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Ganglion Cyst

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An 11-year-old, right-hand-dominant girl with an unremarkable medical history presented with a lump on her right wrist that had appeared the previous day. She denied any trauma, pain, paresthesias, or limited range of motion. Physical examination revealed a 2-cm, firm, mobile nodule on the dorsum of the right wrist (**Figure**).

Figure. *A 2-cm, firm, mobile nodule that had appeared the previous day on the dorsum of an 11-year-old girl's right wrist.*

Her grip strength and wrist range of motion were symmetric bilaterally, and the lesion transilluminated. Her Beighton score for hypermobility was normal at less than 7 points (**Table 1**).

Table 1. Beighton Score for Hypermobility in Children		
Passive dorsiflexion of 5th metacarpophalangeal joint to ≥90° (1 point for each side)	Yes	2
Passive hyperextension of the elbow ≥10° (1 point for each side)	Yes	2
Passive hyperextension of the knee ≥10° (1 point for each side)	Yes	2

Passive apposition of thumb to flexor side of forearm while shoulder is flexed 90°, elbow is extended, and hand is pronated (1 point for each side)	Yes	2
Forward flexion of trunk with knees straight so that hand palms rest easily on floor	No	1
	Maximum Score	9
	Hypermobility	≥7

She received a diagnosis of a ganglion cyst and was referred to a surgeon for further evaluation and management.

Discussion. A ganglion cyst is a benign swelling overlying a joint capsule or tendon sheath that contains gelatinous fluid rich in mucopolysaccharides. Ganglion cysts are thought to arise from the migration of synovial fluid into the vicinity of the joint, and they contain a stalk that connects the cyst to the nearby joint capsule.[1]

The prevalence in children is difficult to determine, since cysts usually are painless and do not interfere with function. In patients with wrist pain, cysts have a prevalence of 19%.[2] In adults, women are up to 3 times more likely to be affected than men.[3] There is a similar gender bias in children, with the reported female-to-male ratio ranging from 1.6 to 1 to 4.7 to 1.[3,4] In children older than 10 years, 60% to 70% occur on the dorsal aspect of the wrist. Volar ganglia account for up to 20% of hand and wrist ganglions, and volar retinacular cysts make up 7% to 12%.[5] Their size may fluctuate with time and activity. One study showed that patients with dorsal ganglions are more likely to have generalized ligamentous laxity and as such are a reason for assessment with the Beighton scale.[6]

The diagnosis is made clinically; cysts are typically firm, rounded, smooth, rubbery, movable, and occasionally tender.[7] Modalities such as transillumination, ultrasonography, and magnetic resonance imaging (MRI) may be useful in distinguishing them from other neoplastic soft tissue masses. Transillumination can differentiate cysts from lipomas, tenosynovial giant cell tumors, epidermoid cysts, and synovial sarcomas (**Table 2**). Masses of infectious origin typically present with erythema, warmth, swelling, and tenderness. Ultrasonography may reveal well-defined margins, thick walls, and acoustic enhancement. MRI may be indicated when pain occurs. One study found MRI had a 100% positive predictive value.[8]

Table 2. Differential Diagnosis of Ganglion Cysts of the Wrist and Hand

Condition	Pathogenesis	Clinical Findings	Transilluminates
Ganglion cyst	Cause unclear; thought to arise from migration of synovial fluid into the	Often asymptomatic; compressible, slightly mobile mass; may be	Yes

	migration of synovial fluid into the vicinity of the joint[9]	slightly mobile mass, may be associated with aching wrist pain, tenderness, and interference with activity[5]	
Epidermal inclusion cyst	Epithelial cells implant in subdermal location, leading to keratin-filled cysts; may be a result of antecedent trauma[1]	Usually firm and mobile, located underneath the skin; skin puncta may be noted[1]	No
Tenosynovial giant cell tumor	Comprised of polymorphous cell population including histoid, xanthoma, and osteoclast-like giant cells[10]	Firm, fixed nodule; painless, and slow growing[10]	No
Lipoma	Mature fat cells enclosed by fibrous capsules[11]	Soft, painless, rubbery, mobile mass[11]	Yes/no
Infectious tenosynovitis	Infection of the closed synovial sheaths of tendons secondary to trauma; may be due to contiguous or hematogenous spread[12]	Tenderness over the course of the tendon sheath, pain with movement of the area[12]	No
Tendinous xanthoma	Tissue macrophages phagocytose lipid components of lipoproteins deposited into tendons[13]	Firm-to-hard subcutaneous nodules with normal-appearing overlying skin that can be easily moved over the nodules[13]	No
Synovial sarcoma	Translocation creates a fusion oncoprotein that drives malignant cell proliferation[14]	Slow-growing, painless, solid mass that arises close to joints or bursae, most frequently adjacent to the wrist[15]	No

Treatment is generally unnecessary, since up to 80% of ganglion cysts spontaneously resolve.[4,16,17] Patients who experience pain or limited range of motion, or whose cysts increase in size, may need surgical intervention. Other treatment options include aspiration, aspiration and injection with or without hyaluronidase, injection with a sclerosant, transfixation with a silk suture, manual rupture, and cyst wall puncture with a percutaneous needle. Aspiration, injection, or rupture is not routinely advised, since these procedures increase the risk of neurovascular injury in volar cysts and results in a higher rate of recurrence, 43% to 83%.[7,8,16-19] Patients who experience pain, limited range of motion, or whose cysts increase in size may

need surgical intervention. Although recurrence rates are generally lower with surgical excision, recurrences in children are higher than in adults and range from as low as 6% to as high as 35%.[7,20] Of note, there is a 25% increased risk of recurrence with patients who have had a previous aspiration of the cyst.[20] Possible complications of surgical excision such as nerve injury, keloid formation, postoperative stiffness, and scapholunate instability must also be considered and explained to the patient and family.[21]

Outcome of the case. Rather than waiting for spontaneous resolution, our patient opted for surgical excision of her ganglion cyst due to cosmetic reasons and was doing well 3 months later. She reported no recurrence of the cyst nor pain at the surgical site. She continued to have full range of motion of the wrist after the surgery.

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