

Radiology Case Reports

Volume 2, Issue 2, 2007

Ruptured Peroneal Ganglion Cyst: MRI with Surgical Correlation

Eric C. Wang, Felix S. Chew

We describe a case of a proximal anterior leg mass causing weak great toe dorsiflexion. The lesion was demonstrated on MR imaging as a multilocular cystic lesion within the extensor digitorum longus muscle that was connected to the proximal tibio-fibular joint by a pedicle. Fluid extravasation was present that extended inferiorly from the lesion along the fascial planes into the distal anterior lower leg. At surgery, the lesion was found to be compressing the deep peroneal nerve. The final pathologic diagnosis was peroneal ganglion cyst.

Case Report

An adult man presented with complaints of a palpable mass in the left anterior leg with increasing weakness of great toe dorsiflexion. He previously noticed the soft tissue mass several months ago, but believed it subsequently decreased in size and did not seek medical evaluation at that time. Over the days prior to his presentation, he noted increasing pain in his anterior leg with active dorsiflexion of his foot, which progressed to night pain, severe enough to warrant a visit to the emergency room. The patient also noted an increasing inability to dorsiflex his great toe. He did not notice numbness. There was no history of trauma to this region.

Physical exam of his left lower extremity demonstrated normal dorsalis pedis pulses with normal skin and no signs of trauma. There was a 7 cm palpable mass at the proximal third of his anteromedial proximal leg, not adherent to the skin. Motor exam demonstrated slight weakness of dorsiflexion of the tibialis anterior and extensor hallucis longus. His peroneal muscles were normal in strength without atrophy. On sensory exam, there was an area of slightly diminished sensation in the deep peroneal nerve distribution at the great toe and 2nd ray webspace; however, sensation in the superficial peroneal, tibial, sural and saphenous nerves was normal.

Radiographs of the region were normal. MRI demonstrated a multiloculated fluid-filled cystic mass within the proximal extensor digitorum longus muscle that appeared to be arising from the tibiofibular joint and extending inferiorly and anterolaterally (Figure 1). There was a pedicle connecting the cystic mass with the proximal tibio-fibular joint. High T2 signal extended from the mass distally into the extensor digitorum longus muscle and inferiorly along the adjacent fascia for several centimeters, consistent with leaking fluid. Following intravenous gadolinium administration there was mild enhancement of the capsule of the mass, but the T2-bright signal tracking inferiorly did not enhance, nor did the cyst contents (Figure 2). These findings were consistent with ruptured peroneal ganglion cyst with fluid tracking down the anterior leg compartment.

At the time of surgery, several weeks later, a multilocular cystic mass was excised from within the peroneal muscula-

Citation: Wang EC, Chew FS. Ruptured peroneal ganglion cyst: MRI with surgical correlation. *Radiology Case Reports*. [Online] 2007;2:35.

Copyright: © 2007 Eric C. Wang. This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs 2.5 License, which permits reproduction and distribution, provided the original work is properly cited. Commercial use and derivative works are not permitted.

Abbreviations: MRI, magnetic resonance imaging, CT, computed tomography

Eric C. Wang (Email: ewangmd@gmail.com) and Felix S. Chew are in the Department of Radiology, University of Washington, Seattle, WA 98105, United States.

Published: June 29, 2007

DOI: 10.2484/rcr.v2i2.35

Ruptured Peroneal Ganglion Cyst

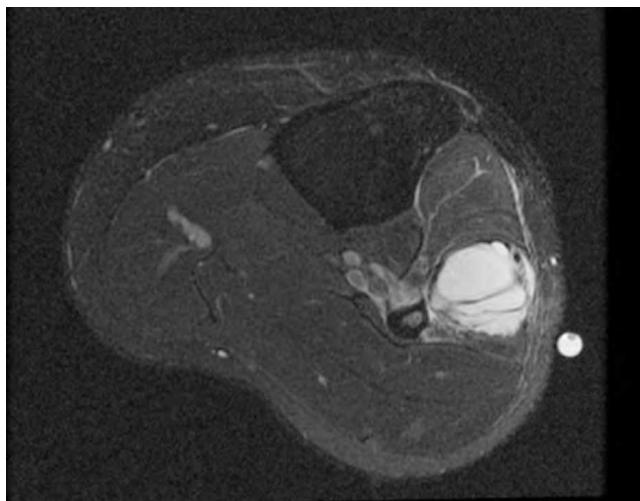


Figure 1A. Ruptured peroneal ganglion cyst. T2 fat-saturated axial MRI shows a multiloculated cyst within the extensor digitorum longus muscle.

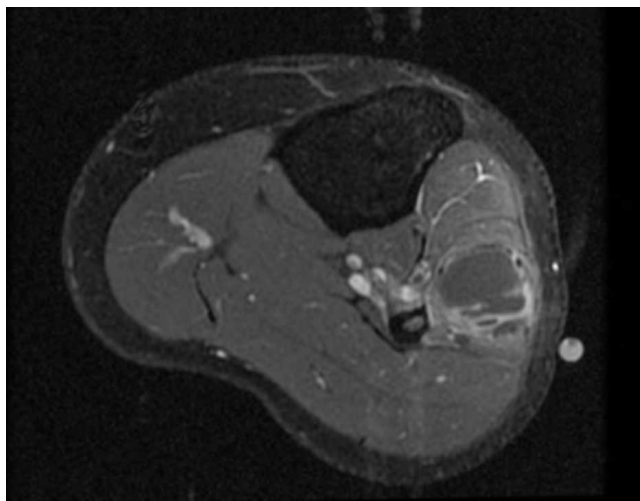


Figure 1B. Ruptured peroneal ganglion cyst. Post-gadolinium T1 fat-saturated axial MRI shows enhancement of the cyst walls but not of the cyst contents or the surrounding tissues.

ture. A pedicle connecting the lesion to the proximal tibiofibular joint was identified, and the mass was found to be compressing the deep peroneal nerve. The final pathologic diagnosis was peroneal ganglion cyst.

Discussion

Peroneal ganglion cysts, also referred to as proximal tibiofibular ganglion cysts, are relatively usual findings on MRI. One study of knee MRI scans in outpatients found a prevalence of approximately 0.76% for proximal tibiofibular ganglion cysts⁽¹⁾, while a similar study of popliteal cysts found a prevalence of approximately 30%⁽²⁾. In both studies, these lesions were mostly incidental, asymptomatic

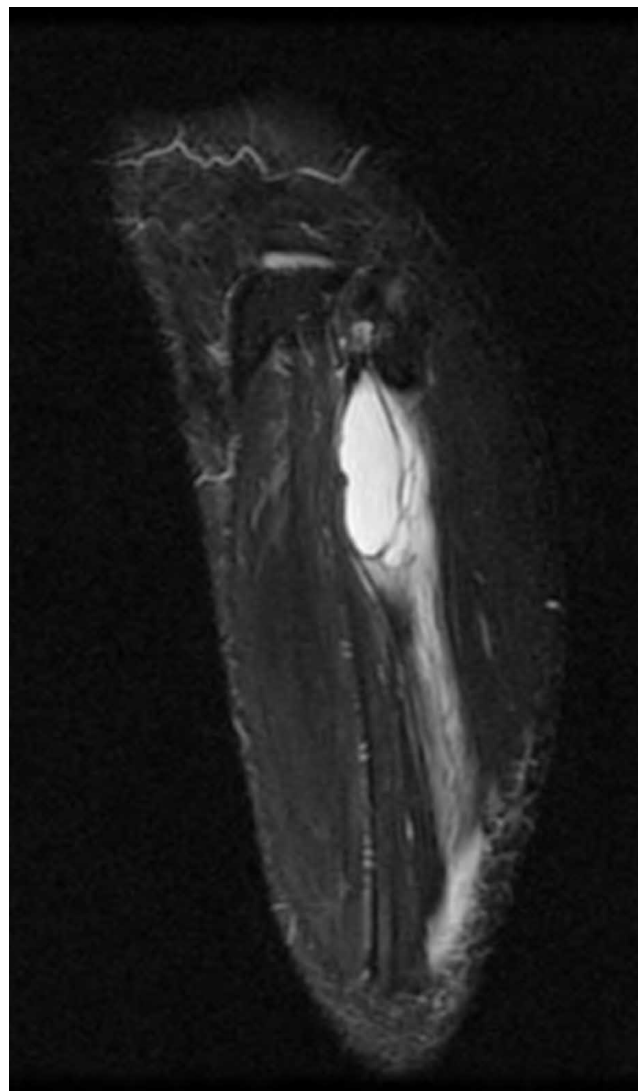


Figure 1C. Ruptured peroneal ganglion cyst. T2 fat-saturated sagittal MRI shows a multiloculated cyst with fluid tracking distally from the lesion along fascial planes.

findings Clinically, they present with signs and symptoms of palpable mass and pain which can radiate down the leg and may be exacerbated by squatting. Compressive neuropathy of the common peroneal nerve or its branches may also occur. Generally, symptomatic peroneal nerve compression is first manifest by anterolateral leg and dorsal foot pain in the peroneal nerve distribution followed by progressive weakness of the peroneal musculature and finally foot drop⁽³⁻¹⁰⁾. Classically, nerve ganglion cysts are described as pseudocysts formed by the accumulation of mucoid material around a nerve sheath, while ganglion cysts are similar mucoid-filled pseudocysts formed from adjacent joints or tendons^(7, 8, 11). Recent studies have shown that peroneal ganglion cysts and intraneural ganglion cysts are similar in

Ruptured Peroneal Ganglion Cyst

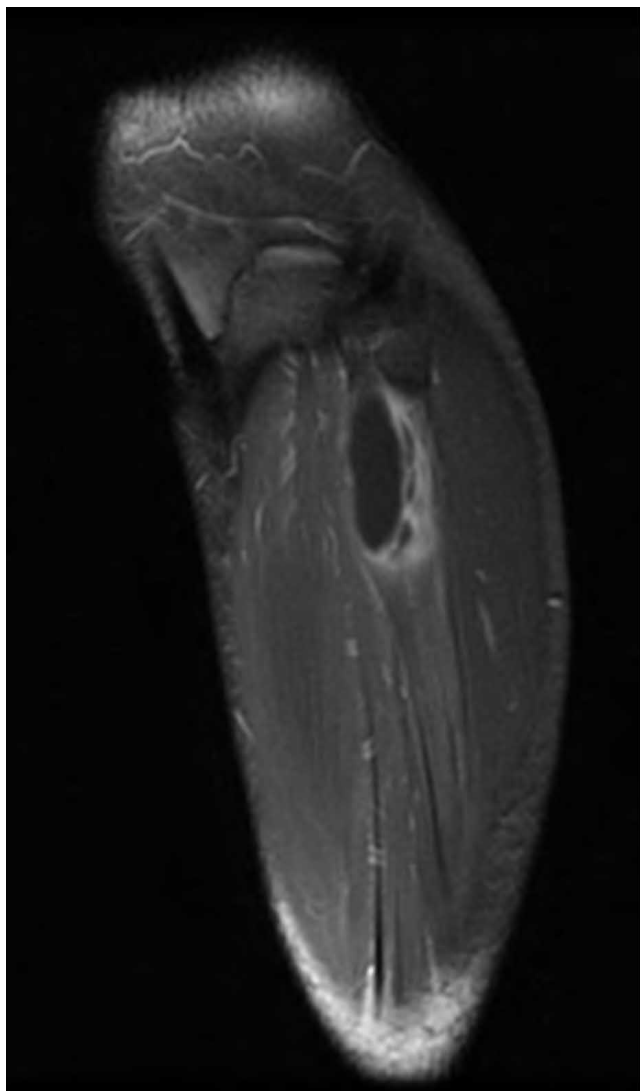


Figure 2. Ruptured peroneal ganglion cyst. Post-gadolinium T1 fat-saturated sagittal MRI shows enhancement of the cyst walls but not of the cyst contents or the surrounding tissues. The fluid tracking distally along the fascial planes does not enhance.

histological appearance and likely are varying manifestations of the same pathologic process; most recent studies use the terms interchangeably (8, 10).

In the case presented, we believe that rupture of the cyst with fluid extravasation was the cause of the acute symptoms. Rupture of peroneal ganglion cysts has not been well-described in the literature, to our knowledge. Radiologists are likely to be more familiar with rupture of popliteal cysts (Baker's cysts); our case demonstrates imaging findings that are similar to this more common condition. We found high signal on T2-weighted MR images that tracked along fascial planes but did not demonstrate enhancement following intravenous gadolinium injection. One might also expect that rupture of a peroneal ganglion cyst might have clinical

features that are similar to ruptured popliteal cysts, although in the anterolateral rather than posterior anatomic distribution. In the case presented, it is clear that mass effect from the cyst was the cause of the patient's chronic symptoms. The deep peroneal nerve innervates the extensor hallucis longus, which dorsiflexes the great toe.

The diagnosis of ganglion cyst has predominantly relied upon physical exam, sonography and MRI. Radiographs generally demonstrate normal anatomy in the setting of ganglion cysts. Sonography is a useful screening modality as it is inexpensive, noninvasive, and easily performed. On sonography, ganglion cysts are typically anechoic with well-defined margins, as is characteristic for fluid-filled masses (11). However, while sonography can distinguish between solid and fluid-filled masses, it provides little information regarding the mass' relationship to adjacent bone, muscle, and nerves, and it may be difficult to distinguish a ganglion cyst from a cystic schwannoma (11).

MRI is the modality of choice to delineate the anatomic boundaries of the lesion. On MRI, ganglion cysts are typically well-marginated with T1-dark, T2-bright homogenous centers, commonly with internal septations creating the "bunch of grapes" appearance (9). Careful examination can reveal communication with the proximal tibiofibular joint, although recent studies suggest that CT arthrography (12) or MRI arthrography (13) may be more sensitive for the evaluation of joint communication than just MRI. Following intravenous gadolinium administration, there may be mild enhancement of the fibrous cyst walls, as in our example, but the center should not enhance (9). With large cysts, mass effect can lead to peroneal nerve compression and denervation with resultant fatty atrophy of the peroneal musculature. The sequelae of denervation should be evaluated both with T1 unenhanced images to show fatty atrophy, as well as fast suppressed T2 or short-tau inversion recovery images to show edema (9, 10).

Treatment of peroneal ganglion cysts has traditionally been marginal excision with removal of the pedicle connecting the cyst to the joint (8). The rate of recurrence after such surgery is 13%, and recurrence following a second excision attempt as high as 100%; thus, repeat surgery is not recommended by some authors for the recurrent ganglion cyst (14). Spinner and coworkers have emphasized the importance of locating and severing the communication between the cyst and the proximal tibiofibular joint to prevent recurrence (15-16). Minimally invasive methods such as needle aspiration and corticosteroid injection have been even less effective, with an extremely high rate of cyst recurrence and low patient satisfaction; however these techniques may be useful for confirming the diagnosis or for those who refuse surgery (8). Any cyst exhibiting evidence of direct mass effect on the peroneal nerve should be treated with surgical excision (17). If a peroneal ganglion cyst recurs after marginal excision, resection arthroplasty of the proximal fibula or proximal tibiofibular joint fusion have been performed with high degrees of success and little or no recurrence (18).

References

1. Dubuisson AS, Stevenaert A. Recurrent ganglion cyst of the peroneal nerve: radiological and operative observations. Case report. *J Neurosurg*. 1996 Feb;84(2):280-3. [[PubMed](#)]
2. Nucci F, Artico M, Santoro A, Bardella L, Delfini R, Bosco S, et. al. Intranural synovial cyst of the peroneal nerve: report of two cases and review of the literature. *Neurosurgery*. 1990 Feb;26(2):339-44. [[PubMed](#)]
3. Jerome D, McKendry R. Synovial cyst of the proximal tibiofibular joint. *J Rheum* 2000; 27:1096–1098. [[PubMed](#)]
4. McCarthy CL, McNally EG. The MRI appearance of cystic lesions around the knee. *Skeletal Radiol*. 2004 Apr;33(4):187-209. Epub 2004 Feb 27. Review. [[PubMed](#)]
5. Steiner E, Steinbach LS, Schnarkowski P, Tirman PF, Genant HK. Ganglia and cysts around joints. *Radiol Clin North Am*. 1996 Mar;34(2):395-425, xi-xii. Review. [[PubMed](#)]
6. Malghem J, Vande berg BC, Lebon C, Lecouvet FE, Maldague BE. Ganglion cysts of the knee: articular communication revealed by delayed radiography and CT after arthrography. *Am J Roentgenol*. 1998 Jun;170(6):1579-83. [[PubMed](#)]
7. Miskovsky S, Kaeding C, Weiss L. Proximal tibiofibular joint ganglion cysts: excision, recurrence and joint arthrodesis. *Am J Sports Med*. 2004. 32(4):1022–1028. [[PubMed](#)]
8. Damron TA, Rock MG. Unusual manifestations of proximal tibiofibular joint synovial cysts. *Orthopedics*. 1997 Mar;20(3):225-30. [[PubMed](#)]
9. Kapoor V, Theruvil B, Britton JM. Excision arthroplasty of superior tibiofibular joint for recurrent proximal tibiofibular cysts: a report of two cases. *J Bone Spine*. 2004 71:427–429. [[PubMed](#)]