has to fold up in flexion. The ganglia arise from the rigid parts of the sheaths. It is possible that they are caused by pressure damage, as I developed several after lifting a heavy radiator with a sharp edge. If they persist and cause symptoms the only treatment is excision.

4. *Ganglia Arising in Association with Tendons and Joints on Dorsum of Fingers.*—These are often lobulated and occasionally fibrous.

5. *Ganglia Arising in Tendons.*—These occur in cases of rheumatoid arthritis, by degeneration in the tendons.

Many theories on the origin of ganglia have been advanced. Ledderhose (1893) put forward the most widely accepted view that they arise by degenerative changes in the connective tissue around the joints and tendon sheaths. King (1932), of Melbourne, agrees closely with this idea, except that he regards the contents as a mucinous secretion. De Orsay *et al.* (1937) of Philadelphia, do not accept this latter view, as they state that the chemical nature of the contents corresponds more closely to a degenerative myxoid material.

Microscopically, the ganglion shows compressed fibrous tissue, without epithelial lining, containing myxoid material. Those ganglia which show their origin most clearly are the sesamoid type arising from the flexor tendon sheaths, as the whole lesion can be seen and the ganglion can be excised intact with the fibrous tissue from which it arises. My view is that these ganglia arise by degeneration from the fibrous tissue of the joint capsules and the flexor tendon sheaths, and it is probable that this degeneration is initiated by trauma or overuse.

Epidermoid Cyst

Of the 300 tumours, 29 were post-traumatic epidermoid cysts. A total of 38 have been seen. These cysts are usually spherical, but are sometimes ovoid or even lobulated. They lie close beneath the skin, almost always on the palmar surface of the hand or fingers. They are often tethered to the skin at the site of the scar of the injury by which they have arisen. They are usually very firm, and fluctuation is not easy to elicit. Very slight pressure on or near the cyst causes the exposed surface to blanch, giving the overlying skin an intense whiteness.

Epidermoid cysts are clearly related to injury. A scar overlying the cyst can commonly be found: 20 patients out of 23 with a clear history related it to a specific injury. The lesions occur in persons whose work renders them liable to injury or in those who have had a laceration or a perforating or crushing injury.

The average age of these patients was 43. The age distribution shows a great preponderance of those of working age. One boy of 9 years had a definite history of having cut himself several years before.

The sex incidence is interesting. King (1933) reported only 3 out of 16 in females, suggesting that this distribution was also subsidiary to trauma. In the present series 13 out of 38 were in females. The change can be explained by the great increase in the number of women in industry since 1933.

Another well-marked feature is the latent period in most cases between the injury and the observation of the cyst. This is commonly months, but may be years.

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

Microscopically, the wall is surrounded by compressed fibrous tissue. The wall itself consists of squamous epithelium without papillae, and with laminated keratin within it. In the centre is the soft material which is about half protein and about half cholesterol, with small amounts of fat and fatty acids.

The cyst may rupture and discharge its contents, but the opening will heal over again and the cyst refill. Infection is a fairly common complication, seen three times in this series. Sometimes the distal phalanx is involved, with erosion of bone.

It is generally accepted that this lesion is due to implantation of some part of the skin in the subcutaneous tissues. Whole skin is not thought to be the likely cause, as the experimental evidence indicates that such an implantation would cause a much more rapid formation of the cyst. King (1933) notes that there is always a layer of connective tissue between the cyst and the skin, and he postulates that the epithelium would have to be driven in a considerable distance to produce a cyst at this depth. In view of this, and the frequency with which a history of open or perforating injury is absent, he inclines to the view that the cyst may well be due to the epithelization of a haematoma or inflammatory focus by cells from a sudoriferous gland lying in the connective tissue below the skin, and involved in the damage. The epithelization may take some time to start, and this may explain the latent period.

Synovioma

The benign giant-cell synovioma of tendon sheath is to me the most fascinating tumour that occurs in the hand. It is also the commonest true neoplasm, though some people doubt its neoplastic origin. There are certainly some features about its natural history and its pathology that are intriguing.

Confusion has arisen in the past because some authors, particularly in America, call this tumour the xanthoma. In this country that name is reserved for the xantho-fibromatous deposits which occur in conjunction with a high blood cholesterol in cases of xanthomatosis.

Nine of these tumours were in the series of 300 under review, but there were 16 altogether in the hospital between 1951 and 1956. The lesion occurs in other places also, notably the foot and the prepatellar bursa. It is most common in women. In our series of 16 there were 14 women and 2 men.

The average age at onset was 34 years, and the average duration of the tumours before attendance for surgery was four and a half years. By definition they occur only in synovium—that is, near joints and tendon sheaths. In this series they were associated with tendon sheaths on the volar surface and joints on the dorsal surface of the digits. They vary in size from a few millimetres to 4 cm. in diameter and nearly always are smoothly lobulated with a definite edge. They spread locally along fascial planes and may extend into tendon or bone. Often they are horseshoe-shaped, lying deep to tendons, and encircling the phalanx. In consistency they are a soft solid, often misdiagnosed as cystic because of mobility. Pain is never severe, though they are often tender. As a rule they grow very slowly, but two of the patients were quite insistent that they appeared suddenly after an injury.

Synoviomas are soft greyish blue in colour and usually show red and yellow areas on both cut and uncut surfaces. The lobules are encapsulated separately, but not the tumour as a whole. The lobules burrow widely, and may extend into bone, into tendons, or almost encircle the finger deep to the tendons or under the skin. Digital nerves are often found in close proximity to the tumour. These relationships lead to difficulties at operation, and as a result small pieces of the tumour may be left behind and lead to recurrences.

This complication is reported in up to 40% of cases. Five of the 16 cases in this series had recurrences after the first operation. Microscopically, the synovioma is a partly encapsulated lobulated tumour, the bulk of which consists of greyish-white spheroidal-celled mesenchyme, intersected by collagen trabeculae of varying thickness. Nuclear pleomorphism is present, probably due to developing fibroblasts. Also a variable number of mitoses are seen, though generally very few.

The characteristic multinucleate giant cells resemble clumped cells of the surrounding mesenchyme. Another characteristic feature of this tumour is the synovial cleft, which has no epithelial lining. These are always present and are not artifacts. They are thought to represent an attempt by the tumour to reproduce synovial tissue.

The reddish areas of the tumour contain variable amounts of blood and haemosiderin. It is thought that they arise from minor trauma to the tumour and subsequent phagocytosis.

Large groups of foam cells are found. These are responsible for the yellow areas in the tumour and also for the name xanthoma, which is often given to it. Stewart (1948), Wright (1951), and Willis (1953), are all convinced of the neoplastic nature of the lesion, and reject the suggestion that it is inflammatory.

Malignant Synovioma

There were no cases of malignant synovioma in the series, but I have seen two since then—one by the courtesy of Mr. G. R. Fisk. The hand is a frequent site for this not very common tumour.

A coloured seaman presented with a diffuse swelling in the palm of the hand and extensions up the lumbrical canals on to the dorsum of the fingers. There was a history of recent injury at sea, and also an operation 12 years previously in West Africa. At operation I found pale-yellow granular material infiltrating the whole palm of the hand. Radiotherapy was given and the swelling disappeared after a few weeks. The hand was a little fibrosed but useful; there was no recurrence after one year.

This tumour usually metastasizes to the lungs eventually, but very seldom to lymphatic nodes.

In Fisk's case a gland was felt in the axilla, at another hospital, and a block dissection carried out. No malignancy could be found in the specimen. This tumour recurred about three years after irradiation and amputation was performed.

As there is not space to discuss all the tumours at length, I shall mention only points of interest.

Skin Tumours

Mucous Cyst or Myxomatous Cutaneous Cyst.—The so-called mucous cysts are curious lesions, most of which arise on the fingers, in close proximity to the base of the nail. The great majority occur in women of 45–60. They are rarely seen in males. They are 4 to 12 mm. in diameter, with a thin translucent covering, and contain syrupy fluid. The outstanding clinical feature is the frequency with which they recur after all forms of treatment except irradiation or radical excision followed by skin-grafting. Gross (1937) has pointed out that they arise by myxomatous degeneration of the corium.

Sebaceous Cyst.—This is very rare on the hand, and can occur only on the dorsum, in the hair-bearing areas, as there are no sebaceous glands on the volar surface.

Subcutaneous Tumour

Lipoma is not as common in the hand as elsewhere in the body, and is very rarely diagnosed pre-operatively, as the relative firmness of the skin and fascia in the hand modify the normal characteristics. Lipomata are classified by their situation. One subcutaneous lipoma was so tense that it was thought to be a sebaceous cyst.

Subfascial lipomata are divided into epivaginal and endovaginal, and it is in this situation that the so-called lipoma arborescens is found. Though not truly infiltrative, this type spreads along the fascial planes, expanding when the fascia is lax. They require wide exposure and careful dissection, as they are apt to recur if not completely excised.

Vascular Tumours

The angiomata are difficult to classify exactly as they are so variable in their form, but there are three types that occur in the hand. Curiously enough, it is uncommon to see these tumours in the skin as birth-marks, most being of the subcutaneous variety.

The hamartoma is in effect an unorganized over-growth of fully differentiated vessels. These are often diffuse and multiple, and it is extremely difficult to eradicate them. One patient attended with a severe infection of the finger, and was insistent that nothing be done about the tumour.

The capillary haemangioma is usually small and raspberry-like, and consists of an irregular meshwork of endothelium-lined channels, covered with thin epidermis and often pigmented. There is a type in which the cells undergo proliferation and which is called a compact or sclerosing haemangioma.

The cavernous haemangioma in the hand is usually an encapsulated lobulated bluish tumour, as opposed to its common form the port-wine stain. It consists of a spongy network of intercommunicating blood-spaces.

Glomus Tumour.—The normal neuro-myo-arterial glomus is a specialized anastomotic system whose function is to control the arteriovenous circulation in the digits and to regulate the local and general temperature of the body. The vast majority of these tumours ocur in the hands and feet, with a predilection for the nail-beds. Around the central anastomotic channels are grouped a mass of glomus cells, and from these the glomus tumour, or haemangiopericytoma, develops. These lesions are commonest in the nail-beds and in females. They are characterized by the severe pain that is felt in spasmodic attacks after pressure over the tumour, and with changes of temperature. Treatment is by excision, and they are reported to be very resistant to local analgesia.

Nerve-cell Tumours

There are three tumours of nerve-cell origin which occur commonly in the hand.

The fibrillary neuroma is the amputation-stump neuroma or the tumour arising in a nerve as a result of injury. It consists of overgrowth of all the elements of the nerve.

The neurilemmoma, perineural fibroma, or neurinoma, is believed to arise from the Schwann cells of the neurilemma. This lies in the course of a nerve, and the nerve bundles fan out over it but are not involved in the tumour. A longitudinal incision in the nerve sheath allows it to be shelled out completely. It is an ovoid or round tumour, well encapsulated, and often brown in colour. It can be symptomless or acutely tender. One of the cases was unusual in that the lesion was on the dorsum of the hand, and lay beneath a pigmented patch of skin. Microscopically these tumours resemble the fibroma with whorls of spindle cells, but the typical feature is the palisading or regimentation of the nuclei. Three cases reported by Jenkins (1952) had all undergone cystic degeneration, and Morus Jones (1953) has reported a cystic tumour arising from a metacarpal.

The neurofibroma occurs as a solitary tumour, or in association with von Recklinghausen's disease. In this tumour the nerve is involved in the process and there

may be considerable disturbance of function. All parts of the nerve can be recognized as contributors to the tumour process.

Tumours of Bone

There were six cases of enchondroma in the 300. Jaffe and Lichtenstein (1943) describe this tumour as the solitary benign enchondroma of bone. They emphasize that it must be distinguished from the osteochondroma (or solitary exostosis or ecchondrosis) and also from Ollier's disease, in which there are multiple lesions. It is the commonest bone tumour in the hand.

There were 10 cases of this tumour in all. Six were in males, and eight were in the left hand. All were in phalanges (one in T.P., five in M.P., three in P.P., and one multiple). The average age of the patients was 33, spread fairly evenly from 5 to 57. Five males and one female attended with a pathological fracture after a minor injury. Three females and one male sought treatment because of a tender swelling. Eight of the 10 cases were treated by surgery with curettage, and most were packed with bone chips, though two were left unpacked following Mason's (1954) advice that the small ones heal quite adequately by ossification of the haematoma that develops in the cavity.

It is surprising how much of the rice-grain-like cartilaginous material can be curetted out of these tumours. It is advised that in order to prevent a recurrence none should be left, and some authors suggest that the cavity should be washed out with iodine or some other medicament for the same reason.

The *x*-ray appearance is of a translucent area in the shaft of the phalanx. It is usually lobulated, with some trabeculation, and occasionally there are areas of ossification within the tumour. Frequently a pathological fracture is present. There is wide acceptance of the theory that they are congenital in origin, arising from cell-rests.

The lesion always starts in the metaphysis, and does not spread to the epiphysis unless the patient is fully grown.

The cortex of the shaft is thinned and often expanded. The diagnosis from osteoclastoma would be difficult were not that tumour so very rare in the hand. When it does occur it is usually in the metacarpals.

The fragments examined microscopically usually show cartilage with mature-looking cells and much mucoid degeneration of the ground substance. The cells are regular and without conspicuous mitoses. Occasionally there are areas of ossification.

Tumour-forming Entities

Pyogenic Granuloma.—This interesting clinical entity is commoner than at one time thought. It occurs most often on the volar surface of the hand and fingers, where the skin is much thicker than elsewhere. It arises when infection follows an injury in which there is some loss of skin, or in which skin apposition is not obtained or is prevented by infection.

A granulation grows through the opening in the skin and spreads out like a mushroom above it. Epithelization cannot occur. Daily application of silver nitrate progressively reduces the size of the granulation and deals with the associated infection, and epithelization occurs across the wound when the granulations are reduced below skin level.

Summary

Few series of figures for the incidence of tumours of the hand have been published, and the proportion of malignancies in some of them appeared to be unduly high.

300 consecutive swellings in the hand seen in a casualty and orthopaedic unit of a big general hospital are analysed here to give an estimate of the proportions in which these tumours appear.

61% were ganglia, 10% epidermoid cysts, and all the remainder—27 different diagnoses in all—made up 29%.

There were 46 neoplasms, of which only two were malignant.

Salient clinical features and points of diagnosis of the various tumours are discussed and their relative frequency is indicated.

The treatment of most of these tumours is by excision, and the ideal condition for this is with a tourniquet under general anaesthesia.

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PHYSICAL ACTIVITY OF PATIENTS AFTER THE ONSET OF ACUTE CARDIAC INFARCTION

BY

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Complete physical rest is commonly held to be the guiding principle in the treatment of acute myocardial infarction (Miller, 1942; White, 1944; Scherf and Boyd, 1947; Friedberg, 1949; Blumgart, 1955; Levine, 1958). The slightest physical exertion in these cases is regarded as potentially lethal. But does the person with an acute myocardial infarct in fact do what he should? It is often found that an attack is immediately followed by a state of marked restlessness in the patient, associated with severe pain. He cannot remain quiet in bed, but tends to move or even gets up and walks about the room in his agony (Warburg, 1943; McLeod, 1949).

The object of this paper is to present my observations on the activities, and especially the physical exertions, of patients with acute myocardial infarction from the onset of the attack to the time when medical aid was sought.