Bucket Handle Tear of Lateral Meniscus

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**Case History:** 26-year-old male with complaints of pain and swelling in left knee joint, had sustained knee injury from falling from a bicycle one month prior.

**Case History:** A 26-year-old male presented with complaints of pain and swelling in his left knee joint. He had sustained a knee injury due to falling from a bicycle one month prior.

Upon ultrasound examination, there was a moderate amount of fluid with internal echoes noted in supra-patellar region which communicated with joint cavity. He was further evaluated by MRI of the left knee joint.

Upon MRI, there was moderate joint effusion, absent normal bow-tie sign in lateral meniscus and displaced torn flap of lateral meniscus, which was seen in intercondylar fossa, suggestive of bucket handle tear of lateral meniscus (double posterior cruciate ligament sign), and severely edematous and inflamed anterior cruciate ligament with grade III signal intensity in entire ligament with few fibers intact.

![Figure 1a (medial meniscus) and Figure 1b (lateral meniscus)](image)

Figure 1. PD FAT SAT (PDFS) sagittal MRI, Figure 1a shows normal bow-tie sign (white arrow) in medial meniscus, and joint effusion. Figure 1b shows loss of continuity between the anterior and posterior horn of lateral meniscus, suggestive of absent bow-tie sign (blue arrow) in lateral meniscus.
Figure 2. PDFS sagittal MRI shows a low intensity band parallel and antero-inferior to posterior cruciate ligament, which is the torn part of lateral meniscus giving rise to “double PCL sign.”

Figure 3. PDFS axial MRI, Figure 3a shows torn flap of lateral meniscus (white arrow) which is seen to be displaced in intercondylar fossa (blue arrow) in Figure 3b.
Figure 4. Sagittal MRI shows loss of continuity and hyperintense signal involving anterior cruciate ligament (arrow) suggestive of anterior cruciate ligament tear and preserved posterior cruciate and Humphrey's ligament.

**Diagnosis:** Bucket handle tear of lateral meniscus, grade III anterior cruciate ligament tear, moderate joint effusion.

**Discussion:** A bucket handle tear is a longitudinal tear of the medial or lateral knee meniscus that extends from the posterior horn toward the anterior horn. Bucket-handle tears are usually precipitated by trauma, and up to 40 percent are associated with an ACL injury. Lateral meniscus tears account for 10 percent to 40 percent of bucket handle tears. The radiographic diagnosis of a bucket handle tear is important because bucket handle tears comprise 10 percent of all meniscal tears and usually require arthroscopic or surgical repair to prevent degenerative change.

Two classic secondary MRI signs of a bucket handle tear are the double PCL sign and the absent bow-tie sign. The double PCL sign represents the posterior portion of the bucket handle, which is still attached to the main meniscal body but slides over the medial tibial eminence to lie in front of the PCL in the intercondylar notch. When the ACL is intact, this sign is specific for a medial meniscal tear, because the course of the ACL prevents lateral meniscus fragments from lying in the intercondylar notch. However, in a patient with a prior or simultaneous interruption of the ACL, a lateral...
bucket-handle tear can also produce the double PCL sign. Other low-signal structures that can be present in the intercondylar notch and must be differentiated from the double PCL sign include the ligament of Humphrey, a torn ACL, fracture fragments, osteophytes or loose bodies. In sagittal MRI of the knee, a bow-tie appearance is created by the anterior and posterior horns of the meniscus, which are seen as touching low-signal-intensity triangles. With 4- to 5-mm sagittal slices, a normal meniscus, which is 9- to 12-mm wide, should look like a bow-tie on at least two consecutive images. When a bucket handle tear forces the central portion of the meniscus into the intercondylar notch, the knot of the bow-tie disappears. Thus, the absent bow-tie sign, as defined by Helms et al, is the continuity of the anterior and posterior meniscal portions in none or only one sagittal image. The presence of this sign can also be due to congenitally hypoplastic or ring-shaped menisci, small menisci (in children and petite adults), partial meniscectomy or arthritic degeneration.

**References**

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