

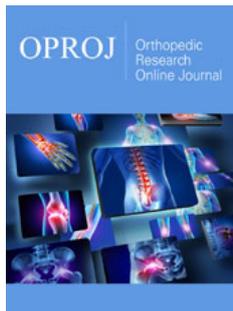
# High-Resolution Ultrasonography Diagnosis of Meniscal Cyst from Lateral Meniscus

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## Abstract

Meniscal cyst is a rare pathology that may present clinically with pain or mechanical symptoms in and around the knee joint. It results from encysted & extruded synovial fluid through meniscal tear usually secondary to trauma. It is best delineated on magnetic resonance imaging of knee joint which provides a noninvasive diagnosis but is non-therapeutic. However, with the availability of ultramodern ultrasound scanner, it is now possible to diagnose meniscal cyst accurately by high-resolution ultrasonography which also provides a possibility of the therapeutic procedure. Hence in this article, we try to emphasize the diagnostic value of high-resolution ultrasonography in rare meniscal cyst pathology of knee joint.

**Keywords:** High-resolution; Ultrasonography; Meniscal cyst; Lateral meniscus

## Introduction

Meniscal cyst (MC) is a rare pathology of knee joint with an estimated incidence of nearly 4% (range 1-8%) in previous studies on magnetic resonance imaging (MRI) of knee joint [1,2]. Majority of these cysts are believed to have arisen from the extruded synovial fluid through meniscal tears [1]. These cysts can be intrameniscal (within the substance of meniscus - IMC) or parameniscal (when the cyst crosses the articular margins - PMC) in location [3].

Meniscal cyst usually presents as a focal knee pain or tender palpable swelling but rarely as painless swelling [3]. Due to its common association with meniscal tears, MC may also present with signs of joint stiffness or locking. PMC may be palpable with PMC of Lateral Meniscus (LM) more commonly palpable than that of Medial Meniscus (MM) [4].

Imaging forms the mainstay of diagnosis and its subsequent management. Magnetic Resonance Imaging (MRI) is gold standard imaging tool for evaluation of internal knee joint pathologies including meniscal tears and MC [4]. With the advent of ultramodern ultrasound scanners, high-resolution ultra sonography (HRUS) has assumed the role of a screening or diagnostic imaging tool in variety of pathologies of joints including knee joint. HRUS can sensitively detect all cysts including MC, besides its ability to guide therapeutic aspiration of these cysts in the same sitting [3]. In this article, we present a case of meniscal cyst that was diagnosed correctly by HRUS.

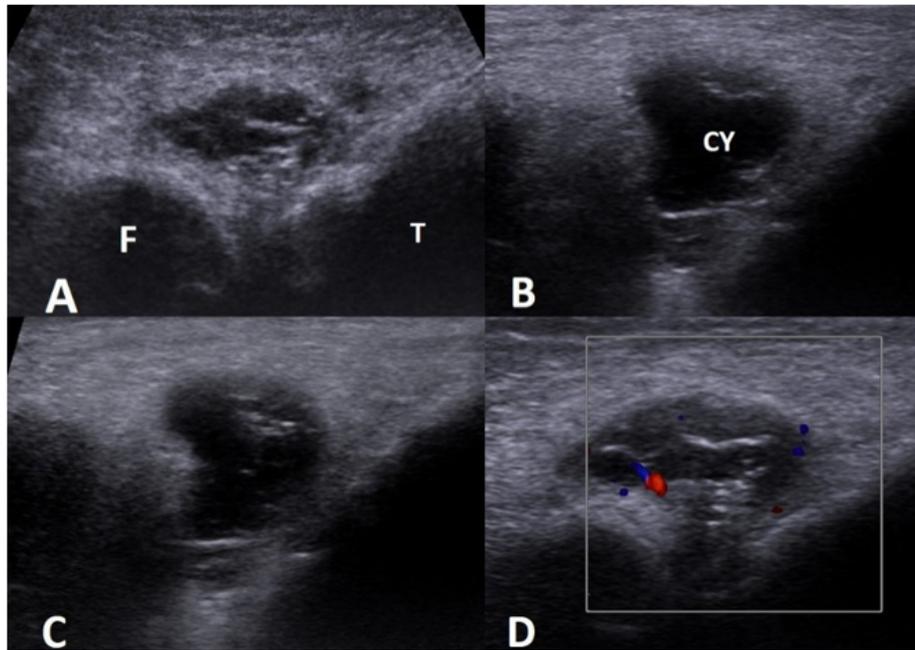
## Case Report

A 26-year old female with focal painful swelling on the antero lateral aspect of knee joint for last few months visited our department for high-resolution ultra sonography to determine the nature of lesion. The swelling was pea-sized and tender without external signs of inflammation. History of trauma was denied. There was no other significant associated clinical finding in the corresponding knee joint. The laboratory findings and radiograph of knee joint were also unremarkable.

HRUS revealed a complex cystic lesion at the site of palpable tender swelling measuring approximately up to 28\*19mm showing intense posterior acoustic enhancement (Figure 1). The lesion was located adjacent to lateral meniscus beyond the articular line & limited externally by lateral collateral ligament. The cyst had smooth walls, echogenic internal debris

with fine septations and echogenic, punctate, mural nodules. No obvious extension of the cyst into joint cavity was noted. On color doppler imaging few vascular channels were noted in the wall & septa of the lesion. No evidence of any obvious synovial fluid

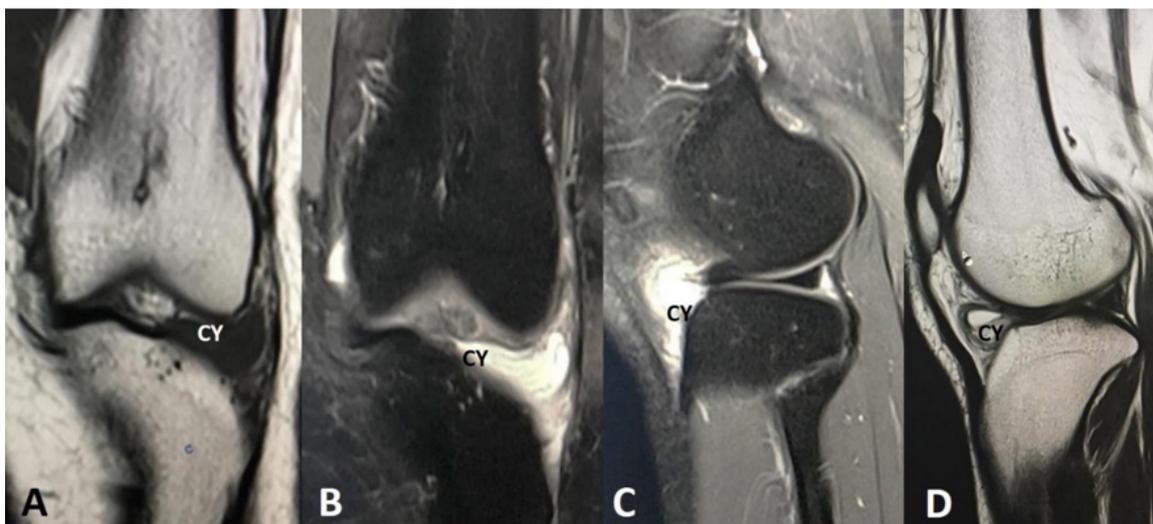
is noted in the suprapatellar bursa. Based on HRUS findings, a diagnosis of inflamed parameniscal cyst of lateral meniscus was made and patient was advised aspiration and injection of steroids. However, the patient refused and insisted on further investigation.



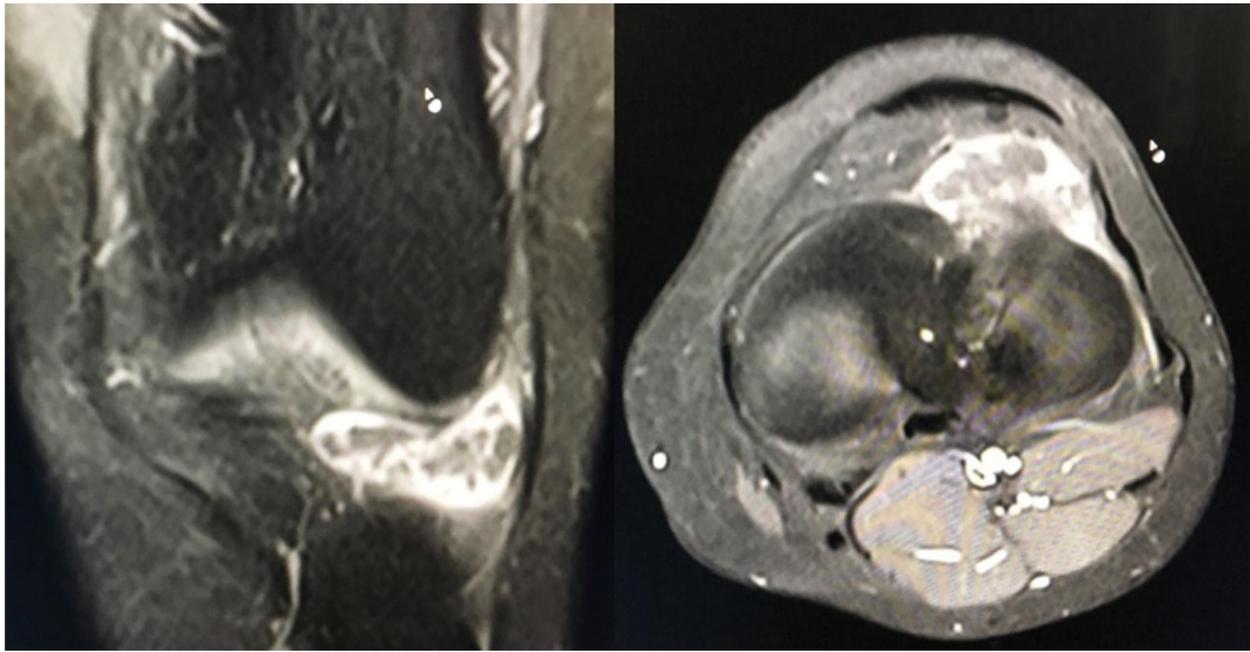
**Figure 1:** Series of HRUS images (A-C) showing a complex parameniscal cyst adjacent to lateral meniscus with internal septations, echogenic debris and mural nodules as well as subtle vascularity on color doppler image (D) [F: Femoral condyle, T: Tibial Condyle].

MRI of corresponding knee joint was done as part of further work-up and it confirmed the HRUS findings with parameniscal cyst of lateral meniscus appearing intermediate-intensity on T1-weighted images and variably hyperintense on T2-weighted, STIR & fat-suppressed PD images showing significant mural & septal enhancement on postcontrast, fat-saturated, T1GRE images (Figure

2 & 3). There was no sign of lateral meniscal tear or joint effusion. No finding was noted in addition to that of HRUS. Following MRI knee joint patient was given treatment options of aspiration with steroid injection or arthroscopic partial resection of lateral meniscus. But patient refused and lost to follow-up.



**Figure 2:** Coronal T1W (A), Coronal STIR (B), Sagittal FS-PD (C) and Sagittal T2W images shows a complex parameniscal cyst of lateral meniscus with thick-walls and internal septations. No evidence of any corresponding meniscal tear or joint effusion was noted [CY: cyst].



**Figure 3:** Coronal (Left) and Axial (Right) Postcontrast, Fat-suppressed, T1GRE MRI images shows a complex parameniscal cyst of lateral meniscus with thick-walls and internal septations showing significant postcontrast enhancement as well as close association with anterior horn of lateral meniscus without tear or enhancement on axial image. No evidence of any synovial enhancement was noted.

## Discussion

Though MC around knee joint is rare yet when present they are commonly symptomatic either due to pain or mechanical symptoms [3]. Since they are commonly associated with trauma hence loculated extrusion of synovial fluid through the meniscal tear is considered as a major etiopathogenetic mechanism except when related to anterior horn of LM [1,5,6]. Few studies have revealed that PMC adjacent to anterior horn of lateral meniscus are less often associated with meniscal tear partially due to cysts or ganglion of anterior cruciate ligament (ACL) [5,6]. Though this did not appear to be in our index case as the epicenter of the cyst was far away from the tibial insertion of ACL.

IMC are usually detected incidentally on knee joint MRI while PMC usually present as painful palpable swelling & rarely as symptomless swelling [3]. PMC are more commonly associated with LM [4]. HRUS offer the advantages of being a noninvasive, radiation-free & inexpensive imaging tool to assess any amenable soft tissue swelling including the area around the joints. It offers the advantage of fast & immediate comparison with corresponding area on opposite side of midline besides being reproducible, easily repeatable and time efficient. Besides, HRUS can be the only imaging tool in patients with contraindication to MRI [3]. Though there are fewer studies on the utility of HRUS in MC yet the conducted studies reveal high sensitivity and specificity. In a study by Rutten et al. [7], HRUS had sensitivity, specificity, Positive Predictive Value (PPV), Negative Predictive Value (NPV) and accuracy of 97%, 86%, 94%, 92% and 94% respectively in detection of MC [7]. Another study done by Sorrentino et al yielded a sensitivity, specificity, PPV & NPV

of 94%, 100%, 100% & 94.5% respectively in detection of MC by HRUS [8].

On HRUS, MC is seen as thin or thick-walled, cystic lesion with posterior acoustic enhancement (confirming its fluidic nature) within or adjacent to meniscus. The cyst may be anechoic or may show presence of internal debris or septations in cases of chronic / complicated cysts. Inflamed MC may reveal some vascularity on color doppler imaging as seen in our index case explain the pain & tenderness of the palpable swelling.

HRUS can be used to guide for aspiration of MC including PMC as a conservative method of management followed by injection of corticosteroids [3,9,10]. This method has been suggested to complete cure the symptoms in nearly 80% with long-term resolution in rest in one of the previously conducted study [3,10]. In another study on lateral meniscal cyst management, partial lateral meniscectomy along with percutaneous decompressive needling of the parameniscal cyst revealed positive clinical and radiological long-term results without signs of degenerative changes [11].

MRI on the other hand, though expensive & has limited availability yet it is considered as the goldstandard imaging tool for diagnosis of MC as it not only delineates its extent but also detect other incidental knee joint abnormalities [4]. However, in our case, HRUS was able to delineate the entire extent and complete nature of the PMC without any additional information on MRI knee joint. MRI is especially useful in large or giant PMC with erosion of adjacent bone, dissection into adjacent tissues and superadded infection as STIR images are extremely sensitive to marrow edema

& post contrast images detect breach in blood barrier [12,13]. MRI however, is severely limited by the cost of its repeatability.

### Conclusion

Though MRI is the gold-standard modality for imaging meniscal cyst yet HRUS in expert hand approaches the accuracy of MRI, besides providing avenues for therapeutic procedure that is well tolerated and effective in majority of patients.

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