

Ian A. Trail
Andrew N. M. Fleming
Editors

Disorders of the Hand

Volume 4:
Swelling, Tumours,
Congenital Hand Defects
and Surgical Techniques

 Springer

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Preface

In recent years there have been significant advances in the understanding and treatment of disorders of the hand and wrist. This has resulted in a significant improvement in the quality of life for many patients. The authors who have produced this text were chosen as they are hand surgeons who have led many of these exciting developments in the management of both elective and trauma hand surgery. All are internationally respected.

The topics covered are well illustrated with images, radiographs and line drawings and provide practical guidance on surgical procedures. The references at the end of each chapter have been chosen as they are either classic papers or are the most relevant to modern surgical management.

Thus we hope that we have produced a book that will enable improved care for current patients with hand and wrist complaints and inspire surgeons to think in greater detail about treatment options that will provide even better care in the future.

Finally, we would like to thank all the contributors as well as Diane Allmark for her help, but also our families for their patience and support.

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We are also particularly grateful to Springer for allowing us to pursue this project and would like to especially thank Rachel Glassberg for all her helpful advice and prompting.

Finally we would like to thank our secretaries, particularly Diane Allmark, and respective families who, for longer than we dare think, have put up with us reading and re-reading manuscripts on what they think is only a small part of the body!

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Part I

Swelling and Tumours

Joseph Dias

Keywords

Pathology • Diagnosis • Dorsal wrist ganglion • Aspiration • Excision • Recurrence • Palmar ganglion • Complications

Introduction

A ganglion is a peculiar disorder, which presents principally with a swelling of the wrist or finger. It is so common that many are treated with good advice and reassurance and in the United Kingdom around half the patients who present in orthopaedic or hand clinics with this condition no longer undergo surgery.

Incidence

A ganglion cyst accounts for between 50 and 70 % of soft tissue hand swellings and is the second most common elective disorder presenting within the United Kingdom with an incidence rate of between 44 and 50 per 100,000 per year. This accounts for over 25,000 cases each year. It occurs predominantly in women in the third and fourth decades of life.

Distribution

In an audit of ganglia, conducted in the Trent region of the United Kingdom, 858 consecutive cases presenting to hand clinics were included. Forty six per cent of these affected the dorsum of the wrist, 28 % affected the palmar aspect of the wrist, 15 % were related to the sheath of the flexor tendon near the head of the metacarpal and 4 % were mucous cysts at the base of the nail in one of the fingers. The remaining ganglia had miscellaneous locations either in the palm or on the ulnar side of the wrist. Occasionally ganglia also appeared on the front of the finger or extended to the dorsum of the middle phalanx. This however was very uncommon. This distribution is similar to other reports [1].

Clinical Pearl

Typically present in females in the third and fourth decades of life.

Appearance is the predominant presenting complaint

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Pathology

Although the aetiology is not clearly defined the pathology is well known. A ganglion arises from collagenous tissue from either a ligament, capsule or tendon sheath. The ganglion itself has a wall and a stalk and contains clear mucinous fluid of jelly like consistency. It presents as a small well-defined hemispherical lump. This lump illuminates when light is shone through it.

The wall of the ganglion is made up of compressed collagen with sparse flat cells without any epithelial or synovial cells lining its surface [2]. The wall is created by the compression of stromal tissue and the cyst contains jelly. The jelly itself is usually clear unless there has been previous bleeding into the ganglion as a result of trauma; this would include a failed needle aspiration. The jelly itself is mucinous and contains glucosamine, mucin, hyaluronic acid with albumin and globulin. The consistency of the jelly is varied. The cyst usually has a stalk and this leads to a collagenous structure which is either a sheath, ligament or capsule. In the vicinity of the attachment of the stalk changes within the underlying structure may be present with clefts containing mucin [3]. There may be daughter ganglion cysts, which are much smaller than the main ganglion and which surround the attachment of the stalk.

Aetiology

The exact cause of a ganglion cyst has not been properly established. Over the years, various theories have been proposed. It has been suggested that a ganglion is a herniation from within the joint or is due to degeneration in the joint [4]. As far back as 1893, they were considered to be a cyst [5] caused by mucoïd degeneration (Fig. 1.1).

A ganglion may be caused by mucoïd degeneration [5] with cells somehow triggered to form the ganglion content. Fibrillation of collagen, mucin lakes within clefts, absence of synovial cells lining the ganglion cyst and that only 50 % communicate with the joint are all factors that support this hypothesis. The factors against

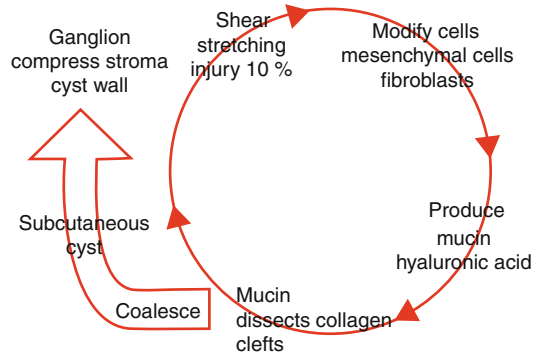


Fig. 1.1 Pathophysiology as described by Carp and Stout, 1928

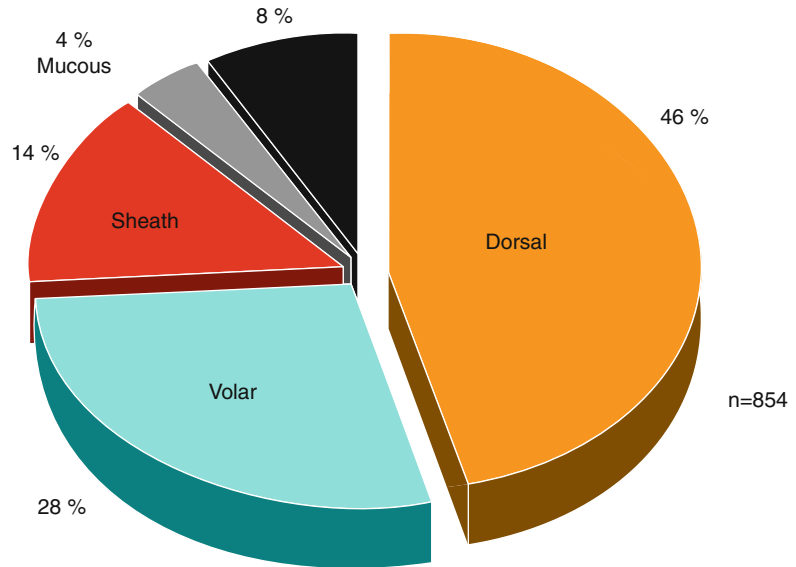
mucoïd degeneration include that it is usually a self-limiting disorder, ganglia are usually solitary and they can occur in young adults, including children, who may also get a recurrence after intervention.

In most cases the onset is spontaneous but in some 10 % of cases the onset of a ganglion may be triggered by an injury. There is probably excessive shear between planes of a collagenous structure in some patients, particularly those with joint laxity. This may initiate metaplasia of cells in the collagenous structure and the fibroblasts and mesenchymal cells start producing more hyaluronic acid and mucin. As this substance is produced and extruded from the cell it dissects neighbouring collagen and causes clefts within which this jelly-like material accumulates. These clefts then coalesce. The jelly like material compresses the surrounding stroma forming a cyst wall, thereby forming a small ganglion [2]. This ganglion grows in size and may herniate out of the capsule and come to lie in the subcutaneous tissue.

Clinical Presentation

The typical patient with a ganglion is a young female in her 30s or 40s. Westbrook et al. [6] explored the reasons why patients presented to hospital. They found that around 40 % presented because they did not like the appearance of the swelling, whereas 28 % thought it was sinister. A quarter had some discomfort related to the gan-

Fig. 1.2 Types of ganglia in the wrist and hand and their distribution. The distribution of wrist and hand ganglia is shown. Mucous cysts of the terminal phalanx account for the least and dorsal wrist ganglia are the most common. The *black pie* represent 8 % of miscellaneous ganglia. These formed the basis of two reports [1, 2]



gion while only 8 % presented with either altered sensation or a significant impact upon their ability to perform tasks. It is important to be aware of the reasons why patients present with a ganglion as very often all they need is reassurance.

The patients usually present with a spontaneous onset swelling either over the wrist or at the base of a finger (Figs. 1.2 and 1.3). The swelling then slowly grows in size. The size of the swelling fluctuates over time. Patients often say that the swelling can increase after a spell of increased activity. The swelling, when it is large, can cause a clear cosmetic blemish. Women, especially when they are young, do not like the appearance as it makes their wrist and hand stand out and look abnormal.

Although patients do not spontaneously complain of weakness, they do admit to it when asked. There is usually a feeling of weakness, particularly when the ganglion is large, and just before the ganglion appears. This weakness changes depending upon the patients' level of activity. Some patients, when asked, also complain of a feeling of stiffness in the involved joint. One in four patients described experiencing discomfort and pain, usually preceding the appearance of the ganglion. The pain is mild and aching in character without any obvious exacerbating or relieving factors. This pain is eased when the ganglion shrinks in size.



Fig. 1.3 Finger ganglion presenting on the dorsal surface. This is an uncommon site for a finger ganglion. It can often arise from the A4 pulley at its side but herniate through the fascia to present on the dorsum of the digit. It transilluminates thereby confirming the diagnosis in most cases

Dorsal Wrist Ganglion

Presentation

A typical patient who presents with dorsal wrist ganglion is usually female in the second, third or fourth decades of life. In the audit of dorsal wrist ganglia, conducted in the Trent region, women outnumbered men four to one.

Patients usually say that the swelling becomes more prominent when the wrist is palmar flexed. The swelling is just distal to Lister's tubercle and is hemispherical in shape without any inflammatory signs around it. It can often feel quite tense. The lump is, however, rarely tender or associated with any restriction of wrist movement. Often the patient has generalised joint laxity assessed by the Beighton's score [7]. Trans-illumination of the ganglion with a light source will result in the cyst "lighting up". Otherwise, whilst patients may have joint laxity, it is unusual for them to have definitive scapholunate instability.

Further investigations are generally not needed. If, however, the wrist is stiff when compared to the contralateral side, then obtaining a radiograph of the wrist is important to ensure that there is not a more generalised disorder, such as an arthritic wrist.

A diffuse non-hemispherical swelling, located only on the dorsum of the wrist usually suggests teno-synovitis of the common extensor synovial sheath. When examined this swelling can be made to fluctuate across the extensor retinaculum. It may also trans-illuminate and therefore it could be confused with a dorsal wrist ganglion. Another swelling that is often hemispherical, soft and may trans-illuminate is a lipoma. This however tends to be much more mobile in two planes and its consistency is softer. A diffuse swelling on the radial side of the wrist can also be related to degenerative arthritis of the radio scaphoid joint but this can be usually identified due to the restriction of wrist movement compared to the opposite side. A ganglion of the wrist should not be confused with DeQuervain's tenosynovitis or peritendinitis crepitans. Another disorder that can be confused with a ganglion is a bony carpal boss [8, 9] which lies at the base of the index or middle finger metacarpals. This too, presents as a swelling on the back of the wrist, although it is usually distal from the usual location of a ganglion. There may, however, be an overlying ganglion cyst arising from the bony protuberance. Generally, however, the consistency of the swelling is hard. Circumduction may demonstrate the tendons snapping over this lump.

A ganglion may occasionally not trans-illuminate, particularly when there has been bleeding into the sack. If the swelling does not trans-illuminate therefore, further investigation is important.

Any ganglion can be clearly seen on an ultrasound scan [10] or on a magnetic resonance image [11]. On the ultrasound the appearance is of a discrete well defined hypoechoic area. On the MRI scan the appearances of a discrete well defined dark area on T1 scan which lights up and is white on a T2 scan.

Treatment

Once the diagnosis has been established, then the treatment options can be discussed with the patient. These treatment options include reassurance, aspiration or surgery to excise the ganglion. Often once patients are told that they have a ganglion and that it is not sinister, they are happy to live with the symptoms and just be reviewed after an interval to ensure that they do not have any other significant disability. If, however, pain or appearance is of significant concern, then the surgeon may consider intervention, either aspiration with or without the injection of chemical substances or alternatively surgical excision.

Clinical Pearl

Differential diagnosis;

DeQuervain's tenosynovitis

Peri-tendinitis crepitans

Lipoma

Osteoarthritis of the radio-carpal joint

Carpal bossing

Recurrence rate after aspiration, approximately 60 %.

Recurrence rate after surgery between 35 and 40 %

Aspiration (Fig. 1.4)

The aspiration of the dorsal wrist ganglion is undertaken using a wide bore needle. Very often, no local anaesthetic is required. A quick stab into

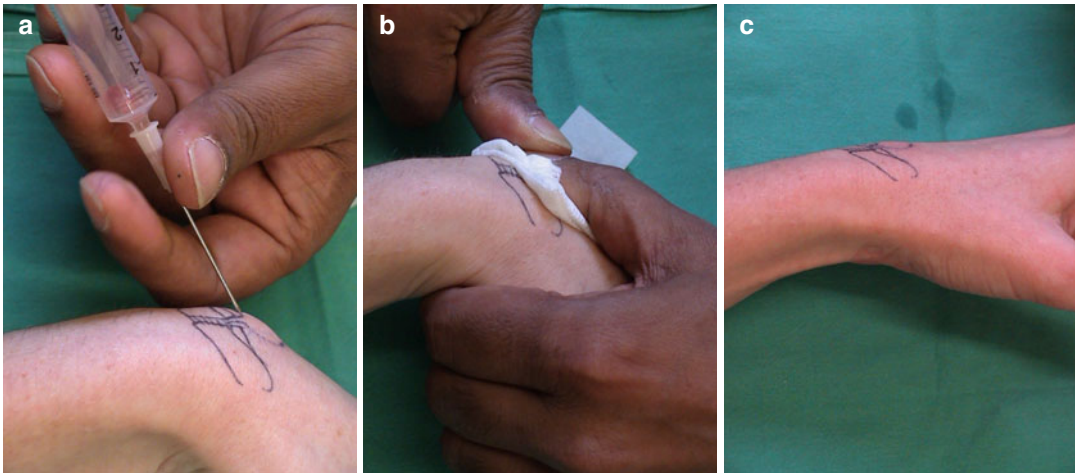


Fig. 1.4 Aspiration of the dorsal wrist ganglion. A dorsal wrist ganglion being aspirated (a) dispersed after multiple punctures (b) and showing the ganglion disappeared. (c)

We usually maintain pressure with a pressured pad and a crepe bandage for the first day

the ganglion and aspiration will draw out the jelly from the ganglion collapsing the swelling. The ganglion disappears immediately. It is possible to do multiple perforations of the ganglion wall by perforating it with the needle and then compressing it firmly using gauze over the perforation site. The pressure should be maintained for a period of a few minutes. The principle here is to cause the ganglion walls to collapse and hopefully with sustained pressure obliterate the space.

Rarely substances have been injected into the ganglion cyst. These include the instillation of steroid. However, studies have not demonstrated any better outcome when steroid has been injected into the ganglion [12]. Hyaluronidase has also been used [13, 14]. There is certainly no established benefit in aspirating recurrent ganglia [15].

After aspiration a third of ganglia reappear within 2 weeks. Another third reappear within 6 months and 15 % each would reappear between 6 months and a year and after a year.

Excision of a Dorsal Wrist Ganglion

The alternative intervention is excision of the ganglion cyst. This can be done either openly through a cut on the dorsum of the wrist or alternatively arthroscopically. The excision can either be a simple excision of the swelling alone or

include identification of the stalk and tracing the stalk back to its origin.

Surgical excision is straightforward and is conducted either through a zigzag longitudinal incision or a transverse incision centred over the swelling itself. Any large veins are diathermised. The walls of the ganglion are then carefully defined. The tendons are moved away from the ganglion. Which tendons need to be moved depends upon the position of the ganglion. It is usual, however, for the ganglion to lie between the third and fourth extensor compartments.

The ganglion is carefully dissected off the capsule and then an arthrotomy is undertaken to identify the stalk of the ganglion. This usually arises from the dorsal scapholunate ligament and often there are daughter ganglion cysts surrounding its attachment, which need to be scraped off the ligament. Care must be taken that the ligament itself is not excised or divided [16]. Usually a rongeur or acurette will help dissect the stalk from the dorsal scapholunate ligament. Haemostasis is then obtained. The capsule does not need to be formally closed. The skin is closed using absorbable sutures and steri-strips. At the end of the surgery local anaesthetic is infiltrated into the wound around the scapholunate ligament and in the subcutaneous tissue. The wrist and hand is wrapped in a bulky wool and crêpe

bandage. For a couple of hours after surgery the wrist and hand is elevated in a Bradford sling. The patient is encouraged to use the hand from the very outset.

Immediate after-care includes instructing the patient to use the hand without restrictions. We prefer to retain the bandages for about a week.

If the patient is very lax jointed with a high Beighton score, we often advise them to use a Futuro splint for the first 3–4 weeks to restrict wrist movement in the initial post-surgical period, in the hope that this may promote some stiffness and reduce movement at the scapholunate interval. We hope that this may decrease recurrence. However, this hypothesis has not been proven.

Arthroscopic Excision of a Dorsal Wrist Ganglion

This ganglion may be excised arthroscopically [17]. Generally authors recommend excision of the ganglion stalk as well as the intra-articular part of the cyst. Other authors [18] have recommended the excision of 1 cm of the dorsal capsule at the same time.

In 2001, Nishikawa et al. [19] described the technique of arthroscopic diagnosis and treatment of dorsal wrist ganglion in 37 patients with a mean follow-up of 20 months and without any complications. They approached this through two arthroscopic portals into the radiocarpal joint using a 2.7 mm arthroscope introduced between the first and second extensor compartment and a probe introduced into the wrist joint from the ulnar side between the fourth and fifth extensor compartments. The radial portal does risk damaging the superficial branches of the radial nerve.

Using an arthroscopic shaver the area over the scapholunate ligament was debrided and a 1 cm diameter section of the dorsal capsule resected, even if the ganglion itself could not be clearly identified. No attempt was made to remove the ganglion sac in the superficial layers. In some ganglia the stalk was clearly seen, in others the stalk ballooned into the wrist joint with external compression but in others the stalk could not be identified. It is, however, some times difficult to identify the stalk [20]. As a consequence, other authors [21] have suggested injecting colour dye

into the ganglion to improve visualisation. Others have used intraoperative ultrasonography [22] to aid with identification of ganglion.

In the same study [20] the authors have recommended that the mid carpal joint should be explored routinely, as this was required to completely excise any dorsal wrist ganglion.

Others have noted a high prevalence of TFCC degenerative changes when a ganglia is present [23].

Generally, the rate of recurrence following arthroscopic excision of ganglia is extremely low [20, 24, 25]. The exact reason for this, when compared to open excision, remains unclear. A prospective randomised comparison between arthroscopic and open dorsal ligament excision, found no difference between the recurrence rate at 12 months [25].

Persistence and Recurrence

Regardless of treatment a ganglion may either persist or recur. The symptoms of pain, weakness and stiffness can persist after all interventions including reassurance, aspiration or surgery. Patients can also continue to regard their ganglion as unsightly.

Results

Reassurance

If the ganglion is left untreated then almost 40 % will disappear spontaneously.

In 1954, McEvedy [26] reported the outcome of 21 dorsal wrist ganglia which did not have any surgery. These were reviewed at 10 years and 41 % had resolved spontaneously with no intervention. In one report [27] 40/101 ganglia treated with reassurance disappeared when assessed at a mean of 6 years after presentation. The rate of spontaneous resolution in children is much greater with 22/28 (76 %) ganglia disappearing [28]. In another study [29] 55 dorsal wrist ganglia were treated without surgery at 6 years. It was noted that 23 had resolved spontaneously. It therefore appears that, when patients

are reassured, that two out of every five dorsal wrist ganglia disappear without treatment in adults and this rate increases to three out of every four in children.

Of the ones that disappear it is very uncommon for this to happen early. We found that 56 % disappear within 6 months, 19 % between 6 months and a year and 13 % take over 1 year to disappear. As a consequence, most that will disappear spontaneously do so within 1 year.

The remaining 60 % which persist behave in two ways. Either they increase and decrease in size, or they remain unchanged merely changing somewhat in size. Thirty eight per cent of the ganglia that persist when nothing is done change size in an episodic fashion usually becoming smaller while 50 % are always present.

Clinical Pearl

Approximately 40 % of ganglions disappear spontaneously.

In children, 75 % of ganglions disappear spontaneously.

After reassurance, 7 % continue to feel that their lump is unsightly and around a quarter of patients, regardless of intervention, will continue to complain of some discomfort in the dorsum of the wrist and hand.

Aspiration

The recurrence rate is 61 % with aspiration [29]. After aspiration alone McEvedy [26] reported on 43 dorsal wrist ganglia at 10 years and noted an 18 % recurrence rate. Nelson et al. [30] reported a 40 % recurrence rate after aspiration with or without injection of steroids and or hyaluronidase. Dias et al. [29] reported 61 % recurrence after aspiration alone, regardless of whether substances were injected in addition.

Excision

The recurrence rate is 36 % after surgery [29]. The recurrence rate after surgery has been reported extensively in the literature over a long period of time [26, 27, 29–31]. McEvedy [26] did a 10-year follow-up of patients who had a dorsal

wrist ganglion excised and found that 40 % of these recurred. Zachariae and Vibe-Hansen [27] reported 29 % recurrence rate, following open surgery, undertaken by experienced surgeons compared to 37 % when done by inexperienced surgeons. A more recent study documented a recurrence rate of 36 % at 6 years [29].

Studies have demonstrated that ganglia that do reappear after surgery do so within 6 months, with half appearing within 6 months and another 20 % appearing between 6 months and a year. Only one third of ganglia reappear after a year.

The patterns of recurrence after intervention is that 57 % recur slowly, only 5 % recur suddenly after a single identifiable episode of trauma and 38 % recur suddenly but without injury.

Symptoms After Intervention

Regardless of treatment the number of patients complaining of pain, weakness, stiffness and concern about the appearance all decreased over 6 years. More patients complained of weakness after surgery, than after aspiration or reassurance. In the audit conducted in the Trent region 60 % of patients with a dorsal wrist ganglion complained of pain, 34 % of a feeling of weakness and 15 % felt it was significant. Eighteen per cent complained of some weakness and 12 % said that the wrist felt stiff.

Disability assessed by the Patient Evaluation Measure after intervention was similar at 19 % where zero represents no disability, after surgery, 15 % after aspiration and 15 % after reassurance alone [29].

Satisfaction With Treatment

The surgical group had higher satisfaction [29] but also had a higher incidence of residual symptoms. As the study was not a prospective randomised study it is difficult to know whether there was selection bias, which may explain this.

It is of note that, even if the ganglion recurs, patients are more satisfied after a surgical excision with 88 % being satisfied with the outcome of the intervention, 80 % are satisfied after aspiration and only 46 % are satisfied when they are merely reassured. This reflects the expectations patients have when they attend a surgical clinic.

There was no difference between men and women on the degree of satisfaction expressed. As expected, recurrence after intervention was associated with more dissatisfaction with 32 % of patients who had a recurrence after treatment expressing dissatisfaction while 17 % of those who did not have a recurrence expressed dissatisfaction with treatment [29].

Complications

We identified an 8 % complication rate. These were usually related to the wound with very few nerve injuries. There were 3 % complications after aspiration but these were minor and short lived. If steroids are used then patients run the risks of lipoatrophy, telangiectasis and depigmentation if the steroid leaks into superficial tissues.

It is clear that one in five patients regardless of intervention will continue to have some pain and weakness at 5 years, although the rate improves over this period of time. More patients who are merely reassured continue to remain concerned about the appearance of the hand. If surgery is done then 8 % have some complication, usually minor. Particular care needs to be taken not to damage the dorsal divisions of the superficial radial nerve.

Prior to treatment, we advise patients of the pros and cons of the different interventions and, in particular that the symptoms of pain, stiffness and weakness may be related to whatever is causing the ganglion rather than to the ganglion itself. We also warn our patients of the recurrence after intervention, but reassure them that the lump is not sinister.

Occult Wrist Ganglion

Occasionally patients, usually young women, present with pain on the dorsum of the wrist without an obvious cause. The possibility of an occult dorsal wrist ganglia needs to be considered. These are easily investigated either using an ultrasound or MRI scan [32–36]. Depending upon the level of symptoms patients may need

open or arthroscopic excision of the ganglion or an ultrasound guided aspiration.

In a retrospective review, Steinberg et al. [37] reported that 18 out of 21 patients having surgical exploration for dorsal wrist pain with normal radiographs had an occult scapholunate wrist ganglion and all were improved after surgery.

It must be noted, however, that occult ganglia may be asymptomatic and more are related to the palmar scapholunate ligament than the dorsal scapholunate ligament. Lowden et al. [38] reported 53/103 asymptomatic wrist ganglia picked up on MRI scans of the wrists of asymptomatic volunteers, only 14 % of which were dorsal.

Palmar Wrist Ganglia

A palmar wrist ganglion is the second most common ganglion around the wrist and hand. It accounts for between 23 % [30] and 38 % of wrist ganglia.

Presentation

These present with a swelling sometimes associated with pain in the front of the wrist usually on the radial side and usually proximal to the scaphoid tuberosity. Two thirds of these ganglia arise from the palmar aspect of the scapholunate joint and one third from the scaphotrapezium joint. Patients can complain that the wrist feels a bit weak. Like a dorsal wrist ganglion, these are more common in women.

The ganglion cyst usually lies between the radial artery, which can be palpated on the radial aspect of the ganglion and the flexor carpi radialis tendon, which lies on its ulnar side. The history and examination findings are similar to those described for the dorsal wrist ganglion.

Reassurance

After reassurance alone of 38 patients with a palmar wrist ganglia, who were followed up for 6 years, 47 % had a persistent ganglion. That is

exactly similar to the rate of persistent ganglia after aspiration [39].

The feeling of weakness was similar between those that had their ganglion excised, aspirated or those patients who were merely reassured; this did not alter over 6 years.

Aspiration

Just as for dorsal wrist ganglia injection of steroid after aspiration does not alter the outcome.

The recurrence rate after aspiration with or without injection of steroids or other substances has been reported to be between 25 % in 67 % [15] per annum. The complications are very low but include discomfort from a while which occurs in about 5 % of those aspirated.

Excision

The surgical excision of a palmar wrist ganglion is conducted through a zigzag or longitudinal incision over the flexor carpi radialis extended distally towards the radial aspect of the base of the thumb. This is the usual approach to the palmar aspect of the wrist. The flexor carpi radialis is reflected ulnarwards. The radial artery and its distal superficial division are identified and protected. The ganglion is then carefully dissected. Usually it runs through an interval between the radioscapoid and the long radiolunate ligament to its origin on the palmar scapholunate ligament. This stalk needs to be identified and traced down to this ligament. The ganglion along with its stalk are then excised, care being taken not to damage the scapholunate ligament. Any daughter cysts in the region of the attachment of the stalk are scraped off using a curette or rongeur.

A third of the ganglia arise from the scaphotrapezium joint. Once again, the origin is scraped off the palmar ligaments of the scaphotrapezium joint. Any daughter cysts are also removed. Haemostasis is then undertaken. The skin is closed and the wound infiltrated with local anaesthetic. The main advantage of excising the palmar wrist ganglion is that in a proportion of

patients the lump disappears immediately after surgery. The main disadvantages are that just over 40 % of these recur and 27 % may continue to have discomfort. Added to that, a small minority end up with damage to the palmar cutaneous branch of the median nerve or very rarely to the radial artery itself. Patients should be made aware of this potential prior to surgery.

After excision of the palmar wrist ganglion in 79 patients, 42 % had a recurrence [39].

Complications

The complications after excision of a palmar wrist ganglia have been reported in 7–28 % of patients and include damage to the palmar cutaneous branch of the median nerve, keloid formation, wound infection and stiffness. Dias and Buch [39] found 20 % of patients reported some form of complication. However, these were usually minor related to the scar, although there were patients who had symptoms related to the palmar cutaneous branch of the median nerve, and one patient who had damage to the radial artery [40].

Jacobs and Goevers [41] reported 28 % of 71 palmar ganglia who had some damage to the palmar cutaneous branch of the median nerve. These risks and benefits need to be clearly explained to patients prior to surgical intervention.

Six patients (of 78 who had surgery) in one study [39] felt that the hand was worse after treatment. Conversely, in none of the patients who had the ganglia aspirated or where it was left untreated felt that their hand had been made worse.

Clinical Pearl

Palmar wrist ganglia have a similar outcome regardless of intervention. The recurrence rate is high and one in five will have a surgical complication.

Sheath Ganglia

Sheath ganglia account for 14 % of ganglia of the wrist and hand [42].



Fig. 1.5 A sheath ganglion. Usually the sheath ganglion is related to the proximal part of the A1 pulley and is not always obvious. The neurovascular bundle will be lateral to the ganglion. When aspirating the ganglion, the needle should be introduced from the midline, with the needle pointing dorsally. Thus avoiding the neurovascular structures

This ganglion usually presents as a hemispherical and slightly tender swelling which is usually on one or the other side at the base of the finger, usually proximal to the proximal finger crease. (Fig. 1.5) Forty per cent affect the middle finger and 26 % the index finger. Both hands are equally affected. As with other ganglia, women are affected three times more often than men [43].

Patients describe discomfort when holding onto objects such as the steering wheel of a car or the handles of a shopping bag. These symptoms come on spontaneously and gradually. Occasionally, this sheath ganglion can be associated with triggering of the finger. Usually, ganglions that present with symptoms tend to be around one centimetre in diameter and tender to touch. Added to that, they arise from the collagenous surface of the first annular pulley and, on occasion, the second annular pulley. An ultrasound scan of the finger will clearly identify the ganglion and its origin. Uncommonly, sheath ganglia can occur in the middle of the finger arising out from the distal end of the A2 or from the A4 pulley.

When they are big enough they may transilluminate; others are identified using an ultrasound or a MRI scan. Sheath ganglia may be treated with either reassurance, aspiration or surgery.

Reassurance

The natural history of the sheath ganglion is that a large number of these will resolve spontaneously without any intervention and regardless of intervention.

Aspiration

They can be treated by aspiration, under ultrasound guidance if very small. After aspiration at 7 years only 12 % had recurred. Complications occurred in a small number of these and these can be avoided by making sure that the entry of the aspirating needle is from the midline and thereafter directed into the ganglion and thus avoiding the neurovascular structures.

Any gelatinous fluid is aspirated and a firm compression applied to disperse the ganglion. Generally, aspiration of a sheath ganglion results in a better outcome than aspiration of wrist ganglia. This may reflect the different rate of development the cell changes that lead to the formation of the ganglia.

The most cost-effective treatment for recurrent flexor sheath ganglion after two aspirations was excision [44].

Excision

Surgical excision is conducted either through a transverse incision centred over the ganglion itself or a longitudinal zigzag incision. A zigzag incision, however, can heal with thickening at the apex resulting in pain and potential contracture. As a consequence, this incision is best avoided. Dissection needs to be meticulous, with care taken to avoid damaging the neurovascular structures which lie on or outside the sheath ganglion. The cyst is dissected to the pulley and removed taking with it a small window from the sheath. If there is any triggering then the A1 sheath is released. Local anaesthetic is infiltrated and the wound closed using dissolving sutures. A bulky bandage is applied but the hand is used from the very outset after elevation for the first hour or so.

Mucus Cyst

Mucus cysts account for 4 % of all ganglia of the wrist and hand. These are associated with degenerative change in the distal interphalangeal joint and often there are Heberden's nodes. These present as a translucent swelling at the back of the terminal phalanx between the nail and the joint. It usually does not appear in the midline as the ganglion bulges out from one or other side of the extensor tendon. When the ganglion extends distally it encroaches upon the germinal matrix of the nail bed leading to the formation of the longitudinal groove in the nail plate in 23 % [45] (Fig. 1.6). Occasionally, the ganglion can rupture and become secondarily infection. This can leave a sinus or punctum on the dorsum of the cyst. Added to that, patients may have restrictions on distal interphalangeal joint movements and occasionally complain of an aching pain secondary to the degenerative arthritis.

Treatment includes reassurance, aspiration or excision. Forty per cent recur after aspiration alone [45]. My personal preference with these is that if the cyst is troublesome or the skin is at risk then these are excised through a Y shaped incision. The ganglion is traced to the joint and any secondary cysts excised. If there is a large osteophyte then it is trimmed back using a small narrow rongeur. However, this is not essential as osteophyte removal does not have an impact on the recurrence rate after excision of the mucus cyst which is generally low. Matthews [45] reported no recurrence after excision of 54 mucous cysts while up to 3 % recurrence rate has been observed in another study [46]. The main risk is stiffness in the distal interphalangeal joint and problems with wound healing when the walls are thin. The condition of the nail ridge, however, improved in 80 % of 31 cases [45]. If there is a risk of skin loss, then either Wolfe graft [47], a bilobed flap [48] or a rotation flap [49] can be used. Surgeons need to be aware of all these techniques. Complications of surgery include infection in 3 % and nail deformity in 7 %. Patients also complain of more pain after surgery [46].

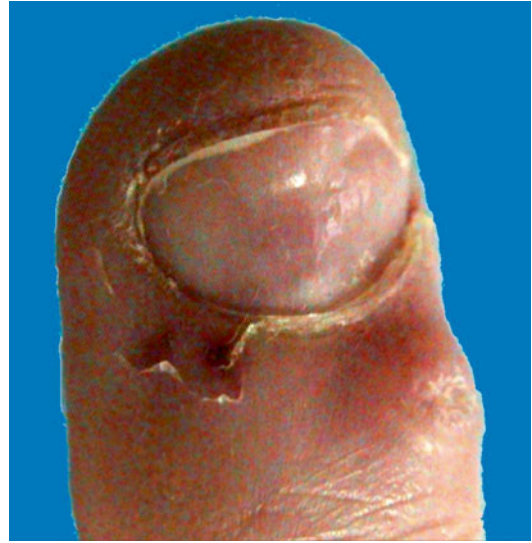


Fig. 1.6 A mucous cyst on one side of the dorsum of the distal interphalangeal joint with a punctum where a previous clinician attempted aspiration. The ganglion has pressed on part of the germinal matrix causing a nail ridge (Dias et al. [29, 39])

Intraosseous Ganglia

Intraosseous ganglion cysts occur in the proximal scaphoid or radial part of the lunate, adjacent to the scapholunate joint and usually, but not always towards the dorsum. These are commonly treated by excision of the ganglion and curettage of the cyst wall with or without cancellous bone grafting [50] with reasonably good outcomes [51]. The natural history of this disorder has not been established.

Nerve Compression by Ganglia

In certain locations ganglia encroach upon nerves and cause either local pressure or infiltrate the nerve itself. This is a particular issue with the ganglia that encroach Guyon's canal. In patients presenting with weakness of the first dorsal interosseous muscle with good preservation of the abductor digiti minimi and with no sensory symptoms in the little and ring fingers, the surgeon must consider the possibility of a ganglion pressing on the deep branch of the ulnar nerve within

this canal. These ganglia can arise from the pisohamate ligament or from within the joint just distal to the hook of the hamate. These can either be aspirated under ultrasound or excised to relieve the pressure on the ulnar nerve. This is one of the few instances of a ganglion where intervention is mandatory to protect nerve function.

Summary

Ganglion cysts are common, accounting for the second most common reason for attendance at hand clinics. Removal of these ganglia is not mandatory, as once the diagnosis is made, many patients are happy simply to monitor the situation. If the ganglia are removed, however, it is important to note that there is a significant recurrence rate, particularly with the palmar wrist ganglia. As such, following reassurance, careful discussion needs to take place regarding the natural history of these swellings and the advantages and disadvantages of either aspiration or surgical excision.

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Pigmented Villonodular Synovitis in the Hand

2

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Keywords

Giant cell tumour • Pigmented villonodular synovitis • Fibrous xanthoma • Sclerosing haemangioma, benign synovioma • Multinucleated giant cells • Xanthoma cells

Introduction

The first description of pigmented villonodular synovitis (PVNS) was by Chassaignac in 1852 [1]. However the actual term PVNS was not introduced into the literature until 1941 by Jaffe, Lichtenstein and Sutro [2]. PVNS is an idiopathic, benign, hyperplastic proliferation of the synovium, which occurs within joints with characteristic pigmentation from haemosiderin. A focal extra-articular form commonly affects the hands, possibly arising from the tendon sheath, and is called a giant cell tumour of the tendon sheath (GCTTS). There are many similarities in the histology between these two conditions, although the clinical presentation can be different. Other terms used are pigmented villonodular bursitis or tenosynovitis, nodular tenosynovitis, fibrous xanthoma, sclerosing haemangioma and benign synovioma. The use of several terms can sometimes be misleading.

Clinical Pearl

Pigmented Villonodular Synovitis (PVNS) arises from intra-articular synovium
Giant Cell Tumour of tendon sheath (GCTTS) arises from tendon sheath

Incidence

The average annual incidence has been estimated to be 1.8 per 1 million population for the intra-articular form and 9.2 per million for the extra-articular form [3]. The GCTTS is the second commonest soft tissue tumour affecting the hand after ganglia [4]. Presentation is typically between age 30 and 50 years. Female predominance ranges between 1.5 and 3:1. The radial digits tend to be more affected. There are reports of this condition affecting all the broad racial groups.

Pathophysiology

Pigmented villonodular synovitis is a condition affecting synovial membranes intra and extra

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articular. The exact aetiology of PVNS is still unknown but hypotheses include inflammatory, neoplastic and metabolic processes. Experimental and epidemiological studies have suggested that PVNS is a reactive process although recent studies have shown that these lesions are capable of autonomous growth thereby suggesting the involvement of a neoplastic process. This theory has been further supported by studies suggesting that heterogeneous proliferating cells, such as fibroblasts, histiocytes, multinuclear cells, and chronic inflammatory cells, might be neoplastic, with other cell types being reactive in nature [5].

This is a benign non-metastasizing condition but can recur locally if not completely excised. Malignant transformation in the hand is rare and reports describe a good clinical outcome providing there are clear resection margins [6].

Clinical Presentation in the Hand

The clinical presentation can be grouped into three categories:

- (a) The commonest form is a **discreet subcutaneous nodule**, usually multi-lobulated, in the digit or palm. Typically these are painless and have been present for several months or even years. They can sometimes interfere with hand function because of their size or can produce neurological symptoms, like paraesthesia, in the affected region. The most frequent location of the tumour is in the index finger (30 %), although other digits are also commonly affected: thumb (13 %), the long (25 %), ring (17 %) and little (16 %) fingers [7]. Lesions are found twice as often on the volar aspect of the hand compared with the dorsal side. Lesions are small and usually vary between 1 and 2 cm in size, but can get bigger if the presentation is late. It is also possible for these lesions to surround the digit and breach through fascial intervals and can be palpated on the dorsal and volar sides of the palm or digit (Figs. 2.1 and 2.2).
- (b) The **diffuse form** can involve a large area of the hand. The margins are ill defined and



Fig. 2.1 Swelling in the Thumb



Fig. 2.2 Swelling in the Thumb

they present as a soft tissue mass. This is thought to represent the intra articular form occurring in other areas of the body such as the knee joint as mentioned below. The soft tissue structures of the hand, like the extensor tendons can be engulfed in the tumour mass and can be difficult to dissect free (Figs. 2.3, 2.4, and 2.5).