

Intraneural Ganglion Cyst at the Wrist Presenting as Radial Neuropathy

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Abstract

Ganglion cysts are the most common cause of a mass or lump in the hand and wrist with a benign presentation and clinical course. The author's present an unusual case of ganglion cyst at the wrist in a patient who presented with radial neuropathy, with a radiological, surgical and pathological correlation.

Keywords: Ganglion cyst; Intra-neural ganglion; Radial nerve; Wrist

Introduction

Ganglion cysts are benign mass-like cystic lesions that commonly occur in association with musculoskeletal structures such as tendon sheaths, ligaments, joint capsules, bursa, muscles or nerves [1]. They can arise at various locations, the most common site being in the hand and wrist, where they are usually asymptomatic but may cause pain and pressure symptoms due to compression of the surrounding structures [2]. Besides plain radiographs, magnetic resonance (MR) imaging and ultrasound are the most common imaging modalities used for the assessment of the wrist joint (post-traumatic, sports injuries, rheumatic or oncologic pathologies [3,4]. Since a large number of these cysts are incidental and asymptomatic, imaging may not be obtained by an experienced hand surgeon. However, if imaging is performed, both the surgeon and radiologist should be well versed with typical and atypical imaging characteristics of these benign lesions, and accurately differentiate them from other neoplastic lesions [5]. Unusual clinical presentation and radiological findings may confuse the imaging picture and unwary radiologist and surgeon may be led away from the actual diagnosis of a benign ganglion cyst. The authors describe an unusual presentation of ganglion cyst at the wrist which presented as radial neuropathy, with respective surgical and pathological correlation.

Case Report

A 15 year old boy presented with a three year history of a cystic mass over the dorsal aspect of the right wrist. There was no limitation of function of the wrist, but he reported transient numbness, pain and tingling in his fingers while writing or performing physical activity. Tinel's sign was absent on physical exam, and there was no decrease in muscle strength or movement of the right hand. EMG was normal with no evidence of median or ulnar neuropathy. The plain radiographs of the wrist showed no bony abnormalities with presence of mild dorsal soft tissue swelling [Figure 1]. MR imaging showed a lobulated lesion in the subcutaneous tissues overlying the dorsal aspect

of the distal radius. The lesion showed hyperintensity on STIR (short tau inversion recovery) images and hypointensity on T1 weighted (T1W) imaging. There was linear extension of the mass lesion to the dorsal radiocarpal capsule, which in view of sensory symptoms raised the suspicion of retrograde intraneural extension along the radial sensory nerve. Surgical excision of the wrist mass was performed, which revealed a ganglion cyst filled with clear fluid. The mass was seen encompassing the two dorsal branches of the superficial radial nerve with a "chain of beads" appearance. Distally, the two branches came together at the interval of third and fourth extensor compartments, which were opened to protect its contents. The histopathological examination of the mass confirmed the diagnosis of soft tissue ganglion cyst. The patient did well postoperatively and the sensory symptoms resolved.

Discussion

A ganglion cyst is a benign cystic mass without a synovial lining that is surrounded by dense connective tissue and is filled with a gelatinous fluid rich in mucopolysaccharides [1]. It may be found in varied locations such as intra-articular, extra-articular, intraosseous or intraneural. There are several theories proposed to explain the pathogenesis of ganglion cysts, such as myxoid degeneration of periarticular connective tissues, displacement of synovial tissue during embryogenesis, and degeneration of connective tissue after trauma (injury hypothesis) [6]. Some authors have suggested the unifying articular (synovial) theory for the intraneural ganglion cyst, which states that the ganglion arises from a rent in the capsule of a synovial joint, dissects through the joint fluid retrograde along the articular branch into

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How to Cite this Article: Avneesh Chhabra. Repeated Sprint Ability Exercise in 9-year-old Basketball Players: Effect of Change of Direction. Ann Med Health Sci Res. 2017; 7: 20-22

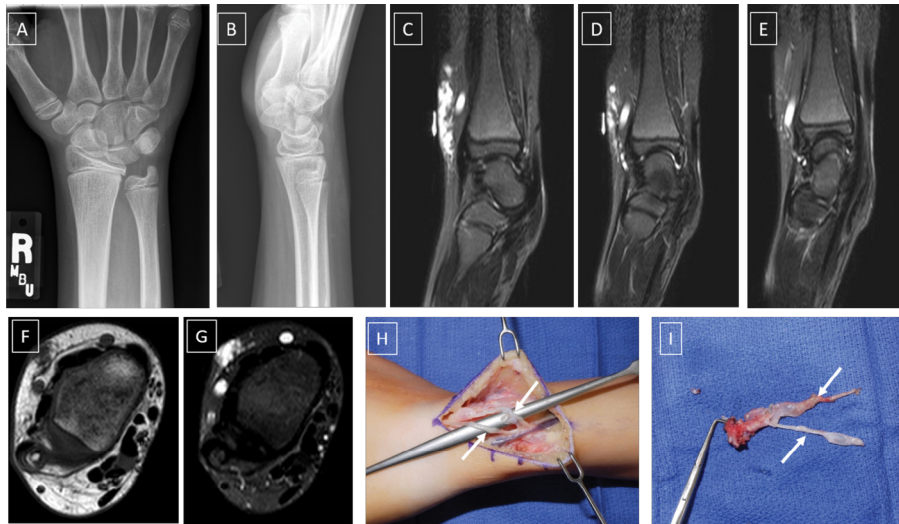


Figure 1: Intra-neural Ganglion cyst. (A,B) Plain radiographs do not show bony abnormality. Notice mild dorsal soft tissue swelling. (C-G) MR images showing lobulated lesion in the subcutaneous tissues overlying the dorsal aspect of the distal radius, showing T1 hypointensity and STIR hyperintensity. (H) Intraoperative view of intraneural ganglion cyst, right wrist. Superficial radial nerve branches (arrows) isolated after opening the ganglion cyst confirming the intraneural extension of the lesion. (I) On the close-up view, the pointer shows the base of the cyst where a circumference of dorsal wrist capsule was removed in conjunction with the mass.

the parent nerve, and propagates intra-epineurally along the path of least resistance [7,8]. Though this mechanism has been described for peroneal nerve ganglion, it appears that a similar mechanism underlies the genesis of other intraneural ganglia elsewhere in the body.

While the imaging features of ganglion cyst are relatively nonspecific and diagnosis is usually based on clinical presentation, it is important that they must be differentiated from tumors to avoid unnecessary interventions. Plain radiographs do not usually show any abnormalities, except soft tissue swelling as seen in all these 3 cases. These are obtained to exclude other pathological mass-like lesions or demonstrate central calcifications, which can be seen with other neoplastic lesions. MRI is the modality of choice to further characterize the cyst, which is often multilobular and depicts hypointensity on T1W images and hyperintensity on T2W or STIR images [9]. Gadolinium administration may reveal rim enhancement in addition to the diffuse enhancement of the cyst [5]. The diagnosis is confirmed only by aspiration of the cyst which reveals fluid which is translucent and thick in consistency.

Ganglion cyst causing radial nerve neuropathy [10-12] are rare. Linear bubbly extension of the cyst along the joint line and/or presence of sensory compressive symptoms should raise the suspicion of retrograde intra-neural extension. Although this entity is benign, in the author's experience, the atypical presentation of such ganglion cyst can lead to unusual radiological findings, which may confuse an unwary radiologist and produce difficulty to the surgeon intra-operatively. Histopathological examination is required in all these cases for final confirmation and diagnosis.

In conclusion, intraneural ganglion cyst of the wrist can manifest with uncommon presentation of radial neuropathy which can lead to atypical radiological and surgical findings.

Conclusion

In conclusion, these findings showed that performing RSA

in-line or with COD resulted in different acute physiological responses for the cardiovascular and neuromuscular systems of 9-year-old basketball. Although all RSA protocols elicited similar HR responses, adding two COD induced larger fatigue. Therefore, coaches and fitness trainers should consider the unique physiological responses to RSA exercises. Especially those working with very young basketball players should consider using no COD in order to reduce the physiological load. Practical ways to reduce this load might be either to use submaximal instead of maximal running speed during RSA with CODs or to perform the COD slowly or to manipulate other exercise parameters (e.g. decrease number of sprints or increase rest duration among sprints).

Conflict of Interest

All authors disclose that there was no conflict of interest.

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