Ganglions represent 60% of hand and wrist tumors and are a common reason for orthopaedic consultation. Women are three times more likely to be affected than men. Although ganglions affect all age groups, they are unusual in children and most common in young adults. Mucous cysts are predominantly seen in older patients.

Ganglions are usually located adjacent to joints and tendons. Common sites about the hand and wrist include the dorsal wrist (dorsal wrist ganglion), volar-radial wrist (volar carpal ganglion), dorsum of the distal interphalangeal (DIP) joint (mucous cyst), and the proximal digital flexion crease (volar retinacular ganglion cyst). Less commonly, ganglions present in an intraosseous location, are adherent to tendons (especially the extensor tendons at the wrist), or are associated with a carpal boss of the second and third carpometacarpal joints.

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Ganglions of the Hand and Wrist

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Abstract

Ganglions of the hand and wrist are common benign lesions. They most frequently arise adjacent to joints and tendons, but may also be intratendinous or intraosseous. Treatment options include observation, aspiration, and surgical excision. Observation is acceptable in most instances. Indications for more aggressive treatment include pain, interference with activity, nerve compression, and imminent ulceration (in the case of some mucous cysts). The recurrence rate after puncture and aspiration is greater than 50% for cysts in most locations, but is less than 30% for cysts in the flexor tendon sheath. Surgical excision is effective, with a recurrence rate of only 5% if care is taken to completely excise the stalk of the cyst along with a small portion of joint capsule. Surgical treatment of occult ganglions is successful with accurate assessment of the source of the pain. Arthroscopic treatment of dorsal wrist ganglions is still experimental, but early results are encouraging. Ganglion surgery requires a formal operative environment and careful technique in order to minimize injury to adjacent structures and minimize the likelihood of recurrence.


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Anatomic and Pathologic Considerations

Gross pathologic evaluation has shown that cysts are often multilobulated. Microscopic examination reveals an outer wall composed of several layers of randomly oriented collagen fibers. The wall is relatively acellular, with few fibroblasts and mesenchymal cells among the collagen fibers. This structure is distinctly different from synovial tissue, lacking an epithelial lining, and is therefore not that of a true cyst. Inside is a clear, viscous mucin containing glucosamine, albumin, globulin, and hyaluronic acid. The histopathologic features of volar retinacular ganglion cysts and mucous cysts are identical to those of dorsal wrist ganglions.

The pathogenesis of ganglions is unclear. Dye studies have documented communication of fluid from the wrist joint into ganglion cysts, but not from the cyst into the joint. Some authors have therefore proposed that ganglions are formed by herniation of the synovial lining in which a one-way valve mechanism is created. Others suggest that ganglions are benign tumors of synovial origin. Both theories fail to explain the lack of synovial lining in surgical specimens. Another theory proposes that a rent in the joint capsule or tendon sheath allows leakage of synovial fluid, which irritates surrounding tissue. This local tissue reacts by forming a...
Ganglions of the Hand and Wrist

pseudocapsule and subsequent ganglion. The reaction between this tissue and the synovial fluid produces the ganglion fluid. The ganglion may enlarge as fluid is pumped in and then decrease in size as the water component is resorbed.

A third possible cause is mucoid degeneration of connective tissue, with breakdown products of collagen collecting in pools, which coalesce to form large cysts. This concept explains the microcysts often seen in the tissue surrounding the main stalk of a cyst in surgical specimens, and may explain the lower recurrence rate when a cuff of normal tissue is also removed. It does not, however, explain the predilection for the juxta-articular position of ganglions or their connection to joints. Yet another theory suggests that recurrent stress and microtrauma at the synovial-capsular interface may stimulate mucin production by mesenchymal cells or fibroblasts.

Dorsal Wrist Ganglions

The most common location for hand and wrist ganglions (in 60% to 70% of cases) is at the dorsal wrist. These lesions classically present over the scapholunate interval. At least 75% of dorsal wrist ganglions connect with the dorsal scapholunate interosseous ligament in the area of its capsular attachment.

Diagnosis

The diagnosis is most often made on the basis of the history and physical examination. Many patients describe an often asymptomatic mass that has been present for months or years, decreasing as well as increasing in size, which is often asymptomatic, but may be associated with aching wrist pain, tenderness, and interference with activity at the time of presentation. The pain associated with occult dorsal ganglions may be due in part to pressure on branches of the posterior interosseous nerve. Larger ganglions may also compress branches of the superficial radial nerve. The mass is compressible, subcutaneous, transfusing, slightly mobile, and without skin changes. Wrist extension often elicits pain at the site.

The differential diagnosis for a dorsal wrist mass is extensive. A mobile mass that moves with excursion of the extensor tendons may represent a ganglion of tendon sheath, giant cell tumor of tendon sheath, tenosynovitis of inflammatory or infectious origin, or an extensor digitorum brevis manus muscle belly. The proximal pole of the scaphoid may be prominent dorsally in cases of dorsal intercalated segment instability, and the proximal pole of the lunate may be prominent in volar intercalated segment instability. A firm mass more radial and slightly more distal may be an osteophyte from scaphotrapezial arthritis. A mass at the base of the index and long-finger metacarpals may represent an osteophyte and associated small ganglion of a carpometacarpal boss.

A compressible mass that decreases in size with elevation of the wrist may be a venous aneurysm. Other types of tumors that have been mistaken for ganglions include lipoma, posterior interosseous neuroma, hamartoma, and sarcoma. One must be prepared for proper biopsy technique in the event that the mass has the appearance of a potentially malignant tumor.

Small dorsal ganglions may be palpable only in full wrist flexion. Occult ganglions are not palpable but may be quite painful. The diagnosis of occult ganglions can be aided by ultrasonography, magnetic resonance (MR) imaging, bone scintigraphy, or arthroscopy.

Ultrasonography and MR imaging have similar rates of specificity and sensitivity, whereas bone scintigraphy and thermography are less specific. Ultrasonography is less expensive than MR imaging, but it is more operator-dependent.

Arthroscopy has potential advantages in both diagnosing and treating an occult dorsal ganglion that is intra-articular and therefore visible from within the radiocarpal joint, and also provides information about other causes of dorsal wrist pain, such as synovitis, chondromalacia, and scapholunate ligament tears. However, arthroscopy should be considered chiefly as a diagnostic aid when the cause of wrist pain has not been identified with a standard workup and conservative treatment has failed. At the present time, arthroscopic treatment of occult ganglions is not generally accepted. If a diagnostic posterior interosseous nerve block directed into the radial floor of the fourth extensor compartment 1 cm ulnar to Lister’s tubercle temporarily alleviates symptoms, it may help confirm a local organic cause of the patient’s pain but does not necessarily indicate a dorsal occult ganglion.

Treatment

Options for treatment include observation, closed rupture, cyst puncture and aspiration, and surgical excision. Some studies show a rate of spontaneous resolution of 50% on long-term follow-up, and the rate may be even higher in children. Many patients just need reassurance that the mass is extremely unlikely to be malignant or to cause nerve, tendon, or joint damage.

Closed rupture, either by firm massage or the traditional sharp blow with the family Bible often leads to recurrence. The reported cure rate varies from 22% to 66%. One case of wrist fracture as a complication of overzealous closed rupture has been reported.
Patients who have significant pain or interference with activity often choose puncture or excision. In one study, a 13% cure rate was reported for a single treatment of multiple punctures performed under local anesthesia. The cure rate was increased to 40% if the wrist was splinted for 3 weeks afterward. However, another study disputes the beneficial effect of splinting. Yet another study suggests that the cure rate can be increased to 85% if patients are willing to undergo at least three aspirations. Injection of corticosteroid at the time of aspiration has not proved beneficial. Injection of sclerosing agents can cause articular cartilage damage and is therefore not recommended.

A novel approach to cyst puncture involving the use of silk suture passed at right angles through skin and cyst, followed by massage and tying of the sutures outside the skin, has been described. The sutures are removed after 3 weeks. The reported cure rate at 6 months was 95%. However, the potential for infection has prevented the widespread acceptance of this technique.

Surgical treatment can be performed with the use of intravenous regional (Bier block) anesthesia, which provides a pain-free, bloodless operative field with lower anesthetic risks compared with axillary block or general anesthesia. Because of the difficulty of obtaining adequate analgesia in the operative field and the presence of tourniquet pain, which may not allow sufficient time to perform careful dissection, wrist block anesthesia is not recommended.

A transverse incision in Langer’s lines leaves a less noticeable scar than a longitudinal one and usually provides adequate exposure. Care must be taken to protect the superficial nerves and extensor tendons on the approach between the second and fourth dorsal extensor compartments, which is aided by loupe magnification. Occasionally, the distalmost portion of the extensor retinaculum must be divided to provide adequate exposure. Careful dissection frees the mass from the surrounding tissue. The dissection is carried down the stalk to its capsular attachment at the scapholunate interosseous ligament. Ganglions may arise from other sites in the dorsal wrist and hand. However, many ganglions that are palpable in remote locations have a stalk that connects to the scapholunate joint. Two incisions may be necessary in this case, one over the mass and another over the scapholunate joint.

The cyst is dissected out through the first incision, passed under the extensor tendons in continuity with its stalk through the second incision, and then excised. Excising a small cuff of normal capsule along with the stalk while preserving the integrity of the scapholunate interosseous ligament (Fig. 1) has been shown to reduce the recurrence rate to approximately 4%, compared with 13% to 40% in a series involving excision of the cyst alone. This lower recurrence rate may be due to the removal of a valvular mechanism or microcysts in the surrounding capsular tissue.

Some surgeons prefer to cauterize the capsular resection margins in the hope that this may decrease recurrence, but this benefit has not been documented. The capsular defect is not closed, as this may lead to loss of wrist flexion. Some prefer postoperative splinting initially for patient comfort, but early wrist motion should be encouraged by postoperative day 3 to 5 to help prevent wrist stiffness.

Arthroscopic surgical treatment involves using a combination of suction punch and motorized shaver to resect the stalk of the cyst along with a 1-cm-diameter area of dorsal capsule at its attachment to the scapholunate ligament. Care must be taken to avoid destabilizing the ligament.
the dorsal portion of the scapholunate interosseous ligament. The arthroscopy is placed in the 6R portal, and a full-radius resector is introduced through the 3-4 portal. This places the resector just proximal to the confluence of the dorsal capsule and the scapholunate interosseous ligament and just proximal to the stalk of the cyst or through the ganglion itself.

Visualization can be challenging. Osterman and Raphael reported that the ganglion and its stalk looked like a pearl suspended from the dorsal capsule in 61% of their patients. Care must be taken to avoid injuring the scapholunate interosseous ligament and the extensor tendons, which lie just superficial to the capsule. Reported recurrence rates during early follow-up were comparable to the best results after open surgical treatment in one prospective cohort of patients.

The indications for operative treatment of occult dorsal ganglions remain controversial. The spectrum of pathologic changes includes mucoid degeneration of the capsule at its confluence with the scapholunate ligament and of the dorsal portion of the interosseous ligament itself. The capsule may be thickened or cystic and bulging. Occasionally, pathologic changes are seen only on microscopic examination.

Surgical treatment begins with excision of a 1-cm-diameter area of dorsal capsule at its attachment to the dorsal scapholunate interosseous ligament. The surface of the ligament is scraped, or a rongeur is used to clean the dorsal scapholunate ligament. A small curette is then inserted between the fibers of the ligament to decompress the scapholunate space and remove gelatinous material. Care must be taken not to destabilize the scapholunate joint. The reported series have been small, but in selected patients in whom other causes of wrist pain have been ruled out, the relief of pain and improvement in function can be dramatic.

### Volar Carpal Ganglions

Between 13% and 20% of hand and wrist ganglions occur at the volar wrist, making this the second most common location. Nearly two thirds arise from the radioscapophalangeal joint, and one third arise from the scaphotrapezial joint. The mass is usually palpable between the radial artery and the flexor carpi radialis (FCR) tendon, but it is occasionally adjacent to the scaphoid tubercle in the anatomic snuffbox or more distal in the palm. Less commonly, volar cysts arise ulnarly from the pisotriquetral joint and are palpable adjacent to the flexor carpi ulnaris (FCU) tendon.

Evaluation of volar carpal ganglions is similar to that of dorsal ganglions. Occult presentation is much less common in this location; ultrasonography may be helpful in diagnosis. Patients with volar cysts may present with sensory or motor nerve palsy involving the palmar cutaneous branch of the median nerve, the median nerve itself, the ulnar nerve, or the deep ulnar motor branch. The differential diagnosis includes the conditions mentioned for dorsal ganglions, aneurysms of the radial or ulnar arteries, and (rarely) intraneural cysts.

Options for treatment include observation, aspiration, and surgical resection. Observation is acceptable unless a nerve palsy is present. As with dorsal ganglions, other indications for surgery include pain and interference with activity. Aspiration is generally not recommended because of the risk of injuring the radial artery or the palmar cutaneous branch of the median nerve. For cysts in an ulnar location, aspiration carries a risk of injury to the ulnar neurovascular bundle. A recurrence rate after aspiration and injection of 57% to 83% has been reported.

Surgical excision may be performed under intravenous regional, axillary, or general anesthesia. Local or wrist block anesthesia is not adequate. A preoperative Allen test should be performed to document flow in the radial and ulnar arteries. Surgical excision of a volar radial ganglion in the presence of a preexisting ulnar artery occlusion should be done only if the patient and surgeon are prepared for arterial repair in the event of radial arterial injury. Loupe magnification, bipolar cautery, and a tourniquet are recommended.

The approach begins with a longitudinal incision just radial to the FCR tendon in the distal forearm and continues with a zigzag extension across the wrist crease if necessary. A transverse incision may provide adequate exposure for smaller ganglions and will heal with a less noticeable scar. Branches of the lateral antebrachial cutaneous nerve and superficial radial nerve must be protected. Initially, the cyst itself is ignored, and the radial artery is carefully dissected free and gently retracted radially. Numerous small branches of the artery and vein comitantes require bipolar cauterization. If this dissection is difficult due to adherence of the cyst wall to the artery, one may use the technique of Lister and Smith, in which one wall of the cyst is left attached to the artery while the remainder of the cyst and the stalk are excised.

The FCR tendon is released from its sheath and retracted ulnarly, taking care to protect the palmar cutaneous branch of the median nerve, which lies adjacent to the tendon ulnarly. At this point, the dissection proceeds down to the volar radiocarpal joint; the cystic mass and its
stalk are excised along with a small cuff of normal capsule. Care must be taken to avoid injuring the important volar radiocarpal ligaments. The capsular defect is left open. The tourniquet is released to verify patency of the radial artery and to allow cauterization of bleeding branches of the artery.

Greendyke et al found that many ganglions that present proximal to the wrist crease and adjacent to the FCR tendon actually arise from the scaphotrapezial joint. The stalk of the cyst communicates with the scaphotrapezial joint by way of the FCR tendon sheath. Cysts arising from this joint may also enter the carpal canal, causing compression of the median nerve, or may emerge distally in the palm.

The surgical approach for ulnar-sided volar ganglions begins with a longitudinal incision along the radial border of the FCU tendon. Further dissection isolates the ulnar neurovascular bundle, which is gently retracted radially, while the FCU tendon is retracted ulnarly. Care must be taken with proximal dissection to avoid damage to the dorsal sensory branch of the ulnar nerve. Many of these cysts originate from the pisotriquetral joint, and release of Guyon's canal may be necessary to allow safe exposure. The patient should be prepared preoperatively for excision of the pisiform in the event that significant pisotriquetral arthritis is seen intraoperatively.

The recurrence rate for volar ganglions after surgical resection is much higher than that for dorsal ganglions, up to 33% in some studies. This may be reduced to 7% with careful dissection of the cyst stalk down to the capsule. Because one third of these arise from the scaphotrapezial joint, one author recommends a capsulotomy at both the radiocarpal and the scaphotrapezial joint if the cyst is inadvertently ruptured during dissection and the joint of origin cannot be identified.

**Volar Retinacular Ganglion Cysts**

Volar retinacular ganglion cysts make up 7% to 12% of hand and wrist ganglions. They generally arise from the A1 or A2 pulley of the flexor tendon sheath and present as a small, very firm, minimally mobile mass near the proximal digital crease or metacarpophalangeal joint. These lesions do not move with flexor tendon excursion and measure 3 mm to 1 cm in diameter.

The diagnosis is usually made by physical examination alone. Pressure on a digital nerve by the cyst may cause decreased sensation distally in the corresponding distribution. The differential diagnosis includes epidermoid inclusion cyst, giant cell tumor of tendon sheath, foreign body granuloma, lipoma, and neurilemoma.

Treatment in many cases is simple observation, but pain due to pressure during grasp may necessitate treatment. Needle puncture is successful in approximately 70% of patients but the digital nerve may be at risk for injury if the cyst lies lateral to midline.

Surgical treatment is generally safe and effective. In a bloodless operative field, dissection is carried down to isolate the mass and tendon sheath, while identifying and protecting the radial and ulnar neurovascular bundles. The mass is excised with a small window of tendon sheath. A light postoperative dressing allows early unrestricted motion.

**Mucous Cysts**

Mucous cysts usually occur in middle age or later and are more common in females. A gradually enlarging subcutaneous mass develops over the dorsal DIP joint. The lesion is firm and minimally mobile and can be transilluminated. The location is typically lateral to midline, since the stalk connects with the DIP joint and is displaced by the terminal extensor tendon. Nail deformity may develop from pressure on the germinal matrix. In rare instances, the cyst presents as a subungual mass with severe nail deformity.

Mucous cysts are associated with osteoarthritis, and radiographs of the DIP joint will typically show joint-space narrowing, subchondral sclerosis, and dorsal osteophytes. The overlying skin may be thinned by the cyst, leading to open rupture and possibly infection. The differential diagnosis includes Heberden's node, gout, and giant cell tumor of tendon sheath.

Observation, aspiration, and excision are options for treatment. Observation is acceptable in many cases. Painful nail deformity and impending rupture due to thinning of skin are relative indications for aspiration and surgery. Pain is the typical indication for excision; however, patients must understand that successful resolution of the cyst will not necessarily relieve pain if the pain is due to underlying osteoarthritis. Aspiration with or without corticosteroid injection has been advocated by some authors, but the recurrence rate may be in excess of 50%. In one study, the eventual cure rate for needle puncture followed by expression of contents was 72%; however, more than ten treatments were required in several patients. The infection rate was 2%.

Surgical treatment should include excision of the stalk of the cyst, removal of the dorsal capsule and synovium, and debridement of dorsal osteophytes to minimize the risk of recurrence. Total resection of
the mass and involved skin is not necessary. Meticulous skin care during surgical dissection and postoperatively minimizes the likelihood of complications. This procedure may be effectively performed with the use of metacarpal block anesthesia and a digital tourniquet.

Many incisions have been described, including H, T, inverted U, and gently curving transverse configurations (Fig. 2). An H-shaped incision with the transverse limb over the DIP joint and the longitudinal limbs in the midaxillary line provides excellent exposure of marginal osteophytes. One may need to plan ahead for the possibility of a rotational flap closure, such as in treatment of an open draining cyst. In this case, the defect may be triangulated, and a transverse incision along the distal base of the defect is gently curved proximally. Care must be taken to avoid damaging the germinal nail matrix, which may extend more than 5 mm proximal to the eponychial fold. A skin graft may be needed for closure, but usually the wound can be closed directly.

A light compressive dressing is used for 2 weeks, but immobilization is not necessary in most cases. If the skin is particularly friable or the terminal extensor tendon seems tenuous after dissection and debridement, immobilization of the DIP joint for the first 10 days postoperatively is prudent. Placement of the splint volarly or laterally avoids pressure on the wound. Osteophyte and capsule debridement along with excision of the stalk lowers the recurrence rate to 2%, compared with 25% to 50% after cyst excision alone. If the patient has pain from arthritis in the DIP joint, arthrodesis may be combined with cyst excision.

For the patient who presents with an open ruptured cyst, wet-to-dry dressing changes with dilute bleach (Dakin solution) or other antibiotic solution, along with oral antibiotic therapy, will promote healing. If infection develops, surgical irrigation and debridement of the DIP joint is indicated, followed by open packing and dressing changes. In the event of chronic wound drainage, surgical irrigation and debridement may be combined with DIP joint arthrodesis.

**Ganglions Associated With Tendons**

Ganglions associated with tendons occur most commonly at the dorsal wrist, but ganglions are occasionally seen along the extensor apparatus in the digits or arising from the FCR tunnel at the wrist. The ganglion is usually adherent to tenosynovium without affecting the tendon structure, but in rare instances the cyst is intratendinous. Intratendinous ganglions are often associated with tenosynovitis.

The provisional diagnosis is made by physical examination, but the definitive diagnosis can be made only on open biopsy. The typical finding is a subcutaneous mobile mass that moves with tendon excursion. Giant cell tumor of the tendon sheath, tenosynovitis of inflammatory or infectious origin, and extensor digitorum brevis manus muscle belly are included in the differential diagnosis.

As with other types of ganglions, observation is acceptable treatment in many cases. Pain, interference with activity, overlying skin changes, and doubt about the diagnosis are relative indications for treatment. Aspiration has a rather high rate of recurrence but carries a low risk of damage to surrounding structures on the dorsal wrist and digits. In addition, the finding of clear gelatinous fluid on aspiration is comforting in ruling out other causes even if the mass recurs.

True intratendinous ganglions may structurally weaken the tendon, and surgery may therefore be indicated. Excision combined with local tenosynovectomy is generally straightforward. Care must be taken when excising intratendinous ganglions to preserve the structural integrity of the tendon. The defect is closed with an inverted nonabsorbable suture.

**Intraosseous Ganglions**

Intraosseous ganglions of the hand and wrist are most common in the scaphoid and lunate. Other locations include the remaining carpal bones, the metacarpals, the phalanges, and the distal ulna. Some are primarily contained within bone, while others seem to form by penetration of a juxtaosseous gan-
glion into bone. The microscopic appearance is identical to that of extraosseous ganglions.20,21

Intraosseous ganglions are often noted incidentally on routine plain radiographs. The lesions appear radiolucent with a sclerotic border and frequently contact a joint surface without causing cortical expansion. Magnetic resonance imaging may disclose intraosseous ganglions that are not visible on conventional radiographs.21 Computed tomography allows precise localization, which may be helpful in planning a surgical approach.

An otherwise normal radiograph without joint-space narrowing, subchondral cortical thickening, osteopenia, or osteophyte formation helps differentiate the intraosseous ganglion from subchondral cysts associated with different types of arthritis. Cystic changes in the ulnar head, lunate, and triquetrum often accompany ulnar impaction syndrome. The differential diagnosis also includes simple bone cyst, aneurysmal bone cyst, osteoid osteoma, osteoblastoma, enchondroma, chondroblastoma, giant cell tumor, nonossifying fibroma, and chondromyxoid fibroma.20

Establishing that an intraosseous ganglion is the actual cause of the patient’s pain may be very difficult and in many cases is a diagnosis of exclusion. One must be wary of embarking on a painful and expensive surgical treatment for what may actually be an incidental radiographic finding. In one prospective study21 the authors used wrist pain, increased uptake on bone scan, and visualization on radiographs or MR images as indications for surgery. All patients experienced pain relief after cyst excision.

If other causes of wrist or hand pain have been addressed and the patient remains symptomatic, surgical curettage of the cyst may be considered. Cancellous bone grafting is indicated for large lesions and those causing thinning of subchondral bone.

For a cyst located in the distal pole of the scaphoid, a volar approach through the floor of the FCR tendon sheath is preferred. Under tourniquet control, a longitudinal incision is made along the radial border of the FCR tendon and zigzagged across the wrist crease. The dissection proceeds to the scaphoid tubercle, taking care to protect the radial artery, the palmar cutaneous branch of the median nerve ulnarly, and branches of the lateral antebrachial and superficial radial nerves distally and radially. This approach allows good access for curettage, as well as for harvesting of the bone graft from the volar metaphysis of the distal radius by extending the incision slightly proximally. The volar radiocarpal ligaments should be repaired during closure.

For exposure of cysts located in the proximal pole of the scaphoid or in the lunate, a dorsal approach is recommended. The bare area of the dorsal radius just proximal to Lister’s tubercle is a convenient source of bone graft in these situations. Depending on the size of the defect and the thickness of remaining subchondral bone, the patient may need splinting or cast immobilization for several weeks to allow incorporation of the bone graft. Rates of significant pain relief ranging between 65% and 90% and recurrence rates of 2% to 25% have been reported.21

Complications

When approaching the patient with a ganglion of the hand or wrist, the surgeon must weigh carefully and discuss frankly the relative risks and benefits of the treatments considered. The primary concern of the patient is often cosmesis, and the relationship of the ganglion to wrist or hand pain may be questionable. Surgery for this condition should never be performed casually without adequate anesthesia, instrumentation, lighting, tourniquet control, assistance, and a sterile environment. Patients who perceive their treatment as simple and straightforward will be less understanding if complications arise.

Complications caused by untreated ganglions are rare. Compression of the median or ulnar nerve by a volar carpal ganglion may cause motor and sensory deficits. Volar retinacular ganglion cysts may compress digital nerves. Skin breakdown and subsequent infection may result from untreated mucous cysts. Vascular occlusion of the radial artery by a volar carpal ganglion has been reported.

Complications of aspiration and injection include a slight risk of infection in all locations, injury to the palmar cutaneous nerve and radial artery in the volar radial wrist, ulnar neurovascular injury in the ulnar volar wrist, and digital neurovascular injury in the region of the palmar digital crease.

Surgical complications include infection, decreased motion, instability, and neurovascular injury. Wrist stiffness is most common after resection of carpal ganglions, especially after closure of dorsal capsular defects and postoperative immobilization. Therefore, capsular closure is not recommended, and early motion is encouraged. Close follow-up should establish whether supervised physical therapy is needed. Injury to the scapholunate interosseous ligament during dorsal carpal ganglion excision, leading to dorsal intercalated segment instability, is extremely rare. Radial artery laceration during volar carpal ganglion excision is the most common vascular complication of surgery. The same nerves that are at risk during aspiration must be respected during the surgical approach to ganglion...
cysts. Branches of the superficial radial nerve on the dorsal wrist are particularly vulnerable when a transverse incision is used.

Summary

Ganglion cysts are a common presenting complaint encountered by orthopaedists and hand surgeons. Many patients need only reassurance as to the benign nature of the mass. If significant pain or interference with activity develops, needle aspiration or surgery may be considered. Needle puncture is effective treatment for approximately 70% of volar retinacular ganglion cysts, but is less than 50% effective for dorsal carpal and mucous cysts. The eventual cure rate is higher if the patient is willing to undergo multiple procedures. Corticosteroid injection along with aspiration, although often performed, has no proven benefit. Needle puncture and aspiration is not recommended routinely for volar carpal ganglions because of the risk to neurovascular structures. The underlying principle for successful surgery is complete excision of the stalk of the cyst along with a cuff of surrounding capsule at the base of the stalk. Experience with mucous cysts, as well as the early arthroscopic results with dorsal carpal ganglions, suggests that complete excision of the main body of the cyst is not necessary. In a patient with dorsal wrist pain at the scapholunate interval and a negative workup for other causes, an occult ganglion may be considered.

References