Tumors of the hand may arise from any tissue present in the hand; skin, subcutaneous tissue, tendons, nerves, blood vessels, or bone. Table 1.

They occur at any age and certain tumors are more likely located in the hand than in any other part of the body, i.e. the epidermal inclusion cyst and the glomus tumor. The vast majority of tumors are benign and excision is the treatment of choice.

A detailed history, careful systematic physical examination and detailed examination of the hand are important in the diagnosis of the tumor. X-rays of the hand and chest are performed if either bone involvement or malignancy is expected.

Malignant tumors are uncommon but must be in the differential diagnosis when dealing with hand tumors as premalignant and life-threatening malignant lesions demand early diagnosis and prompt definitive management. Diagnosis is based on a clinical examination, high level of suspicion, special investigations (e.g. X-rays, and when available CT scans, radio-isotope scans and magnetic resonance imaging) and biopsy. It is understood that most will only have x-ray.

Incidence: the most common tumor is the ganglion with benign giant cell tumor and the lipoma following next in order of frequency.

I. Benign Soft Tissue Tumors of the Hand

Ganglion

This is the most common tumour of the hand after the wart (verruca vulgaris). The ganglion is a small cystic swelling containing clear jellylike fluid. The pathogenesis and etiology of ganglions continue to be confusing. Specific traumatic initiating history is cited as an etiological factor in approximately 10% of patients. Mucoid degeneration of the joint capsule producing cystic degeneration is still a widely accepted theory. Ganglia commonly arise in relation to joints and tendon sheaths and some regard ganglia as being the result of herniations.

Sites

Ganglions usually occur in very specific locations. The most common site is the dorsal wrist (60-70%), followed by the volar wrist (18-20%), the flexor tendon sheath ganglion (volar retinacular ganglion) (10-12%) and the distal interphalangeal (DIP) joint – the mucous cyst. Ganglia may also occur in relation to any other joint or tendon in the hand. They may also occur in the carpal or
ulnar tunnels, where they may compress their respective nerves. Ganglia may also rarely occur within bone as a cyst - intraosseous ganglia.

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<thead>
<tr>
<th>Tissue</th>
<th>Benign</th>
<th>Malignant</th>
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<tbody>
<tr>
<td>Skin</td>
<td>Epidermoid cyst</td>
<td>Squamous cell carcinoma</td>
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<td></td>
<td>Verruca Vulgaris</td>
<td>Basal cell carcinoma</td>
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<td>Malignant melanoma</td>
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<td>Fat</td>
<td>Lipoma</td>
<td>Liposarcoma</td>
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<td>Fibrous Tissue</td>
<td>Fibroma</td>
<td>Fibrosarcoma</td>
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<td>Juvenile aponeurotic fibroma</td>
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<td>Nodular fasciitis</td>
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<td>Desmoid Tumour</td>
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<td>Tendon Sheath and Joint Capsule</td>
<td>Ganglion</td>
<td>Synovial sarcoma</td>
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<td>Mucous cyst</td>
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<td>Benign giant cell tumour</td>
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<td>Muscle</td>
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<td>Simple bone cyst</td>
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<td>Aneurysmal bone cyst</td>
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<td>Osteoid osteoma</td>
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<td>Subungual exostosis</td>
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<td>Carpal boss</td>
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<td></td>
<td>Giant cell tumour</td>
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<tr>
<td>Macrodactyly</td>
<td>(Lipofibromatosis, Hamartoma of Infancy or Localized Gigantism)</td>
<td></td>
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Fig 1
Classification of Hand tumors (Courtesy Prof. Ulrich Mennen, Editor The Hand Book: A Practical Approach to Common Hand Problems, Southern Book Publishers, South Africa)
Symptoms of Ganglions

In the majority of ganglia a symptomless swelling is mostly the only concern. The swelling is often very hard and not compressible. Some patients may however complain of pain and weakness especially with increased activity. The intraosseous ganglion most often presents with persistent aching pain in the absence of a mass.

The most symptomatic ganglion is the volar retinacular ganglion, which presents as a small, hard, painful lump at the base of the fingers. This often barely palpable ganglion may cause more discomfort than the larger protruding ones especially with gripping objects.

Treatment

Most ganglia will resolve spontaneously within two years (75%). A wide variety of non-operative methods have been tried in treating ganglia. These include rupture by firm external pressure, rupture by needling under local anaesthesia, and aspiration with or without injections of cortisone, hyaluronidase, cortisone or sclerosing agents. The use of sclerosing agents must be avoided.

Excision is the treatment of choice. However, if adequate care is not taken recurrence is likely.

Surgical principles

Not all ganglions require operative treatment. In fact, a number will resolve spontaneously, depending on their location. Over half recur after rupture by pressure or by a needle. The cure rate with operative treatment has been reported to be over 70-90%. If the source of the ganglion is eliminated surgical cure approaches 100%.

Adequate anaesthesia and a tourniquet are essential. The incision must allow extension. Damage to nearby nerves must be avoided (particular attention to the cutaneous branches of the radial nerve with dorsal wrist ganglia and digital nerves with volar retinacular ganglia). The ganglion must be carefully exposed, taking care to identify communications. It is most important to get to the site of origin of the ganglion. Failure to do this will predispose to recurrence. Tracing the ganglion to its origin can be tricky in those cases where the ganglion has a long pedicle. The volar radial ganglion may pose considerable difficulties because of its close relationship to branches of the radial artery.

Because ganglia can spontaneously resolve, the surgeon should wait at least 6 months before planning operative intervention as the method of treatment. Patients with a long history can be operated on immediately.

♦ Dorsal Wrist Ganglion

The dorsal wrist ganglion usually presents between any of the extensor tendons and very often directly over the scapholunate ligament (Fig 1). Even in the
absence of a mass, the dorsal ganglion should be included in any differential diagnosis of the painful wrist.

Under tourniquet control dorsal ganglia are approached through a transverse incision over the proximal carpal row avoiding damage to the cutaneous branches of the radial nerve which can vary in their position. Damage can cause troublesome tender neuromas in addition to areas of anaesthesia on the dorsum of the hand. Under loupe magnification, if possible, the ganglion is mobilized through the extensor retinaculum to the underlying joint capsule. The portion of the capsule through which the ganglion arises is excised including its origin from the scapholunate ligament. The origin can be cauterized leaving the ligament intact. Often small ganglia/vesicles can be seen arising from the ligament and these must be cauterized. Care must be taken to preserve this ligament. The tourniquet is released, haemostasis obtained, the wound closed, and wrist use limited for 2 weeks. The patient should be warned that discomfort in the wrist might be experienced for 3-4 weeks. Some may leave a small drain in overnight.

![Dorsal Wrist Ganglion](image)

**♦ Volar Wrist Ganglion**

These ganglia commonly present along the volar wrist crease between the abductor pollicis longus and the flexor carpi radialis tendons. Due to the high incidence of injury to the radial artery and/or injury to the palmar cutaneous branch of the median nerve causing long term pain, operative treatment of volar wrist ganglions is only indicated when the ganglion is producing prolonged functional limitations of hand use.

The surgical technique for excision of this volar ganglion is similar to that described for dorsal ganglion. Loupe magnification and tourniquet control are important as these ganglia are usually intimately associated with the radial artery. The ganglion pedicle is followed to the volar joint capsule and the capsular origin is excised. Hemostasis is obtained and the skin closed.

**♦ Volar Retinacular Ganglion**
This small ganglion presents as an almost bony, firm, tender mass near the metacarpal phalangeal (MP) or palmar digital flexion crease. It usually arises in the junction between the A1 and A2 pulleys of the flexor tendon sheath or often in the centre of the A2 pulley. Surgery can often be avoided by rupturing the ganglion with a 20 gauge needle under local anaesthesia with a 90% cure rate. If the patient experiences pain when gripping objects or if the mass recurs and patient requests surgery, it can be excised under local anaesthesia with the use of a forearm tourniquet. Identification of both radial and ulnar digital neurovascular bundles is important to avoid possible injury to these nearby important structures. The ganglion is traced to its origin from the tendon sheath and a small portion of the sheath is excised along with the ganglion. The skin is closed and early motion allowed.

♦ **Mucous Cysts**

This cyst is classically found at the base of the nail (Fig 2). It has been believed by some to be a ganglion of the DIP joint that usually occurs between the fifth and seventh decade. It can present with longitudinal grooving of the nail caused by pressure on the nail matrix by the cyst and can be present with or without a palpable nodule. X-ray almost always demonstrates evidence of osteoarthritic changes in the DIP joint.

Exposure of the ganglion is through elliptical skin incision - the overlying skin may be difficult to dissect away from the cyst. Care is taken to protect the nail matrix directly under the cyst. The neck of the cyst can be traced to the joint which is exposed by incision alongside the extensor tendon. Synovectomy and joint debridement of osteophytes must be done to limit the possibility of cyst recurrence. The skin is closed directly but might occasionally need an advancement or rotational skin flap. Many will just debride the osteophyte without dissecting out the cyst as the osteophyte is the cause for the cyst.

![Fig 3](http://dermatlas.med.jhmi.edu/derm/Display.cfm?ImageID=-2006976955)
**Giant cell tumor of tendon sheath**

This is the second most common tumour of the hand. (Fig 4) It is known by many names, including pigmented villonodular synovitis, benign synovioma, brown tumour and fibrous xanthoma.

The term giant cell tumor of tendon sheath is however really a misnomer, for the lesion is not a tumor, may not involve a tendon sheath and may only have a few giant cells. Some regard this lesion as a benign reactive inflammatory response.

These lesions are firm, lobular masses ranging in size from a few millimetres to several centimetres. They have a dense fibrous covering and usually grey with brown or yellow areas due to hemosiderin or lipid contained within the histiocytes. Microscopically, the tumors are characteristic; composed of small oval or spindle-shaped cells, multinucleated giant cells, lipid laden macrophages and irregularly placed connective tissue.

**Clinical features**

The tumor may occur at any age, usually during middle age. It presents as a painless nodular lump. The size may vary from a small nodule to a very large mass (Fig 3). While the tumor may occur at any site, it commonly occurs in relation to the proximal or distal digital joints. From here, the swelling gradually extends volarly or dorsally over or under the tendons and surrounding the neurovascular structures. Pressure erosion of bone may occur in long-standing cases.

**Treatment**

The tumor needs to be carefully excised under tourniquet control. Care must be taken to avoid injuring the digital nerve since it is often intimately associated with the tumor. The recurrence rate is high if even the minutest trace of discoloured tissue remains in the synovium. Surgical magnification lessens the likelihood of recurrence to approximately 5%. If local recurrence occurs, further local excision is indicated, for the lesion is a benign condition.
Epidermoid cyst

Epidermoid cysts, also known as inclusion cysts or implantation dermoids, are caused by the traumatic implantation of a fragment of skin into the subcutaneous tissue. The fragment of skin grows slowly, producing a cyst lined by squamous epithelium containing a creamy fluid with cholesterol crystals and keratin flakes. These cysts are common in persons whose hands are subjected to repeated minor trauma i.e. manual workers. When seen on the volar or grasping surface of the hand they may be fixed into position secondary to confinement by fascial planes. On the dorsum of the hand they are more round and freely movable. The cysts are round or ovoid with thick walls. As a rule, epidermoid cysts are painless, but they may cause discomfort by interfering with hand function.

Treatment is by simple excision though care must be taken to remove the entire epithelial sac because recurrence is possible.

Verruca Vulgaris

This most common benign skin tumor is caused by the human papovavirus - DNA virus. It is transmissible by direct contact and/or autoinoculation.

There different treatment modalities. The two most common are application of a topical irritant to elicit an amount of virospecific IgM and IgG response, e.g. Salicylic acid preparations and the second is surgical excision with total and complete excision of the wart. A third method is to shave the wart to the level of the surrounding epidermis, the entire wart can be cauterized and then curetted from the surrounding normal epidermis. Cryotherapy is a fourth method with or without prior shaving of the wart level to the dermis.

Lipoma

Although there is a moderate amount of fatty tissue in the hand, lipomas are relatively uncommon compared to other areas of the body. Lipoma of the hand has the characteristics of lipoma elsewhere in the body. Lipomas can cause significant problems. They may occur subcutaneously or deep to the fascia. Most lipomas are painless but they may compress nerves or cause mechanical problems due to their size, and may be cosmetically unacceptable.

Excision is the treatment. Although they can often easily be shelled out, simple surgical removal can sometimes be difficult, due to the tumor’s propensity to grow along the line of least resistance. They can extend in any plane for a considerable distance. Again a bloodless field and loupe magnification are important to prevent damage to important structures in the hand and to ensure complete removal of any remaining lipoma cells.

Fibroma

Fibroma may present as a firm nodular swelling. They can be simply excised.
Juvenile aponeurotic fibroma

A fibrous lesion occurs in the palms and soles. It consists of an ill-defined, highly cellular fibrous proliferation occurring in the subcutaneous tissue, deep fascia and sometimes muscle. Although locally invasive, these lesions are benign and therefore, should be treated by local excision preserving tendon and neurovascular function.

Nerve tumors

Nerve tumours in the hand are relatively rare. These tumours include neurilemmoma (Schwannoma), neurofibroma or the multiple neurofibromatosis of Von Recklinghausen's Disease.

The Schwannoma or neurilemmoma characteristically occurs in only one location in a peripheral nerve. The tumor is intra-neural but grows eccentrically. It can usually be shelled out without loss of nerve function.

The neurofibroma, however, grows in an interlacing fashion with the nerve fascicles. It is extremely difficult to dissect and excise without nerve damage. Even though there is a reported 15-30% chance of malignant degeneration in the
neurofibromas of Von Recklinghausen's disease, excision is warranted only if a particular lesion begins to grow, presents as a large tumour affecting hand function (Fig 4a & b) or otherwise change its behaviour.

**Glomus tumor**

This tumour arises from the glomus body, a neuro-myoarterial apparatus with its function in temperature regulation. The normal glomus is a tiny organ, less than one millimetre in diameter and usually found in the nail beds, finger pads and elsewhere in the hands and feet.

The majority of these tumours occur under the nail, but they may also be found in the distal part of the finger. They are made up of hypertrophied and disorganised elements of the normal glomus body.

Patients with a glomus tumor present with a triad

- pain
- tenderness
- cold sensitivity.

Pain is the first symptom to appear. It is described as sharp, stabbing, or burning and usually triggered by external pressure or cold. Careful physical exam will delineate one very tender spot. This is best done using the head of a pin or closed jeweller’s forceps. Physical examination may also show ridging of the nail. This is a pressure phenomenon and radiographs may show indentation of the distal phalanx, again from pressure. The tumor is more common in adults and multiple tumors in one fingertip have been reported. Rarely, the glomus tumor can present as an intraosseous lesion.

**Treatment** of this tumor is satisfying with a cure rate of 100% if completely removed. Surgical excision is done under tourniquet control with magnification. If the lesion is subungual the nail is removed and the nail matrix is incised longitudinally. The lesion can then be bluntly dissected from the nail matrix which is repaired with 6-0 or 7-0 absorbable sutures.

**Pyogenic granuloma**

This is usually a solitary polypoid capillary hemangioma often associated with trauma or local irritation, representing a vasoproliferative inflammatory response, found on the skin and gingival or oral mucosa. It presents as a small erythematous papule that enlarges and may become pedunculated and may become infected and ulcerate with accompanying purulent exudate.
The case above was secondary to an injury with a piece of wire. Treatment consists of excision followed by cauterization of the base.

**Hemangiomas**

Hemangiomas of the hand may range from the capillary telangiectasia to the extensive cavernous lesions (Fig 11). Gigantism of digits may also occur. Lesions may regress spontaneously and, therefore, treatment in infancy should be delayed.

**Haemangiomas can be classified into three groups:** (a) the cavernous hemangioma, (b) the capillary hemangioma, and (c) a mixture of cavernous and capillary hemangioma. They are thought to arise as embryonic rudiments of mesoderm tissue manifested as independently growing blood channels.

Haemangiomas are divided into involuting and non involuting tumours;

- All **involuting hemangiomas** seen at birth or found soon thereafter grow rapidly for approximately 6 months, begin to involute at around 1 year and generally disappear by age 7—9 years, the so-called ‘strawberry nevus’. The ratio of involuting to noninvoluting tumors is 4:1; therefore, knowledge of
the onset of appearance of the lesion is important in both diagnosis and prognosis.

- **Non involuting hemangiomas** (Fig 11) are seen in older individuals who present with complaints of pain, discomfort, or a feeling of fullness in the affected part. A mass is usually palpable. If a thrill is palpable or a bruit heard, the lesion is better classified as an arteriovenous fistula.

**Treatment** of hemangiomas varies with the age of onset.

- The tumors that occur early will **involute** and their prognosis is good. Occasionally, if the tumor is large, ulceration or bleeding may be a problem, but this can usually be treated conservatively with steroids. Oral propranolol is a new effective treatment. See chapter “Cutaneous Lesions.”
- For the **noninvoluting** lesions, except for the capillary haemangiomas (also known as the port wine stain), surgical excision is the treatment of choice. In the well-defined lesion, surgery will almost always be successful. If, however, the lesion is infiltrative, recurrence is common and a number of surgical procedures are often necessary for ablation. Complete surgical excision can be difficult but should be attempted if at all possible without risking damage to vital structures and therefore risking functional loss.

When patient presents with persistent pain with negative x-rays and CT and MRI are not available, exploration should be done. See figures 12 and 13.

**Arteriovenous (AV) Fistulas**

AV fistulas may be placed in two categories - acquired or congenital.

**Acquired AV fistulas** can be either surgical or traumatic in origin and will not be discussed here.

**Congenital AV fistulas** share a common etiology with hemangiomas. These are classified as primarily arterial, venous, capillary, or a combination.

**Treatment** of congenital AV fistulas is extremely difficult and not recommended in the district hospital unless very small.
The surgical options are: (a) excision of the fistula in stages, (b) ligation of feeder arteries and communicators and (c) amputation.

Surgery on these lesions, however, often promotes the lesion into a more active phase, making them quite aggressive locally. Nonsurgical options on these lesions include x-ray therapy or intra-arterial embolization.

Leiomyoma

This is a slow-growing, usually painless lump that occurs in the subcutaneous tissue. It is well encapsulated, firm to hard in consistency. They probably arise from vascular smooth muscle and can be easily excised.

Malignant soft-tissue tumors

Basal Cell Carcinoma (BCC)

These sun-related lesions are rarely found on the hand except in Caucasians with many years of chronic sun exposure. They are extremely rare in people with darkly pigmented skins but very common and often very problematic in people lightly pigmented skin and particularly in Albino’s. When present, it is usually located on the dorsum of the hand as an ulcer with raised pearly edges and an erythematous base. Treatment consists of excision with a margin of normal 2-3 mm of adjacent normal tissue as well as in depth. When located near the nail bed
it can be mistaken for a paronychia. Skin grafting is normally required in this location. When basal cell carcinoma involves the nail matrix, amputation at the DIP joint may be required to reach normal tissue margins.

**Squamous Cell Carcinoma (SCC)**

One of the most frequently encountered malignancies of the hand is SCC overall but fortunately as with the BCC, almost never seen in darkly pigmented skins except in long standing wounds with Marjolin's ulcer. It is sadly a significant problem in Albino patients. In a large percentage of cases, premalignant lesions such as solar keratosis have been present for a considerable period of time before the development of malignancy. SCC has the capacity to metastasize, usually through the regional lymphatics. SCC involving the nail matrix and perionychial area can be a difficult diagnostic problem. Biopsy-proven SCC in any area of the hand requires early wide excision with margins of 1-2 cm or more of normal tissue, depending on how well circumscribed the lesion is and the location on the hand. This may require amputation of one or more digits and metacarpals. Extensive involvement of recurrent or untreated tumours of long duration could require hand amputation.

![Fig 17](image17.png)

Marjolin's ulcer—SCC in old burn

Any unusual tumor as the superficial Marjolin’s ulcer above should be biopsied.

**Malignant Melanoma**

Again, these are uncommon in the darkly pigmented skin people groups except for the acral lentiginous type.

Four types of malignant melanoma are distinguished.

![Fig 18](image18.png)
Subungual Melanoma
(Courtesy www.dermpathmd.com)

♦ The **lentigo maligna** or melanotic freckle of Hutchinson is small lesions. They may be tan, black or brown in colour and flat with an irregular border. They are slow growing lesions.

♦ **Superficial spreading** come in a variety of colours varying from tan to black with combinations of blue or red. Occasionally, these melanomas become depigmented and will appear as white lesions.

♦ **Nodular melanomas** usually present as a raised darkly pigmented lesion

♦ **Acral lentiginous melanoma** is a melanoma that appears on the palms of the hands, soles of the feet, subungual areas of the fingers and toes, and web spaces. The **subungual melanoma** (Fig 6) usually occurs as a dark lesion under the nail, usually on the thumb. Care must be taken in making the diagnosis of subungual melanoma and a thorough history is needed to differentiate from post-traumatic nail bed changes. The importance of the subungual melanoma is that it is often erroneously believed to be a fungal infection, and its proper treatment may be delayed because of a delay in its diagnosis by biopsy. This type of melanoma has the lowest 5-year survival rates of all these variants, generally found to be in the range of 10% to 20%. These tumors spread aggressively and have a high incidence of local and regional recurrences. Therefore, they are best treated by aggressive resection.

**Treatment**

For the surgeon in a district hospital, obtaining accurate pathological diagnosis may not be possible. Tumor levels may be difficult or impossible to determine. The different types of melanoma are listed below for those who occasionally see a light skin person. Mostly you will see acral lentiginous melanoma and these need amputation or wide excision.

The evaluation of a patient with suspected melanoma should include a thorough physical examination, chest x-ray, and routine laboratory studies. Precautions must be taken if a biopsy is done; where possible, excisional biopsy should be the choice. The operative treatment of malignant melanoma is determined by the type of melanoma, the Breslow thickness, and the stage. (Breslow thickness is the standard now and not Clark’s levels.)

♦ All melanomas, regardless of the histological subtype, are treated the same now. The margins should be one cm for Breslow thickness of .75mm or less and two cm for lesions > .75mm thickness.

♦ Since most do not have the capability of getting Breslow thickness determinations, one should resect all melanomas with 2 cm. margin.

♦ Elective lymph node dissection is not indicated in any patient since long term studies show no improvement in mortality.
If histopathology is available and sentinel node biopsies are possible for melanomas with a Breslow thickness of > .75 and ulcerated lesions, then if the biopsy is positive and there are no other distant metastasis, lymph node dissection could be carried out.

Subungual melanomas will require an amputation with a 1 cm. margin

Acral lentiginous melanomas should be excised using the same guidelines as above—1 cm. for Breslow thickness< .75mm and 2cm. for Breslow thickness > .75mm. Practically a 2 cm. margin should be used in most of our hospitals.

There are times that the author would consider wider resections in district hospitals when no other form of treatment is possible and when there are other findings as satellite lesions.

Other treatment modalities as isolated perfusion of the extremity with chemotherapeutic agents and immunotherapy are not possible in most locations.

Fig 19
Acral lentiginous melanoma

Sarcomas

All histogenic types of soft-tissue sarcomas may occur in the hand. They are, however, uncommon when compared to the more proximal part of the upper extremity and appear less aggressive in their course.

Synovial Sarcoma

Synovial sarcomas are reported to be the most common malignant neoplasm of mesodermal tissue in the hand. This sarcoma arises from synovial tissues; the joint capsules, bursa, or tendon sheaths. It presents as a small, soft, fixed lesion usually misdiagnosed as a ganglion. In contrast to other sarcomas, the lesion is usually not painful and has a slow growth rate. The synovial sarcoma has significantly higher incidence of metastasis to regional lymph nodes than other soft-tissue sarcomas. Treatment of synovial sarcoma is by wide local excision with adjuvant chemotherapy.

Epitheloid Sarcoma

The epitheloid usually presents in the superficial subcutaneous tissue as a painless raised nodule. The nodule may progress to ulceration leading the
surgeon to the diagnosis of an infected wart, chronic ulceration, or foreign body granuloma. When the tumor originates deeper in the hand it may appear as nodular fasciitis or tenosynovitis.

The tumor spreads along tendon sheaths in the subcutaneous lymphatics or along fascial planes. When vascular invasion is found in epitheloid sarcoma there is extremely poor prognosis and amputation is recommended as early as possible. The regional lymph nodes should be dissected. If recurrence occurs a forearm amputation must be done.

**Malignant Fibrohistiocytoma**

The malignant fibrohistiocytoma presents as a painless mass of less than 6 months' duration. This tumor is believed to be of histiocytic origin. The treatment of malignant fibrohistiocytoma is by radical local excision. In the absence of metastasis there is good prognosis if the tumor is controlled locally. Adjuvant therapy should be considered where the tumor involves skeletal muscle because the metastatic rate is over 40% regardless of the surgical procedure carried out.

![Fig 20 Malignant fibrohistiocytoma](image1)

![Fig 21 Lipofibromatosis hamartoma--benign](image2)

The two conditions above look similar. The malignant fibrohistiocytoma in Figure 8 is a malignant condition and was seen in an older patient. The hamartoma in Figure 9 is a benign lipofibromatosis condition seen in a child.

**Desmoid Tumor**

By the nature of their locally aggressive behaviour desmoids are sometimes referred to as low-grade fibrosarcomas. They are rare tumours and their treatment can be very frustrating as they frequently recurrence after excision because of the difficulty in recognizing clear tumor margins. Most recurrences are at the site of excision and, frequently, amputation must be done to prevent further spread.

**Benign Bone Tumors of the Hand**

**Chondroma (Enchondroma)**
Chondromas are the most common bone tumor in the hand. The majority of chondromas are solitary lesions, but multiple chondromas may occur, as in Ollier’s disease and Maffucci’s syndrome. The proximal phalanx and metacarpal are the usual sites. Chondromas may be discovered incidentally during investigation for some other purpose or they may present as smooth, hard, painless lumps or as pathological fractures (most common presentation). The solitary lesion presents a typical radiographic appearance - a radiolucent area is present in the shaft with thinning and expansion of the cortex. Irregular calcification occurs in the central portion of the lesion. Less commonly, the chondroma may be situated eccentrically, forming a mass called enchondroma.

♦ **Treatment**

Asymptomatic chondromas can be watched. Symptomatic chondromas can be curetted and bone grafted. A dorsal approach is used, the extensor tendon split or retracted to one side, a window made in the bone and the lesion thoroughly curetted. In the fingers cancellous bone graft from the distal radius is packed into the cavity. If there are large defects, then the iliac crest maybe used for cancellous bone grafts.

![Multiple enchondromas—Ollier’s disease](image)

**Osteochondroma**

These are aberrant cartilage areas that produce a bony mass. They are relatively uncommon in the hand. If troublesome, these lesions can be excised.

**Osteoid osteoma**

This uncommon tumor may occur in any bone of the hand, the terminal phalanx being a favoured site. The clinical presentation is typical - intense local pain often relieved by aspirin. Local swelling with tenderness and increased sweating may be present. Radiographs reveal a typical round lucency containing a dense sclerotic central nidus and surrounded by sclerotic bone. A bone scan is often diagnostic if available. The osteoid osteoma shows up as an intense hot spot on bone scan.

♦ **Treatment**
Osteoid osteoma may undergo spontaneous resolution. Indomethacin can help with pain relief if the patient wants to try to avoid surgery. Surgical excision achieves dramatic relief provided the nidus has been removed. A dental drill is helpful in making a window in the affected bone and care must be exercised in identifying and excising the nidus.

Aneurysmal bone cyst

This is very rare in the hand. The lesion may resemble a chondroma. Treatment consists of curettage and bone graft.

Giant cell tumour of bone

Giant cell tumour of bone may occur in the metacarpals of the hand. The lesion arises in the epiphyseal area, causing an expansile radiolucent area. Clinically, the patients present with pain and swelling and sometimes a pathological fracture. Treatment is by curettage and bone graft. The clinical behaviour resembles that of other giant cell tumors of long bones.

Carpometacarpal bossing (carpal boss):

This is a firm bony mass on the dorsum of the bases of the second and third metacarpals. It is best seen when the wrist is volar flexed. The carpal boss may be confused with the more common wrist ganglion, especially since it may also be associated with a small ganglion. If symptoms are persistent the boss may need to be excised—ostectomy.

Malignant Bone Tumours of the Hand

Primary malignant bone tumours of the hand are very rare. The diagnosis is made by incisional biopsy. When the diagnosis is confirmed, ablation of the tumor with tumor-free margins should be the goal of surgery. Reconstruction is usually performed at the time of excision or it may be delayed. The same surgical staging of malignant bone tumours as used for musculoskeletal sarcomas can be used to decide on the proper procedure. Combined treatment of radical surgery and adjuvant chemotherapy is used if available.

Osteogenic Sarcoma

Osteogenic sarcoma of the hand is extremely rare. It presents as a progressively painful mass occurring most commonly in the first and second decades. The radiographic appearance is typical for osteogenic sarcoma with an expansile sclerotic destructive bony lesion.

Chondrosarcoma

Chondrosarcoma presents the majority of time in patients that are over 40 years of age. In the hand it is extremely rare. However, if seen the most common
location is the proximal phalanx. On x-ray, it appears as a radiolucent area with cortical destruction in the margins.

**Ewing's Sarcoma**

Ewing's sarcoma occurs in the first decade of life and is a very rare malignancy in the hand. It may present as an inflammatory process with erythema, swelling, and pain. Radiographically, it is seen as a destructive lytic lesion.

**Metastatic Tumours of the Hand**

The most common tumours that metastasize to the skeleton of the hand are from the lung, breast, or kidney. The distal phalanx is the most common site. The hand is involved with metastases 0.1 % of the time. Occasionally, biopsy will identify the primary lesion. Metastatic disease in the hand is an extremely poor prognostic sign. The vast majority of patients are dead from the primary disease within 1 year of the diagnosis. As such, limited amputation is indicated for hygiene and pain management.

**Macrodactyly**

This is not a typical tumor. It is also discussed in the congenital hand chapter

**Classification of Macrodactyly or Gigantism**

- Group I. Gigantism associated with lipofibromatosis
- Group II. Neurofibromatosis with fat and fibrous tissue found in peripheral nerves
- Group III. Hyperostosis
- Group IV. Hemi hypertrophy

**Lipofibromatosis**

Macrodactyly (lipofibromatosis) is a hamartomatous enlargement of soft tissue and underlying bone. It can be static or can grow commensurately with the hand and or foot, or progressive, growing faster than the rest of the limb.

Some authors believe that the digital nerves cause the disproportionate growth, the so-called "nerve territory-oriented macrodactyly" of the finger. Enlargement more commonly follow the distribution of the median nerve than that of ulnar nerve of the affected digits. (Fig 7)

There can be an association with Wilm's tumor, adrenal carcinoma, and hepatoblastoma.

Macrodactyly simplex congenita is seen in 10% of cases. The enlargement includes skin, subcutaneous tissue, nerve, joint, and bone (tendons and blood
vessels are of normal size) and most often phalanges are involved and metacarpals are spared.

Fig 23
Macrodactyly of the middle and ring fingers

Fig 24

Fig 25
Macrodactyly of the index and middle fingers

Fig 26
Macrodactyly both hands in young girl: Treated with amputation as primary procedure

Fig 27
Macrodactyly of the first and second toe with syndactyly

Lipofibromatosis hamartoma

Treatment (also see in Congenital Hand chapter—the editor suggests amputation in most cases. The debulking principles below are useful but require knowledge of hand anatomy and hand surgery experience. Even with debulking, most cases come to amputation as a secondary procedure. It is realized that in many cultures amputation of a finger will be poorly accepted. It will take time for the families to accept amputation of a finger or fingers. Fortunately, this is not a life threatening condition and the surgeon can wait until the family accepts the amputation. Ideally the surgeon attempts to save a thumb but practically, it may be best to amputate and perform a pollicization of the index or long finger if available.)

If a debulking procedure on a thumb is planned, then the editor would advise the surgeon to look for the procedure in major hand or pediatric surgery texts.

Neurofibromatosis
**Neurofibromatosis**

Minimal hand and forearm deformities should not affect existing hand function. Extensive arm, forearm, and hand lesions can be debulked for functional reasons with predictable outcomes.

**Hemihypertrophy**

Patients with hemihypertrophy are difficult to treat. As long as the hand is functional and all joints are passively mobile, no surgery is recommended.

Every case must be carefully individualized as hands with hemihypertrophy represent there is a wide range of hand abnormalities. Most of these hands have surprisingly good function despite the deformities caused by the hypertrophic and contracted muscle groups that result in various flexion contractures of the forearm and hand and ulnar deviation of the digits. Surgical decisions are dictated by functional and aesthetic needs.