5-2019

Air in Parameniscal Cyst: Alarming Appearance of a Benign Condition

Madison Grasty

Nicholas Laucis
Henry Ford Health System

Manmeet Dhillon
Henry Ford Health System

Gas in a Parameniscal Cyst: Alarming Appearance of a Benign Condition

Madison Grasty MS, Nicholas Laucis MD, Manmeet Dhillon MD,

Department of Radiology - Henry Ford Health System, Detroit, Michigan

Abstract

Introduction:
Parameniscal cysts are an uncommon finding in radiology and often are associated with meniscal tears. While they are not always symptomatic, they may manifest with knee pain and require radiologic studies. We present an unusual case of a gas containing parameniscal cyst concerning for possible necrotizing fasciitis.

Case Report:
A 60 year old male patient with a history of gout and previous gout exacerbations presented to the emergency department with knee pain. His clinical picture in conjunction combined with the radiographic finding of subcutaneous gas was suspicious for necrotizing fasciitis. Upon further imaging, it was concluded that the patient had a gas filled parameniscal cyst.

Conclusions:
This case is unique and presents an important teaching point with the very concerning presentation of a benign condition. Knowledge of this presentation of parameniscal cysts could possibly prevent unnecessary workup or intervention. Our search through the database of radiology reports through 2000 did not reveal similar presentations of paramensical cysts.

Case Report

A 60 year old man presented to the emergency department complaining of pain in the left knee. Discomfort began a week prior to presentation, was insidious in onset and became progressively worse, prompting him to visit the emergency room. Despite the severity of the pain, the patient stated it began without a recent injury, trauma or falls and felt similar in nature to previous gout exacerbations. The patient denied any recent procedures or injections to his left leg.

The patient has a past medical history of gout, hypertension, type 2 diabetes, and left knee parameniscal cyst. The parameniscal cyst was aspirated 5 months before presentation with pathology negative for malignant cells.

Review of systems revealed joint pain and joint swelling without muscle pain.
The patient's exam was significant for edema and exquisite tenderness as the medial aspect of the left knee. A moderate left knee joint effusion was present, however the knee had full range of motion. No crepitus around the knee was noted. Laboratory assessment showed elevated blood ESR at 56 mm/hr and CRP 1.8 mg/dL.

Given his clinical picture and suspicion of gouty arthropathy, a knee radiograph was obtained (figure 1). The left knee x ray demonstrated no acute fracture, dislocation or effusion. However an area of soft tissue density medial to the knee contained gas. This area of soft tissue gas was in the location of a previously see parameniscal cyst on MRI (figure 3). Due to suspicion for possible infection, a CT of the knee was acquired to investigate possible air in the soft tissues versus infected parameniscal cyst. The CT showed a multiseptated parameniscal cyst along the medial patellofemoral joint, with a large amount of air in the cyst (figure 2). Additionally, severe tricompartmental osteoarthrosis with spurring, joint space loss, subchondral cystic formation and vacuum phenomenon within medial and lateral compartments was shown.

Orthopedic surgery in discussion with radiology determined the patient has a benign gas filled parameniscal cyst and the patient's symptomatic presentation was likely a gout exacerbation.

Laboratory Values

WBC	5.5 K/uL	Lymphocyte %	35 %
RBC	4. 03 M/uL	Monocyte %	7 %
HgB	11.7 g/dL	Eosinophil%	3 %
Hct	35.1%	Basophil %	1 %
MCV	87.2 fl		
RDW	17.1%	ESR 56 mm/Hr	
Platelet	156 K/uL	CRP 1.8 mg/dL	
Neutrophil %	54 %		

Imaging

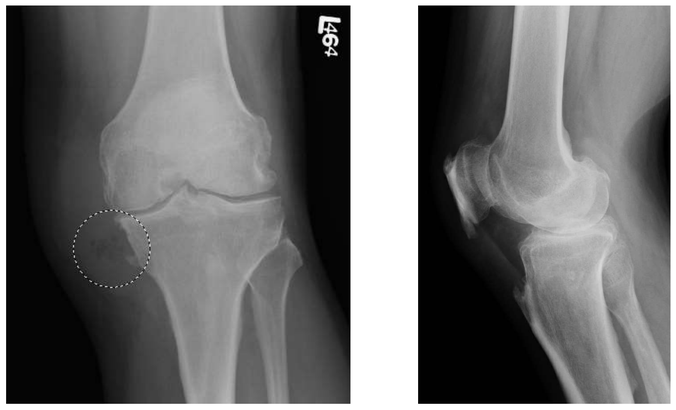

Figure 1. AP and lateral radiographs of the left knee. Several small bubbles of gas are seen in a round collection in the medial soft tissues is present (circle). Note the advanced degenerative changes in the knee joint.

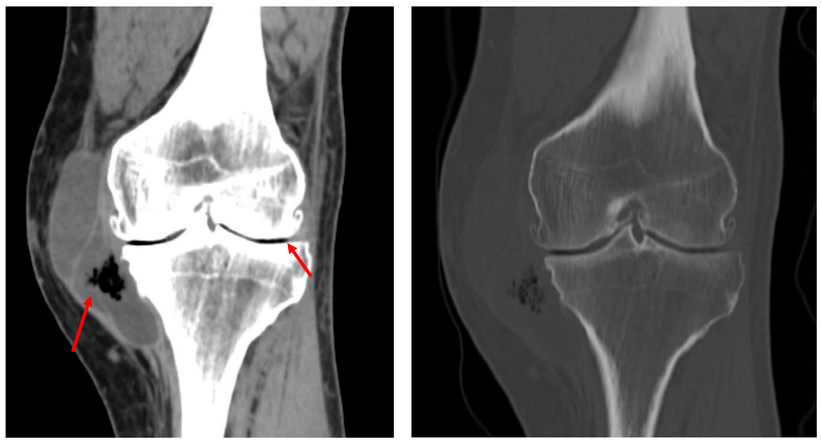

Figure 2. Coronal CT of the left knee with soft tissue windowing (left) and bone windowing (right) obtained at the time of the radiograph, demonstrating a gas and fluid filled septated parameniscal cyst. Note the gas in the knee joint spaces. No gas is seen linearly tracking through any other soft tissues, as what is typically seen in necrotizing fasciitis.

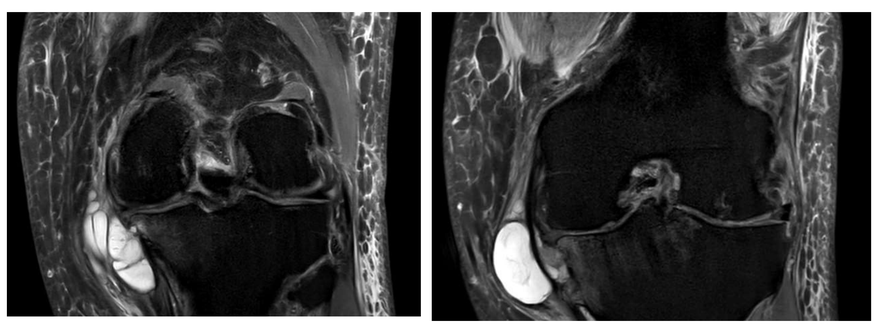

Figure 3. Two coronal MR imges of left knee obtained a year before the patient's presentation. A medial multiseptated parameniscal cyst was seen in the same location as the cyst seen on the later CT, albeit smaller. No gas is seen within the cyst.

Discussion

Parameniscal cysts are the result of cystic structures which appear adjacent to the meniscus. These are often associated with a tear in the meniscus and subsequent synovial fluid extravasation through the defect in the meniscus into the adjacent soft tissues by weight bearing forces, creating a presentation similar to the one seen in this patient [1].

On occasion, gas can fill parameniscal cysts. Spontaneous and transient intra-articular gas is commonly seen on routine radiographs, referred to as vacuum phenomenom. This phenomenon, more commonly seen on children and infants, was observed by Fick in 1910 [2]. The vacuum phenomemon is created as distraction of opposing articular surfaces converts a potential space into a real space, whose volume must be filled. A negative pressure is created, causing gas dissolved in synovial fluid to leave solution to fill the space. When the articular surfaces are allowed to return to their normal position, the vacuum is released and the gas immediately disappears [3].

In advanced osteoarthritis, as in this patient, the joint capsule is thickened and less compliant, increasing the occurrence of vacuum phenomenon with slight distraction of the joint [3]. In the presence of a parameniscal cyst, gas from vacuum phenomenon can follow the defect in the meniscus and similar to a ball-valve mechanism, become trapped within the parameniscal cyst. There the gas is not readily absorbed, such as it is intra-articularly. This gas is different composition from normal air, typically containing 90% nitrogen [4].

MRI is the diagnostic method of choice for parameniscal cyst, however if this pathology is not suspected and radiographs reveal a finding of subcutaneous emphysema without a history of trauma, as in this case, this may lead clinicians to suspect necrotizing fasciitis or an infected parameniscal cyst. It is important to investigate into a patient's recent procedures, aspirations, or injections, since air can be introduced iatrogenically, and air in a parameniscal cyst after a recent aspiration or inejction should be concerning for an infected cyst.

Air within the soft tissue, particularly along anatomical planes in the absence of trauma is pathognomonic for necrotizing fasciitis [5]. Given the possible sequela which can result from this diagnosis, it is a medical emergency and prompt action is critical in ensuring patients receive proper treatment to prevent patient demise. When a patient presents with suspected necrotizing fasciitis, the care team should do its best to rule out other etiologies as the differential diagnosis when necrotizing fasciitis can include but is not limited to cellulitis, pyoderma gangrenosum, dermatomyositis, gas gangrene, vasculitis, diabetic myonecrosis, gas-containing or infected parameniscal cyst, compartment syndrome or DVT. The treatment for necrotizing fasciitis is quite radical and often warrants broad spectrum antibiotics, extensive surgical debriding, hemodynamic support and at times intravenous immunoglobulin.

Parameniscal cysts are rare with an incidence ranging from 1 – 8% and this can create an opportunity for them to be missed, given the uncommon nature of this finding [6]. Being aware of their etiology, clinical and radiologic presentation can be particularly critical when they can appear so similarly to the grave diagnosis of necrotizing fasciitis.

References

1. De Smet AA, Graf BK, del Rio AM. Association of parameniscal cysts with underlying meniscal tears as identified on MRI and arthroscopy. AJR Am J Roentgenol. 2011 Feb;196(2):W180-6. doi: 10.2214/AJR.10.4754.
2. Fick. Rudolf: Handbuch der Anatomie und Mechanik der Gelenke unter Berficksichtigung der bewegenden Muskeln. Teil II, Allgemeine gelenk- und Muskel Mechanik, p. 53. Jena. Gustav Fischer. 1910.
3. Kay SP, Gold RH, Bassett LW. Meniscal pneumatocele. A case report of spontaneous, persistent intra-articular and juxta-articular gas. J Bone Joint Surg Am. 1985 Sep;67(7):1117-9.
4. Knutsson, Folke: The Vacuum Phenomenon in the Intervertebral Discs. Acta Radiol., 23: 173-179, 1942.
5. Chaudry AA, Baker KS, Gould ES, Gupta R. Necrotizing Fasciitis and Its Mimics: What Radiologists Need to Know. AJR Am J Roentgenol. 2015; 204: 128-139. 10.2214/AJR.14.12676
6. Kose O, Erol B, Ozyruek S, Ege T. A giant parameniscal cyst of the knee joint. Case Reports 2013;2013:bcr2013009440