BMJ Best Practice

Ganglion cyst

Straight to the point of care

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Summary

Ganglion cysts are the most common benign lesion of the hand/wrist.

Typically, insidious onset with no predisposing conditions.

Usually only a cosmetic problem but local pain and neurovascular compression may occur.

Conservative management usually suffices if no neurovascular compromise.

Aspiration of dorsal cysts can be therapeutic and diagnostic.

Surgical excision has a higher rate of resolution but recurrence is possible.

No reported malignant transformation.

Definition

Ganglion cysts are smooth, soft, benign masses that are usually located on the wrist (dorsal or volar aspect) with one or more communicating stalks into the wrist joint or surrounding structures. They can be single or multiloculated and are filled with viscous, sticky, mucinous fluid.

Epidemiology

Ganglions are the most common type of tumor located within the hand and wrist.[1] They are more likely to be present in women and have a female to male ratio of 3:1.[2] In children, the female to male ratio is 1.4:1 to 1.8:1.[3] [4]

The condition usually affects patients in their second to fourth decades, but can be present at any age.[5]

Dorsal ganglions account for roughly 60% to 70% of ganglion cysts, while volar wrist ganglions account for the remainder.[6] Volar cyst incidence may be similar or exceed that of dorsal ganglion cyst incidence in children ages ≤10 years; dorsal wrist location predominates in children >10 years and adults.[3] [4]

Ganglions most often originate within the wrist joint in the adult population, but occasionally may arise from the tendon sheath. Patients under ages 13 years have a higher percentage of ganglions arising from the tendon sheath (33%) compared with adults.[3]

Etiology

There is no specific identifiable causative factor; however, there is much speculation regarding etiology.

- Traumatic events may be recalled and linked to the ganglion in anywhere from 10% to 40% of patients.[7]
- Scapholunate injury has also been hypothesized to lead to dorsal ganglia.[8]
- Arthrographic studies have demonstrated radiopaque dye passing from the wrist joint into the ganglion cyst unidirectionally, leading to the theory that a small hole in the wrist capsule may cause a one-way valve allowing growth of the cyst.[9]
- Ganglions may also represent benign tumors of synovial origin; however, there is no specific synovial lining noted on histologic examination.[10]
- Synovial fluid leaking into the surrounding tissue may lead to formation of a cyst wall enclosing cystic fluid.[11]
- Mucoid degeneration of collagen in the surrounding tissue may lead to cyst formation.

A definitive link between ganglion cyst development and traumatic injury has not been established.

Pathophysiology

Ganglion cysts are usually small structures measuring 1 to 3 cm in diameter and located on the radial aspect. Impingement or surrounding of the radial artery can occur during cyst development. Occasionally, occult ganglions (<1 cm) or larger ganglions (up to 8 cm) have been reported. Cysts can be singular or multiloculated and are usually located next to a joint or the surrounding tendons. Macroscopically, they tend to be smooth, white and firm with an underlying stalk connection to the joint surface. They are mobile, nonadherent to underlying tissue, compressible, and usually not directly painful on palpation. The outer wall is comprised of randomly oriented collagen fibers with no definitive endothelial lining.[10] The cyst itself is filled with a thick, gelatinous, clear mucin comprised of glucosamine, globulin, hyaluronic acid, and albumin.[12]

Cysts may compress surrounding neurovascular structures and patients may experience wrist pain, paresthesia, intrinsic muscle paralysis, and/or coolness of the hand or fingers as a result.

Dorsally located cysts are usually connected to the scapholunate interosseous ligament in the area of the dorsal capsular attachments; however, the stalk may be long enough to have the palpable mass located a distance away from the dorsoradial wrist. Two thirds of volar cysts are connected to the radioscaphoid joint and one third to the scaphotrapezial joint.[13]

There is no documented history of malignant transformation of a ganglion cyst.

Classification

Anatomic

- Volar: between the flexor carpi radialis tendon and the radial artery.
- Dorsal: usually connected to the scapholunate ligament or scaphotrapeziotrapezoidal joint.

Typical dorsal wrist ganglion cyst

From the collection of Marco Rizzo, MD, Mayo Clinic; used with permission

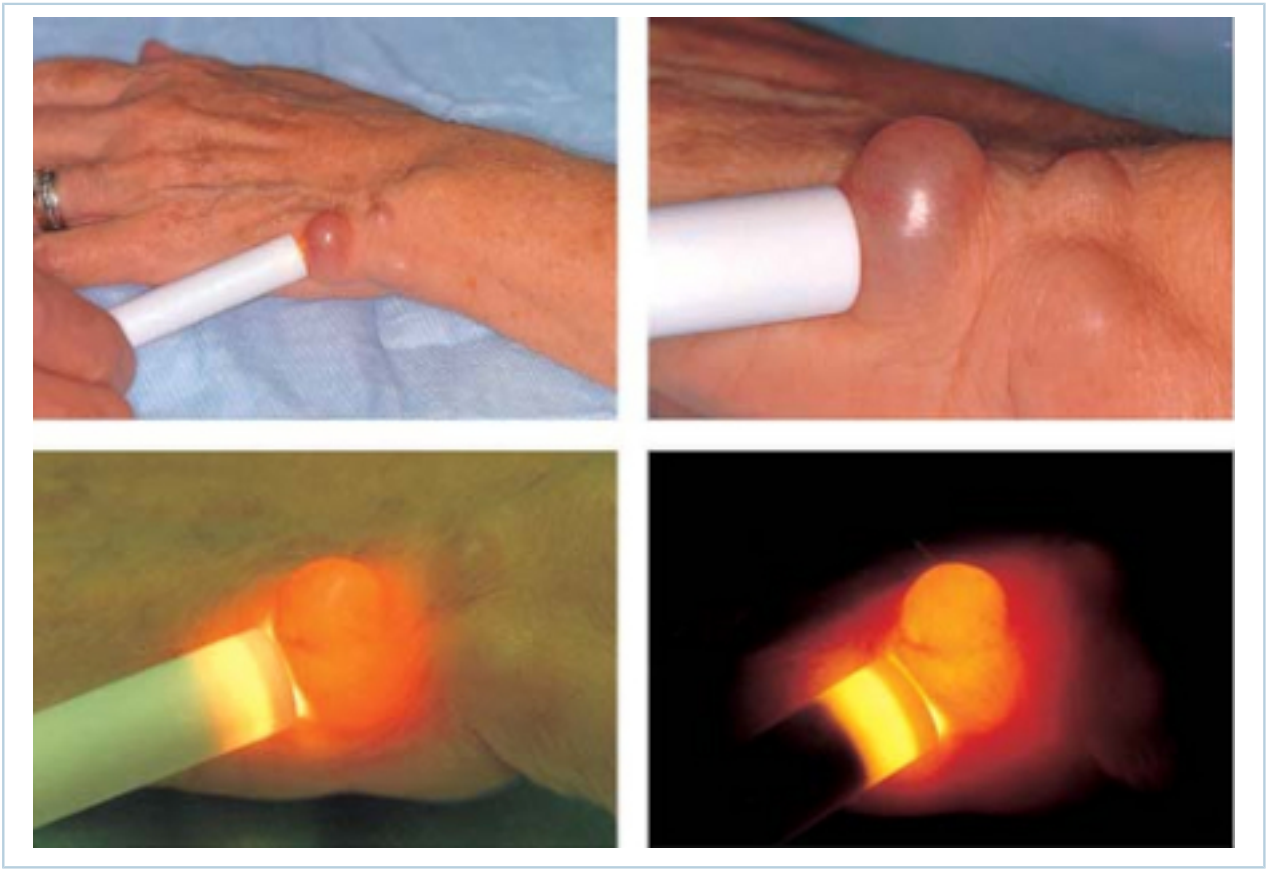
- Occult: vague dorsal wrist pain with wrist flexion.

Case history

Case history #1

A 35-year-old female presents complaining of a mass located over the dorsal aspect of her wrist. She states the mass has been present for approximately 6 months and does not cause her any pain. It has slowly enlarged and is now interfering with her ability to slide on a bracelet. She claims that it has increased in size after strenuous activity and seems to shrink back to the current size with resting of the arm. She denies any paralysis or paresthesias to her hand or fingers. She has good blood flow through

her radial and ulnar arteries with brisk capillary refill. The mass is fluctuant and not firmly attached to underlying structures and is not painful with palpation. The structure transilluminates when examined with a penlight.



Transillumination of ganglion cyst using pentorch

Botte MJ et al. Musculoskeletal Key. Available at: https://musculoskeletalkey.com/ganglion-excision; used with permission; cited from Green DP et al. Green's Operative Hand Surgery. 4th ed. New York: Churchill-Livingston, 1999: 2171-83

Other presentations

Ganglion cysts can also present on the volar aspect or occultly; however, this is less common than the dorsal variant. Presentation is usually due to cosmetic deformity; however, occasional pain, weakness, or paresthesia may be present secondary to impingement on surrounding neurologic structures, and coolness of the hand or fingers may be present secondary to radial nerve compression. Occult ganglions are usually undetectable by physical examination but may be a cause of vague wrist pain.

Approach

Ganglion cysts are usually diagnosed clinically without the need for further laboratory or imaging studies unless other pathological processes are suspected.

Historical factors

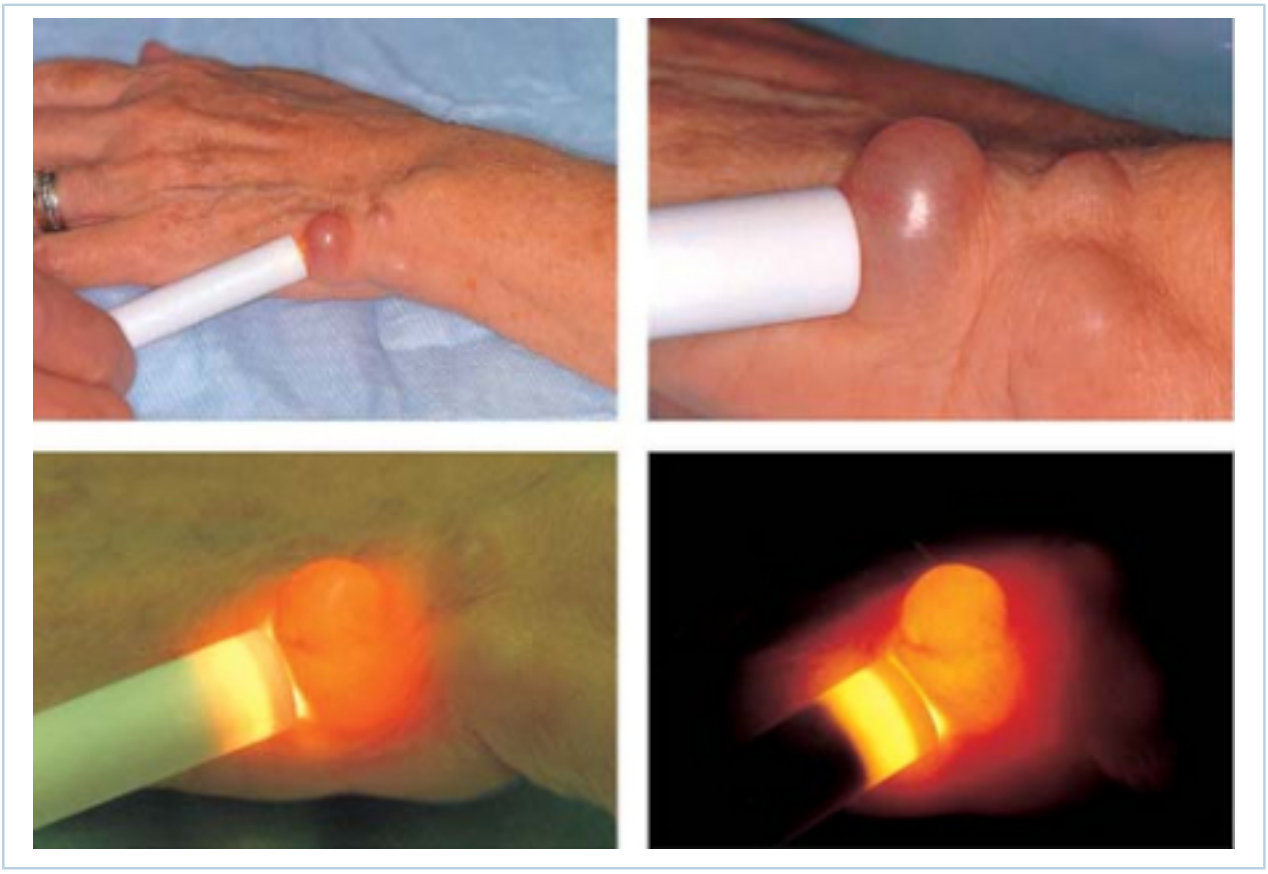
Cysts commonly present as cosmetic concerns; however, presenting symptoms may include wrist aching (with/without activity), paresthesia, weakness and coolness of the hand/fingers. There may be complaints of the mass increasing in size after activity of the involved extremity, and returning to baseline after rest. They may develop very rapidly: for example, overnight, or over long periods of time.

A history of trauma (vague wrist pain after trauma can suggest scapholunate instability) may be revealed, although cysts usually have an insidious, atraumatic onset.

Physical exam

Volar cysts are usually located between the flexor carpi radialis tendon and the radial artery. Dorsal cysts usually overlie the scapholunate interval, but may arise from a number of sites over the dorsal aspect of the wrist.

Ganglia usually appear as well circumscribed, subcutaneous, smooth masses (typically 1-4 cm in diameter). They are freely mobile structures that are not attached to underlying soft tissue and do not move with finger flexion or extension. Transillumination with a penlight often reveals a reddish glow.



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Smaller ganglion or occult ganglion may not be palpable; however, wrist flexion may induce pain.

There is usually no pain on palpation of the mass, but, if large enough, the mass may compress underlying neurologic or vascular structures leading to secondary examination findings. Such neurologic signs may include:[14] [15]

- numbness in ring and small fingers (due to compression of the ulnar nerve)
- numbness over dorsoradial hand (due to compression of the superficial branch of the radial nerve)
- numbness in the palm (due to compression of the palmar cutaneous branch of the median nerve)
- numbness in the thumb, index, or long finger (due to compression of the median nerve).

Vascular compression typically presents as pain in the radial or ulnar side of the hand depending on the location of the ganglia (radial or ulnar, respectively). The fingers may feel cool, appear pale or blue, and demonstrate sluggish capillary refill if circulation is inadequate to perfuse the hand.

Laboratory tests

Typically, laboratory tests are unremarkable and are only required if there are suspicions of infection. White cell count, erythrocyte sedimentation rate, and C-reactive protein may be elevated in infection.

Imaging

Radiography does not usually yield information that will alter care plans of patients with ganglion cysts, therefore imaging is not typically indicated unless the cause of the mass is doubted.[16]

When the probability of other wrist pathology remains high, ultrasound or magnetic resonance imaging (MRI) may be performed. With regards to ganglion cysts, ultrasound and MRI can help confirm cyst size, physical characteristics, relationship to radial artery, and ligamentous injury.[17] [18] There is no difference in ganglion cyst detection rate between ultrasound and MRI.[19] [20]

Occult ganglia can be visualized by MRI with a sensitivity of 83%, specificity of 50%, positive predictive value of 94%, and accuracy of 80%.[21]

Aspiration

Dorsal ganglia may be aspirated for diagnostic (and potentially curative) purposes. Aspiration of the volar ganglia is not recommended due to the potential risk of injury to the radial artery.[22]

Care must be taken with aspiration as the cyst is in direct communication with the wrist joint and septic arthritis is a rare complication. Aspiration technique involves sterile preparation, introduction of a large-bore needle (e.g., 18 gauge) into the cyst and removal of cyst contents. A clear, jelly-like, viscous, mucin is diagnostic of a ganglion cyst.

If there are any concerns regarding infection or inflammatory arthropathy, the fluid obtained should be sent for microscopic exam for white blood cells and crystals.

History and exam

Key diagnostic factors

subcutaneous wrist mass (common)

- Dorsal cysts are usually located near and distal to the Lister tubercle. Volar cysts are usually located between the flexor carpi radialis tendon and the radial artery.
- Diameter is typically between 1 to 4 cm, although can reach up to 8 cm.
- Characteristics include being smooth and slightly mobile with no connections to underlying tendons.

wrist pain (common)

- Patients may experience occasional aching discomfort secondary to compression of surrounding structures. In some patients, this aching is only present after activity.
- Occult ganglia are usually undetectable by physical examination but may be a cause of vague wrist pain.
- Dorsal ganglia may compress the posterior interosseous nerve and cause pain in the wrist region.[14]

nontender mass (common)

- There is usually minimal to no pain on palpation unless the cyst is overlying neurological structures.

increased mass size after activity (common)

- Ganglion mass can often increase temporarily with strenuous activity of the involved extremity, and return to baseline after rest.

transilluminating mass (common)

- Typical reddish glow of a fluid-filled cyst is observed when a penlight is held next to the cyst.
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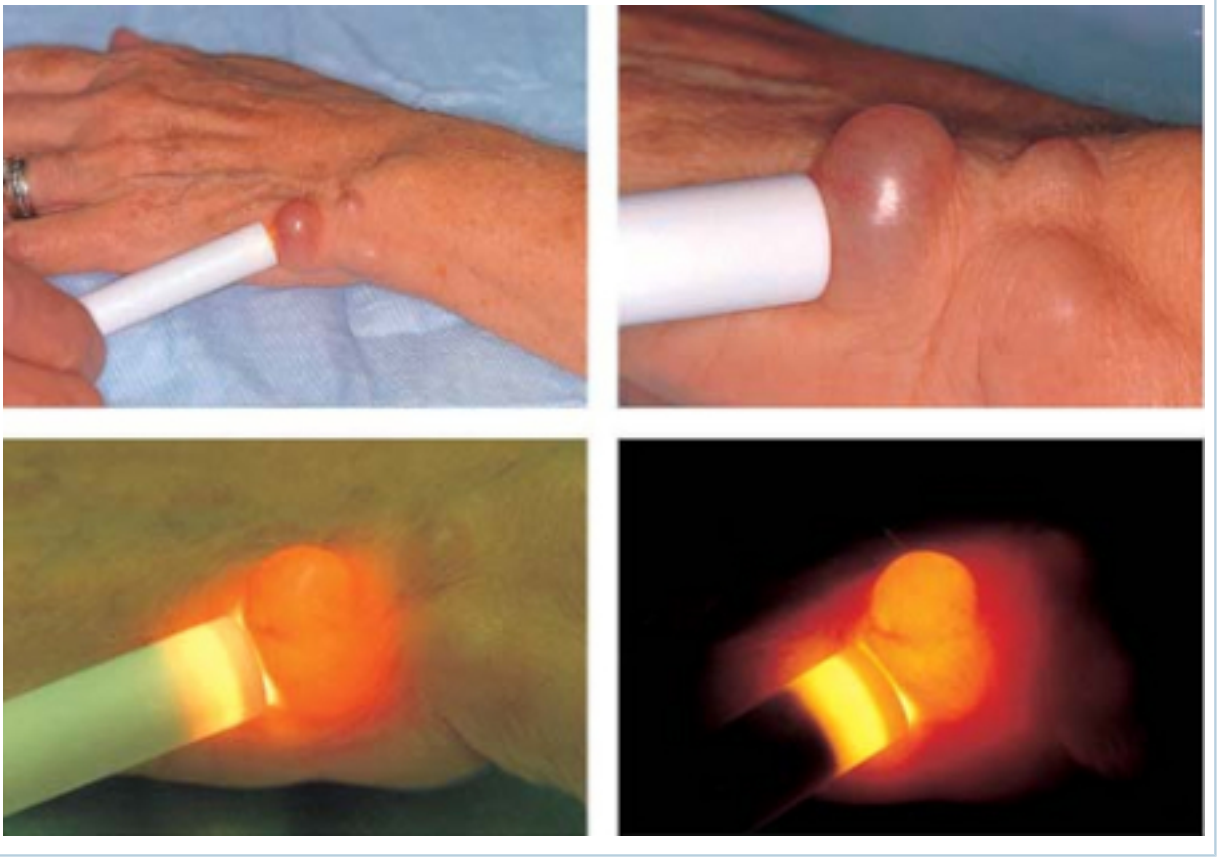

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Other diagnostic factors

unable to recall onset of lump (common)

- Patients do not usually remember when the mass began.

hand or finger coolness (uncommon)

- Compression of the radial artery can lead to compromised blood flow to the radial side of the hand.

paresthesia or weakness of fingers (uncommon)

- Patients may describe altered hand/finger sensation if there is compression of neurologic structures.

reduced sensation in the hand (uncommon)

- Dorsal ganglia may compress the superficial radial nerve causing reduced sensation on the dorsum of hand.[14]
- Volar ganglia may compress the ulnar nerve causing reduced sensation of the small and ring fingers.[15]
- Volar ganglia may also compress the median nerve mimicking carpal tunnel syndrome.[15]

Risk factors

Weak

female sex

- They are more likely to be present in women (female to male ratio is 3:1).[2]
- In children, the female to male ratio is 1.4:1 to 1.8:1.[3] [4]

age 10 to 30 years

- The condition usually affects patients in their second to fourth decades, but can be present at any age.[5]

trauma

- When questioned about injuries, anywhere from 10% to 40% of patients may recall a specific traumatic event prior to the appearance of the ganglion.[7]
- A definitive link between traumatic injuries of the wrist joint and resultant ganglion formation has not yet been confirmed.

scapholunate instability

- As the “stalk” of wrist ganglia almost always arises at the scapholunate ligament, injury or disruption of this ligament has been postulated as a cause of dorsal cyst formation.[8] There have been reports of chronic injuries to the scapholunate ligament in patients with persistent pain after ganglion excision. However, there is no definitive link; most patients with ganglions do not have any signs or symptoms of scapholunate instability or injury.

Tests

1st test to order

Test	Result
no initial test	**clinical diagnosis**

Other tests to consider

Test	Result
cyst aspiration • Aspiration of dorsal ganglion cysts will yield a thick, jelly-like, clear fluid. • If there are any concerns regarding infection or inflammatory arthropathy, the fluid obtained should be sent for microscopy for white blood cells and crystals. • Aspiration of volar ganglion cysts is not recommended due to the potential risk of injury to the radial artery.[22]	**thick, clear, jelly-like, fluid**
erythrocyte sedimentation rate • May be elevated if mass is secondary to an infectious process.	**normal**
C-reactive protein • May be elevated if mass is secondary to an infectious process.	**normal**
complete blood count • White cell count may be elevated if mass is secondary to an infectious process.	**normal**
wrist x-ray • Typically, radiographs are normal. However, in some cases, evidence of healed fractures or scapholunate injuries may be apparent. Scapholunate injuries appear as widening greater than 3 mm on the posteroanterior radiograph or dorsally angulated lunate on the lateral radiograph. • Degenerative changes (sclerosis and decreased joint space) may be present if mass is secondary to osteoarthritic changes.	**normal**
ultrasound • Performed when the probability of other wrist pathology remains high. • Delineates size and physical characteristics of ganglion cysts.[17][23] • May show volar ganglion communication with the radial artery.	**single or multiloculated cystic structure**
magnetic resonance imaging • Performed when the probability of other wrist pathology remains high. • Delineates size and physical characteristics of ganglion cysts.[17][18][23] • May show volar ganglion communication with the radial artery. • Can determine the involvement of any flexor or extensor tendons. • Can detect ligamentous injuries (e.g., scapholunate ligament tears). • MRI has sensitivity of 83%, specificity of 50%, positive predictive value of 94%, and accuracy of 80% for occult ganglion cysts.[21]	**fluid-filled cyst**

Differentials

Condition	Differentiating signs / symptoms	Differentiating tests
Carpal tunnel syndrome	• Paresthesia in the thumb, index, and long finger typically worse at night (patients with ganglion cysts rarely describe paresthesia). This may awaken the patient from sleep. With advanced cases, weakness of the hand and difficulties with fine motor tasks may become evident. • Physical examination can reproduce the symptoms of paresthesias by direct compression of the median nerve at the volar wrist crease or placing the patient in a position of wrist flexion for up to 1 minute. Typically, a Tinel sign is present with tapping over the median nerve at the wrist.	• Electromyelographic evaluation will show focal slowing of conduction velocity in the median sensory nerves across the carpal tunnel; prolongation of the median distal motor latency; possible decreased amplitude of median sensory and/or motor nerves.
Lipoma	• Does not transilluminate. Mass is usually not entirely spherical.	• Aspiration does not yield any fluid. • Ultrasound demonstrates a noncystic mass. • MRI demonstrates a well-circumscribed mass with increased signal intensity on T1-weighted image.
Giant cell tumor of the tendon sheath	• Mass is more solid and does not transilluminate. Mass is fixed to the underlying tendon sheath and is therefore less mobile than a ganglion cyst.	• Aspiration does not yield fluid. • MRI or ultrasound confirms solid tumor located adjacent to tendon sheath.
Tenosynovitis	• Diffuse swelling and bogginess of the tenosynovium overlying the tendons. Usually tracks along the tendon in a longitudinal fashion, not a discrete mass. Can have transverse band-like pattern across the wrist.	• Aspiration does not yield any fluid. • MRI demonstrates increased fluid uptake along the tendons, not a well-defined cystic structure.
Carpal instability	• Disruption of the normal carpal kinematics usually preceded by trauma to the	• Radiographs demonstrate a dorsally or volarly angulated lunate with regards to the

Condition	Differentiating signs / symptoms	Differentiating tests
	wrist. Can result in a change in lunate position where the proximal pole of the scaphoid can be palpated. No transillumination, compressibility, or movement of the mass on examination.	capitate, and a widening of the scapholunate or lunotriquetral joint space.
Osteoarthritis	• Usually preexisting arthritic conditions, typically of the scaphotrapeziotrapezoid joint. • Palpable hard, firm, noncystic, nonmobile mass which does not transilluminate.	• Posteroanterior and lateral view radiographs of the wrist show degenerative changes (osteophyte or arthritic surfaces of the scaphotrapeziotrapezoid joint).
Radial artery aneurysm	• Mass may be pulsatile and a thrill palpated. Does not transilluminate.	• Ultrasound with Doppler flow will demonstrate blood flow within the structure. • Aspiration may yield arterial blood and is not recommended.
Posterior interosseous nerve neuroma	• Mass not as freely mobile (anchored to posterior interosseous nerve in posterior aspect of the wrist) and does not transilluminate.	• Aspiration does not yield any fluid. • Ultrasound demonstrates noncystic mass. • MRI demonstrates mass without increased signal intensity on T2-weighted image.
Soft tissue sarcoma	• Typically not well circumscribed or as freely mobile (can be difficult to distinguish given the varied presentation of sarcomas).	• Referral to specialized center recommended for aspiration or biopsy. • MRI helps determine lesion location and varied characteristics. May show ring enhancement or varied signal intensity.
Osteosarcoma	• Typically not well circumscribed or mobile (can be difficult to distinguish given the varied presentation of sarcomas).	• Referral to specialized center recommended for aspiration or biopsy. • MRI helps determine lesion location and varied characteristics. May show ring enhancement or varied signal intensity.
Septic arthritis	• Typically presents with an erythematous, warm, swollen joint. There is pain associated with minimal motion of the radiocarpal	• Difficult to differentiate from crystalline arthropathy without joint aspiration. • White cell count, ESR, and CRP levels usually elevated.

Condition	Differentiating signs / symptoms	Differentiating tests
	joint. An effusion can often be detected.	• Joint aspiration will yield purulent material with increased neutrophil count and typically bacteria on Gram stain and culture.
Crystalline arthropathy	• Typically presents with an erythematous, warm, swollen joint. There is pain associated with motion of the radiocarpal joint. An effusion can often be detected.	• Difficult to differentiate from septic arthritis without joint aspiration. • Aspiration of the joint will yield crystals on polarized microscopic exam.
Previous#trauma	• Previous history of injury of the wrist or carpus may cause malunited fractures with palpable deformity or ligament disruptions resulting in carpal instability.	• Posteroanterior and lateral view radiographs of the wrist help detect previous traumatic events. Bony malunion of fractures, degenerative disease, or signs of carpal instability may be present.

Approach

Ganglion cysts are primarily a cosmetic deformity and conservative treatment is usually first-line.

Further intervention (aspiration or surgery) can be explored if cysts are cosmetically unpleasant or compromising local neurovascular structures secondary to mass effect. Patients with neurovascular compromise related to ganglia are typically treated with surgical resection. Completely devascularized fingers/hand are extremely rare, so surgical intervention can usually be performed in a nonemergent but timely manner.

Published randomized and pseudo-randomized trials lack methodological detail and sufficient outcome measures, and are not suitable to determine the relative effectiveness of clinical treatment against simple reassurance.[24]

Observation

Given that ganglia are the most common benign tumors of the hand and the wrist with no reported cases of malignant degeneration, the most appropriate initial line of treatment is observation or conservative measures such as activity modification to avoid painful wrist positions or volar wrist splinting for pain control.[11] [25]

Observation can be continued indefinitely with more advanced treatment reserved for neurovascular compromise, pain, functional limitations, or cosmetic deformity. Conservative treatment results in spontaneous resolution in up to 58% of adults and up to 93% of children over a 9- to 12-month period.[26] [27] [28]

Analgesia

Patients may report some discomfort or aching, especially after activity. This can usually be alleviated by an nonsteroidal anti-inflammatory drug as well as activity modification. Compressive wraps or wrist supports worn during activities that exacerbate discomfort can also help.

Cyst aspiration

Cyst puncture and drainage, with or without corticosteroid injection, is the primary form of closed management of dorsal ganglia and can be curative as well as diagnostic.

Aspiration of volar ganglion cysts is not recommended due to the potential risk of injury to the radial artery.[22]

While aspiration can be done in the office, caution must be utilized given the direct extension of the cyst stalk into the wrist joint. Septic arthritis is a rare, but possible, complication of this procedure.

Dorsal ganglion cyst aspiration has been reported to have a 13% success rate with single puncture and drainage. This can be increased to approximately 40% if the wrist is splinted for 3 weeks afterward, and approximately 85% with up to 3 treatments.[26] [29] [30]

Evidence suggests simple aspiration yields similar success rates (33%) to aspiration and injection of corticosteroid.[31] Injection of corticosteroid may reduce inflammation and increase the success rate, but definitive benefit has not been demonstrated.[32]

Needling of dorsal cysts can lead to overall decompression and multiple needling of the base or stalk of the cyst can increase the rate of resolution to 42%.[26] Multiple needling can be painful or uncomfortable and injection with local anesthetic may be warranted.

Risk of recurrence following cyst aspiration.

One systematic review of studies that reported treatment outcomes for adult wrist ganglions found that 59% of patients who underwent aspiration experienced recurrence.[33] Aspiration was not associated with a significant reduction in recurrence compared with reassurance.[33]

Surgical excision

Cysts that are recalcitrant to conservative management may be addressed surgically if they are painful or cosmetically unpleasing and the patient desires excision of the mass. Surgery is recommended as a first line treatment when there are paresthesias, muscle weakness, or vascular insufficiency.

Surgery is the most successful treatment but it is not a guaranteed cure. Surgical options include formal open excision versus arthroscopic decompression and resection. Prior to surgery, patients should be advised that they will be trading cosmetic masses for surgical scars, and that complete excision may be prevented if the cyst encapsulates neurovascular structures.

Dorsal ganglion recurrence is reduced when a cuff of normal tissue is removed along with the stalk of the ganglia. However, care must be taken to avoid injury to the scapholunate interosseous ligament or a resultant scapholunate diastasis may develop. Volar wrist ganglia often intimately surround, or are attached to, the radial artery and have a slightly higher rate of recurrence. A cuff of the ganglion may remain after surgery in these patients to avoid injury or arteriotomy of the artery. Wrist immobilization following surgery may help to reduce the rate of recurrence, but motion should be initiated relatively soon postoperatively to reduce the risk of stiffness.

Risk of recurrence following surgical excision.

The risk of recurrence following open surgery varies. Typically, dorsal ganglia have a 3% to 9% recurrence rate and volar ganglia have a recurrence rate of 7% to 19%. Open surgical excision is associated with a significantly lower chance of recurrence compared with aspiration.[33] In pediatric patients with wrist ganglia, the patient's age is an important factor in recurrence, with teenagers having higher recurrence rates.[34]

Arthroscopic debridement offers the benefit of treating any other intra-articular pathology that may be noticed on examination. One systematic review reported pooled recurrence rates of 9% and 20% for arthroscopic excision and open surgery of dorsal ganglion cysts, respectively.[35] When low quality studies and/or those with high risk of bias were excluded, recurrence rates were 7.9% for arthroscopic surgery and 9.8% for open surgery.[35] In a subset of studies, complication rates were reported to be similar between open and arthroscopic surgery (6% versus 4%, respectively).[35]

Other treatments

Closed rupture of ganglion cysts using forced massage or a sharp blow with a heavy object have been reported. These techniques are not recommended, and may lead to fracture of the distal radius or injury to surrounding structures.

Treatment algorithm overview

Please note that formulations/routes and doses may differ between drug names and brands, drug formularies, or locations. Treatment recommendations are specific to patient groups: see disclaimer

Acute (summary)		
without neurovascular compromise		
	1st	**observation**
	adjunct	**activity modification + analgesia**
	2nd	**cyst aspiration ± corticosteroid injection**
	3rd	**surgical resection**
with neurovascular compromise		
	1st	**surgical resection**

Treatment algorithm

Please note that formulations/routes and doses may differ between drug names and brands, drug formularies, or locations. Treatment recommendations are specific to patient groups: see disclaimer

Acute

without neurovascular compromise

1st **observation**

» Given that ganglia are the most common benign tumors of the hand and the wrist with no reported cases of malignant degeneration, the most appropriate initial line of treatment is observation.[11] [25]

» Conservative treatment can lead to spontaneous resolution in up to 58% of adults and up to 93% of children over a 9- to 12-month period.[26] [27] [28]

adjunct **activity modification + analgesia**

Treatment recommended for SOME patients in selected patient group

Primary options

» naproxen: 250-500 mg orally twice daily when required, maximum 1250 mg/day

OR

» diclofenac potassium: 50 mg orally (immediate-release) twice or three times daily when required, maximum 150 mg/day

OR

» ibuprofen: 400-800 mg orally every 6-8 hours when required, maximum 2400 mg/day

» For activity-related pain, patients may benefit from activity modification. Compressive wraps or wrist supports worn during activities that exacerbate discomfort can also help.

» Discomfort or aching, especially after activity, can usually be alleviated by nonsteroidal anti-inflammatory drugs.

2nd **cyst aspiration ± corticosteroid injection**

Primary options

» triamcinolone acetonide: 10 mg into affected area as a single dose
-and-

Acute

» lidocaine: (1%) 1-2 mL into the affected area as a single dose

» Cyst puncture and drainage, with or without corticosteroid injection, is the primary form of closed management of dorsal ganglia and can be curative as well as diagnostic. Aspiration of volar ganglion cysts is not recommended due to the potential risk of injury to the radial artery.[22]

» While aspiration can be done in the office, caution must be utilized given the direct extension of the cyst stalk into the wrist joint. Septic arthritis is a rare, but possible, complication of this procedure.

» The success rate of single aspiration of dorsal ganglion cysts can be increased by approximately 27% if the wrist is splinted for 3 weeks afterward.[29]

» Evidence suggests that simple aspiration yields similar success rates (33%) to aspiration and injection of corticosteroid.[31] Injection of corticosteroid may reduce inflammation and increase the success rate, but definitive benefit has not been demonstrated.[32]

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3rd **surgical resection**

» Cysts that are recalcitrant to conservative management may be addressed surgically if they are painful or cosmetically unpleasing and the patient desires excision of the mass.

» Prior to surgery patients should be advised that they will be trading cosmetic masses for surgical scars, and that complete excision may be prevented if the cyst encapsulates neurovascular structures.

» Options include a formal open excision versus arthroscopic decompression and resection.

MANAGEMENT

Acute

» Dorsal ganglion recurrence is reduced when a cuff of normal tissue is removed along with the stalk of the ganglia. However, care must be taken to avoid overaggressive resection of the scapholunate interosseous ligament or a resultant scapholunate diastasis may develop.

» Volar wrist ganglia often intimately surround, or are attached to, the radial artery and have a slightly higher rate of recurrence. A cuff of the ganglion may remain after surgery in these patients to avoid injury or arteriotomy of the artery.

» Wrist immobilization following surgery may help to reduce the rate of recurrence, but motion should be initiated relatively soon postoperatively to reduce the risk of stiffness.

» The risk of recurrence following open surgery varies. Typically, dorsal ganglia have a 3% to 9% recurrence rate and volar ganglia have a recurrence rate of 7% to 19%. Open surgical excision offers a significantly lower chance of recurrence compared with aspiration.[33] In pediatric patients with wrist ganglia, the patient's age is an important factor in recurrence, with teenagers having higher recurrence rates.[34]

» Arthroscopic debridement offers the benefit of treating any other intra-articular pathology that may be noticed on examination. Recurrence rate following arthroscopic resection is 7% to 11%.[7] [36] [37] [38] [39] Two systematic reviews of arthroscopic excision of ganglion cysts conclude that arthroscopic excision and open excision have comparable outcome profiles, including recurrence and complication rates.[35] [40]

with neurovascular compromise

1st **surgical resection**

» Patients with neurovascular compromise related to ganglia are typically treated with surgical resection. Completely devascularized fingers/hand are not typical presentations of ganglia, so surgical intervention can usually be performed in a nonemergent but timely manner.

» Options include a formal open excision versus arthroscopic decompression and resection.

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Patient discussions

Patients are advised to moderate or modify any activity that exacerbates symptoms. Once a ganglion appears, there may also be benefits to using compressive wrist supports when performing vigorous activities. It has not been confirmed, but this may help to limit cyst growth.

Patients should be informed of recurrence rates after treatment and that, if surgical excision is possible, it may not be a definitive cure. Patients should be advised that, for cosmetic corrections, a bump will be replaced with a surgical scar.

FOLLOW UP

Monitoring

Monitoring

No particular schedule of monitoring is required as there have never been occurrences of malignant degeneration, and the problem is primarily cosmetic.

If cysts continue to grow and become painful or begin to compress underlying neurovascular structures, repeat evaluation is recommended.

FOLLOW UP

Complications

Complications	Timeframe	Likelihood
treatment-related radial artery injury	**variable**	**low**
Aspiration/injection of volar ganglion may cause radial artery damage.		
treatment-related median nerve injury	**variable**	**low**
Aspiration/injection of volar ganglion may lead to injury of the palmar cutaneous branch of the median nerve.		
fatty atrophy post corticosteroid injection	**variable**	**low**
Injection of corticosteroid into a subcutaneous location has been known to cause fatty atrophy.		
skin depigmentation post corticosteroid injection	**variable**	**low**
Injection of corticosteroid medications into a subcutaneous location has been known to cause skin depigmentation.		
treatment-related septic arthritis	**variable**	**low**
Injection may lead to infection and, as ganglia have direct communication with the joint space, septic arthritis may result. Therefore, sterile preparation and technique should be employed every time needles are introduced into ganglia.		
wrist stiffness post immobilization	**variable**	**low**
Wrist stiffness may occur if patients are immobilized for prolonged periods after excision.		
wrist instability post surgical resection	**variable**	**low**
Scapholunate diastasis may occur due to over aggressive resection of the scapholunate interosseous ligament.		
surgery-related neurovascular injury	**variable**	**low**
Neurovascular injury may occur with surgical excision.		
neuroma formation post surgical resection	**variable**	**low**
Neuroma may occur after surgical excision.		
cosmetic scar post surgical resection	**variable**	**low**
Patients should be advised that, for cosmetic corrections, a bump will be replaced with a surgical scar.		

Prognosis

There are no reported cases of malignant transformation of untreated cysts.

Conservative management

With observation, spontaneous resolution has been reported in up to 58% of adults and up to 93% of children over a 9- to 12-month period.[26] [27] [28]

Cyst puncture and aspiration

If the original procedure is not successful, multiple treatments may be required. Puncture of dorsal ganglion cysts has been reported to have a 13% success rate with single aspiration. This can be increased to approximately 40% if the wrist is splinted for 3 weeks afterward, and approximately 85% with up to 3 treatments.[26] [29] [30]

Surgical excision

Recurrence rates vary, depending on cyst location and the ability to fully excise the entire cyst and stalk (e.g., sometimes volar cysts are so adherent to the radial artery that complete excision is not possible).

One systematic review reported pooled recurrence rates of 9% and 20% for arthroscopic excision and open surgery of dorsal ganglion cysts, respectively.[35] When low quality studies and/or those with high risk of bias were excluded, recurrence rates were 7.9% for arthroscopic surgery and 9.8% for open surgery.[35] In pediatric patients with wrist ganglia, the patient's age is an important factor in recurrence, with teenagers having higher recurrence rates.[34]

The incidence is decreased when a cuff of normal tissue is removed along with the stalk of the ganglia. However, care must be taken to avoid overaggressive resection of the scapholunate interosseous ligament or a resultant scapholunate diastasis may develop.

Recurrence rates of volar ganglia after open treatment are slightly higher than for dorsal ganglia, ranging from 7% to 19%.[13] [38]

Diagnostic guidelines

International

ACR appropriateness criteria: chronic hand and wrist pain (https://www.acr.org/Clinical-Resources/Clinical-Tools-and-Reference/Appropriateness-Criteria) [18]

Published by: American College of Radiology **Last published:** 2023

ACR appropriateness criteria: soft tissue masses (https://www.acr.org/Clinical-Resources/Clinical-Tools-and-Reference/Appropriateness-Criteria) [17]

Published by: American College of Radiology **Last published:** 2022

Key articles

- American College of Radiology. ACR appropriateness criteria: soft tissue masses. 2022 [internet publication]. Full text (https://acsearch.acr.org/docs/69434/Narrative)
- American College of Radiology. ACR appropriateness criteria: chronic hand and wrist pain. 2023 [internet publication]. Full text (https://acsearch.acr.org/docs/69427/Narrative)
- Lee I. Clinical treatments for wrist ganglia. ASERNIP-S Report No. 63. Adelaide, South Australia: ASERNIP-S, October 2008 [internet publication]. Full text (https://www.surgeons.org/-/media/Project/RACS/surgeons-org/files/re-asernip-s/asernip-s-reports/2008_annual_report_3217kb.pdf?rev=f349c1a2d0d3442ea7bcd9701d516954&hash=54F6A1112651D7B15BA65C4A002B0949)

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Images

Figure 1: Typical dorsal wrist ganglion cyst

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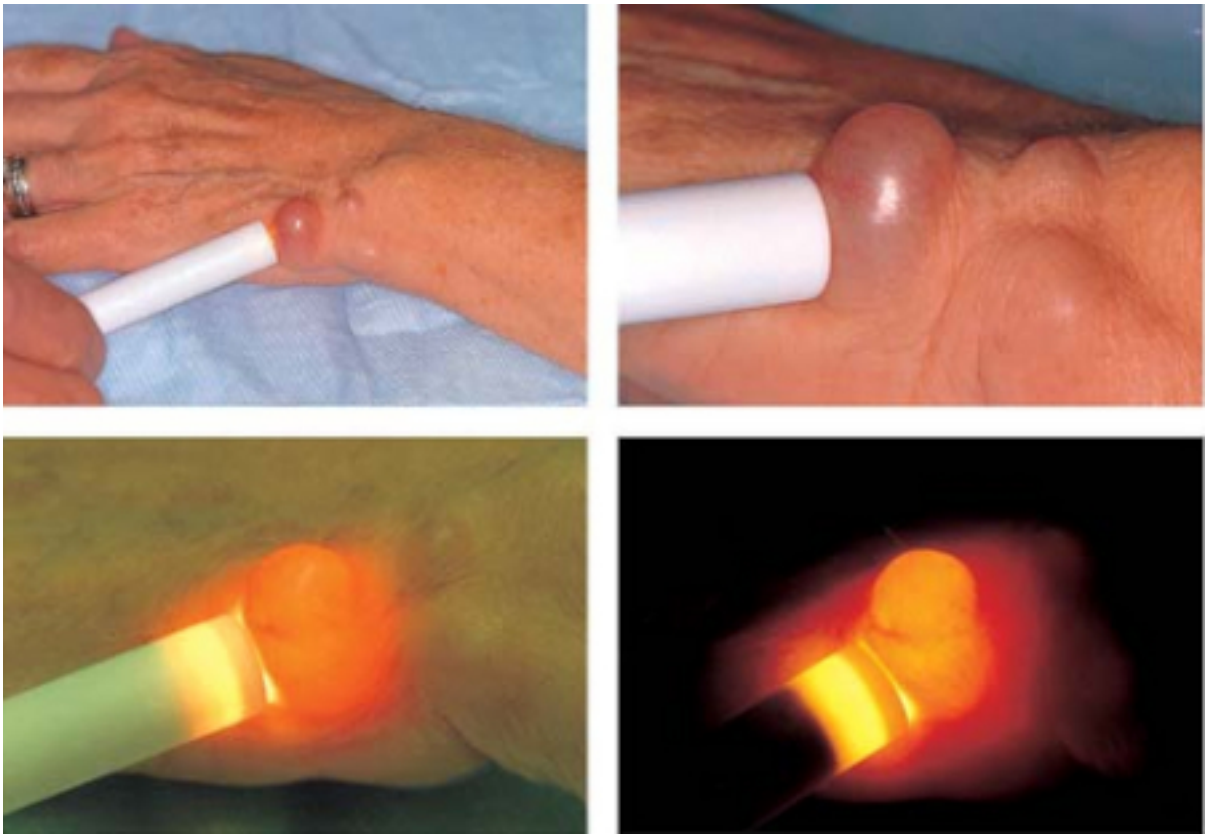

Figure 2: Transillumination of ganglion cyst using pentorch

Botte MJ et al. Musculoskeletal Key. Available at: https://musculoskeletalkey.com/ganglion-excision; used with permission; cited from Green DP et al. Green's Operative Hand Surgery. 4th ed. New York: Churchill-Livingston, 1999: 2171-83

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Figure 1 – BMJ Best Practice Numeral Style

5-digit numerals: 10,000

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