

## PLICA SYNDROME – A NEGLECTED DIAGNOSIS IN KNEE PAIN

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**ABSTRACT**

**OBJECTIVE:** The Plica syndrome is a neglected diagnosis in knee pain. The purpose of this article is to emphasize the diagnosis of Plica syndrome by MRI knee, which affects the patient management. **MATERIAL AND METHODS:** Retrospective evaluation of MRI knee revealed the diagnosis of Plica syndrome in otherwise reported normal MRI knee. The synovial plica are easily appreciated as low signal bands on sagittal and axial T1 and T2 weighted images at the anatomic locations of knee joint. **RESULTS:** Out of 737 reported normal MRI knee, five cases revealed thick bands of plica, which in clinical setting of knee pain and trauma, suggested the diagnosis of Synovial Plica syndrome at MRI and confirmed by arthroscopy. **CONCLUSION:** MRI knee is an easy, non-invasive method to diagnose the synovial plica syndrome, which can affect the patient management and avoiding unnecessary arthroscopy.

**Key words:** Plica syndrome, knee pain, MRI

**Introduction**

Plica syndrome is defined as painful impairment of knee function, whereby normally thin, pliable synovial plica becomes abnormally thickened, edematous and fibrotic, leading to clinical syndrome.<sup>1</sup> The synovial plicae are normal structures in the knee, representing embryological remnants of synovial membranes during development.<sup>2</sup> These plicae are asymptomatic and may be seen on MRI examinations as thin bands of low signals in most pulse sequences.<sup>3</sup> However, due to chronic inflammation with direct trauma or repeated sports activities, can lead to thickening and fibrosis of the plica, resulting in painful impairment of knee functions. MRI examinations, particularly Gradient echo T2 weighted images and fat suppressed T2 weighted or proton density images are valuable for the demonstration of synovial plicae in the normal or abnormal knees.<sup>3</sup> Demonstration of thickened synovial plica in the clinical setting of knee pain with no other obvious cause on MRI examinations is valuable for the management of such patients. Plica syndrome

is a neglected diagnosis in majority of patients presenting with chronic pain with normal MRI knee reports. Retrospective evaluation of normal MRI knee reports with chronic knee pain from October 2007 - May 2009, revealed five cases to be having Plica syndrome at MRI and confirmed by arthroscopy. The purpose of this article is to emphasize the diagnosis of Plica syndrome, which may be neglected and easily diagnosed non-invasively by MRI knee examinations, affecting the patient's management.

**Materials and Methods**

Between May 2009 – June 2012, there were 950 MRI examinations of knee, done at King Saud Hospital, Unaiza, Kingdom of Saudi Arabia, a teaching Hospital affiliated with Qassim University, KSA. Out of 950 cases, 737 cases were reported normal by the two consultant radiologist having 6-10 years of experience in MR reporting. The cases with degenerative changes in menisci are considered to be normal and included in this study. However, cases with meniscal injuries,

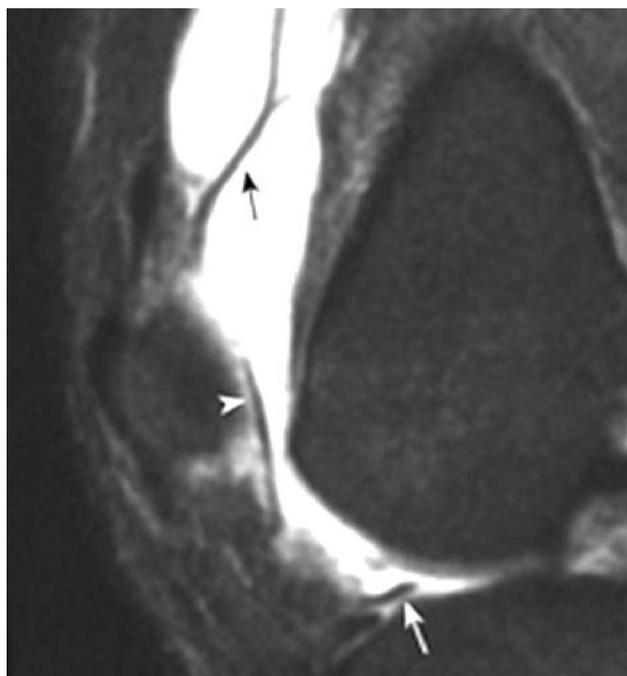
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ligamentous injury, Bakers cyst, Osteoarthritis changes and bone bruise are excluded from the study. All MRI examinations were done on 1.5 Tesla MRI machine, Siemens Avanto.

All the knees were evaluated with fat suppressed T2 weighted sagittal images and proton density axial images for this study in addition to routine standard sequences for MRI knee. Retrospective evaluation of these 737 reported normal MRI examinations by the author revealed synovial thickening, reflected by the thickened low signal bands on fat suppressed T2 images or proton density images at the locations of normal synovial plicae in the knee in five cases. The presence of synovial plicae was correlated with the clinical notes of patients having chronic recurrent knee pain. Two patients had already arthroscopy revealing suprapatellar plica syndrome. Remaining three patients were called and asked for the arthroscopy. Subsequent arthroscopy in these 3 selected cases confirmed the diagnosis of Plica syndrome.

## Results

On MR imaging, the normal synovial plicae are represented by low signal thin bands in the suprapatellar, infrapatellar and mediopatellar locations (Fig. 1).



**Figure 1:** Multiple synovial plicae. Sagittal fat-saturated T1-weighted MR arthrogram demonstrates suprapatellar (black arrow), mediopatellar (arrowhead), and infrapatellar (white arrow) plicae.

The MRI in two knees showed low signal band in the suprapatellar region (Fig. 2) and labelled as suprapatellar plica syndrome.



**Figure 2:** Suprapatellar plica. Sagittal gradient-echo MRI shows a low signal thick band like structure at the suprapatellar space (arrow). Note also the intraarticular loose bodies (arrowheads).

Two MR knee revealed, low signal bands in mediopatellar locations (Fig. 3) and labelled as mediopatellar plica.



**Figure 3:** Medial Plica. MRI demonstrates a thin, hypo intense line (arrow) that originates at the medial wall of the knee joint.

One MRI knee demonstrated the low signal band in infrapatellar location (Fig. 4) and was labelled as having infrapatellar plica syndrome.



**Figure 4:** Infrapatellar plica. Sagittal turbo spin-echo T2-weighted MR images show a thickened low-signal-intensity band (arrow) anterior and parallel to the ACL.

No case was found to have lateral plica syndrome in this study. The arthroscopy confirmed the diagnosis of suprapatellar plica in two cases, mediopatellar plica in two cases and infrapatellar plica in one case. This is in accordance to the findings of MRI examination (Tab. 1)

Number of Patients	Clinical Symptoms	Previous MRI Report	Retrospective MRI diagnosis	Arthroscopic diagnosis
Two	Chronic pain above the patella, aggravated by stairs climbing	Normal	Suprapatellar plica syndrome	Suprapatellar plica
Two	Chronic Pain medial aspect of knee aggravated with sports activities.	Normal	Mediopatellar plica syndrome	Mediopatellar plica
One	Mild pain off/on infrapatellar region	Normal	Infrapatellar plica syndrome	Infrapatellar plica

**Table 1:** Comparison of MRI and Arthroscopy results

## Discussion

The synovial plicae are considered as remnants of synovial membranes at suprapatellar, infrapatellar and mediofemoral locations in few cases. These plicae are asymptomatic and may be seen on MRI examinations as thin bands of low signal on T2 weighted and proton

density images against the high signal fluid. MR arthroscopy is ideal to demonstrate these plicae by virtue of distended joint capsule. The chronic inflammation due to repeated sports activities or direct trauma can lead to loss of pliability, thickening and subsequent fibrosis of the plica, resulting in chronic knee pain. The change in morphology of plica may lead to snapping sound as the plica moves over bony prominence.

Few anatomic studies revealed many types of synovial plicae with variable thickness and rigidity.<sup>4</sup> Most authors accept thickened plicae are symptomatic and related with plica syndrome.<sup>5</sup>

Mediopatellar plica syndrome is common in teenagers with sports activities, having low incidence of meniscal and ligamentous injuries.<sup>6</sup> Medial patellar pain during physical activities or rest is typical. A palpable, tender cord like structure medial to the patella is considered a pathognomonic in most cases of mediopatellar plica syndrome. Sagittal fat suppressed T2 images and proton density axial images are valuable in demonstration of mediopatellar plica, it appears as low signal band in T1 and T2 weighted images, pronounced against high signal fluids within the joint.

Suprapatellar plica syndrome manifests clinically as chronic dull aching pain above the patella, aggravated by stairs climbing or long sittings with knee flexed.<sup>7</sup> On physical examination, tenderness and palpable cord like structure superomedial to patella is the clue for the diagnosis. However, clinical diagnosis is difficult and MRI is needed to confirm the diagnosis. At MR imaging, the suprapatellar plica is best visualized on sagittal fat suppressed T2 images as low signal band posteriosuperior to the patella. The diagnosis of suprapatellar plica is also difficult on arthroscopy; therefore, MRI is more crucial here.

The infrapatellar plica or ligamentum mucosum is rarely symptomatic. Its significance is to identify it as anatomic structure on MRI examinations, avoiding confusion with loose bodies or focal nodular synovitis. On MRI, infrapatellar plica is visible on sagittal T2 images as low signal structure anterior and parallel to the anterior cruciate ligament.<sup>8</sup>

The lateral plica existence is doubtful; however literature search reveals its visibility on MRI examination as thin low signal band on lateral aspect of patella. It is rarely symptomatic.<sup>9</sup>

The prevalence of synovial plica is variable based on

methods of detection. The arthroscopy is more prevalent to diagnose the synovial plica. However, with the advent of MR imaging, plicae are easy to demonstrate as low signal bands against high signal fluids. So far only few imaging studies are available highlighting importance of plicae detection.

Zidorn has classified suprapatellar plica into four types based on morphology.<sup>10</sup> The only available study by R. Lee Cothran et al reported few cases of infrapatellar plica injury.<sup>11</sup> Sakakibara categorized mediopatellar plica into four groups based on size.<sup>12</sup> Ogatta and Uthoff correlated the rare lateral plica with the lateral subluxation of patella.<sup>2</sup>

The limitation of this study is retrospective evaluation and at a small scale. However, further large scale retrospective or perspective studies will open new doors to the diagnosis of easily missed and neglected diagnosis of synovial plica syndrome. The significance of the diagnosis of this rare condition can alter the patient management, avoiding uncertainty and unnecessary arthroscopies.

## Conclusion

Synovial plicae are normal anatomic structures in the knee. Due to repeated sports injuries or direct injury to the knee, may result in loss of pliability of plica, with thickening, rigidity and fibrosis of the plica. Such patients may present clinically with chronic knee pain. MR imaging is a valuable non-invasive method to detect the plica as low signal bands. A diffusely thickened plica with other non-specific findings on MR imaging in the clinical setting of trauma and pain, clinches the diagnosis of synovial plica syndrome.

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