



MRI IN BUCKET-HANDLE TEAR OF THE KNEE- A CASE SERIES

Dr. Shubhajit Debnath	Post Graduate Student, Department Of Radiodiagnosis, Agartala Government Medical College & G B Pant Hospital, Agartala, West Tripura, India.
Dr. Pintu Biswas*	Senior Resident, Department Of Radiodiagnosis, Agartala Government Medical College & G B Pant Hospital, Agartala, West Tripura, India. *Corresponding Author
Dr. Tanusri Debbarma	Assistant Professor, Department Of Radiodiagnosis, Agartala Government Medical College & G B Pant Hospital, Agartala, West Tripura, India.
Dr. Trilochan Tripura	Post Graduate Student, Department Of Radiodiagnosis, Agartala Government Medical College & G B Pant Hospital, Agartala, West Tripura, India.
Dr. Pulak Saha	Senior Resident, Department Of Orthopaedics, Agartala Government Medical College & G B Pant Hospital, Agartala, West Tripura, India.

ABSTRACT Bucket-handle tear of the meniscus is a displaced longitudinal tear that commonly presents with mechanical knee symptoms and is frequently associated with cruciate ligament injuries. We present a case series of five male patients with traumatic knee injury who underwent MRI evaluation. All cases demonstrated bucket-handle tears of the medial meniscus, predominantly involving the posterior horn and body, with displaced fragments into the intercondylar notch. Characteristic MRI signs, including absent bow-tie appearance and double PCL sign, were identified along with associated ACL or PCL injuries. MRI plays a crucial role in accurate diagnosis and surgical planning.

KEYWORDS : Bucket-handle tear, Cruciate ligament injury, Double PCL sign, Knee MRI, Medial meniscus, Meniscal tear.

INTRODUCTION

A bucket-handle tear is a vertical, longitudinal meniscal tear in which a substantial fragment becomes displaced away from the native meniscal rim into the intercondylar notch or adjacent joint space. This displaced "handle" produces mechanical symptoms such as locking, clicking, and restricted extension and is often associated with other injuries like anterior cruciate ligament (ACL) tears [1–3]. Magnetic Resonance Imaging (MRI) is the modality of choice for diagnosing this bucket-handle tear due to its high soft-tissue contrast and ability to depict meniscal morphology in multiple planes (sagittal, coronal and axial). In this case series we are presenting five different cases of bucket handle tear of medial meniscus of knee joint diagnosed on MRI. Figure 1 showing schematic diagram of knee joint.

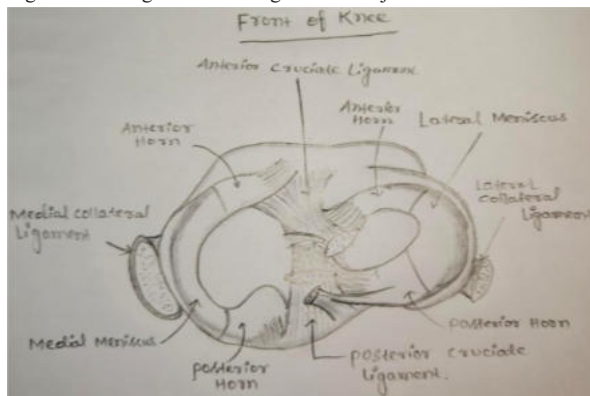


Fig- 1: Anatomy of the Knee Menisci: The schematic diagram of knee (axial) illustrates the C-shaped medial and more circular lateral meniscus with clearly marked anterior and posterior horns. Firm attachment of the medial meniscus to the MCL makes it less mobile and more prone to bucket-handle tears compared to the lateral meniscus.

Case 1:

A 24 years old male patient with history of traumatic injury to left knee presented with complaint of restricted knee movement with pain and swelling of left knee. MRI left shows complete tear of ACL with complex tear of body and posterior horn of medial meniscus with displacement of inner fragment into the intercondylar eminence giving double PCL sign on sagittal section.

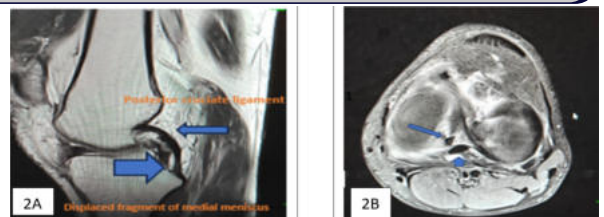


Fig- 2: Sagittal T2 (A) & axial PDFS (B) image of left knee showing displaced posterior horn of medial meniscus at intercondylar eminence (long arrow in A & short arrow in B) – creating bucket handle sign.

Case 2:

A 27 years old male patient presented at orthopaedics OPD with complaint of pain & swelling to left knee following a football match. MRI done which shows bucket handle tear of posterior horn of medial meniscus with ACL sprain.

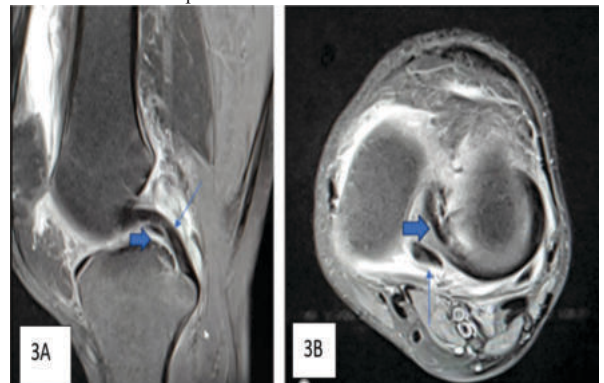


Fig- 3: Sagittal (A) & axial (B) PDFS of left knee demonstrating PCL (long arrow), displaced posterior horn of medial meniscus (short arrow) at intercondylar eminence having a double PCL appearance on sagittal PDFS sequence.

Case 3:

A 37-year-old male right knee pain and instability following a road traffic accident. MRI right knee of same patient shows bucket handle tear of posterior horn of medial meniscus with complete tear of anterior cruciate ligament (ACL).

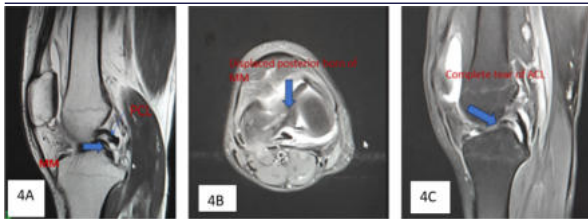


Fig- 4: Sagittal T2WI (A) & axial (B) PDFS image of right knee showing double PCL (A), displaced medial meniscus at intercondylar eminence (B). Sagittal PDFS at another plane demonstrating complete tear of ACL tear (C)

Case 4:

This 48 years old male patient with history of accidental trauma to right knee followed by pain, swelling and instability of joint. MRI of right knee done which shows bucket handle tear of body & posterior horn of medial meniscus with complete tear of posterior cruciate ligament (PCL).

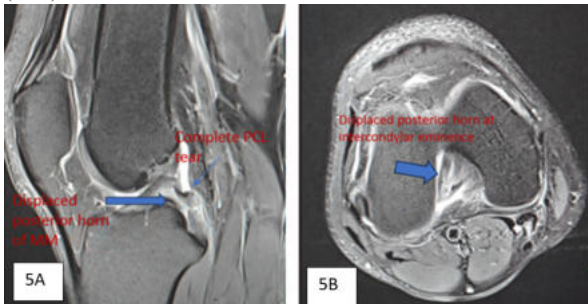


Fig- 5: Sagittal PDFS (A) & axial image (B) showing complete tear of PCL with displaced posterior horn of medial meniscus (arrows in both) giving rise to double PCL sign.

Case 5:

This 26 years old male with history of road traffic accident presented at orthopaedic OPD for pain & swelling of left knee joint. MRI done which shows bucket handle tear of medial meniscus with partial tear of ACL.

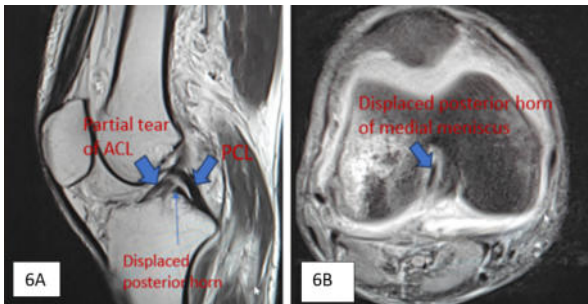


Fig- 6: Sagittal T2WI (A) showing double PCL (arrows) with partial tear of ACL. Axial PDFS showing displaced posterior horn of medial meniscus (arrow) at intercondylar eminence.

DISCUSSION

The critical role of MRI in diagnosing bucket-handle tears cannot be overstated. Its capacity to detect displaced meniscal fragments, visualize indirect signs, and assess associated ligamentous injuries provides comprehensive preoperative insight. Correlation with arthroscopy-the definitive diagnostic and therapeutic tool-confirms MRI's high diagnostic accuracy in detecting meniscal pathology. Combining MRI signs increases both sensitivity and specificity and minimizes the risk of missed tears [4, 5].

In the Indian context and globally, meniscal injuries-and specifically bucket-handle tears-represent a significant proportion of knee derangements in active individuals, with MRI integral to timely diagnosis and management [6-8]. Prompt recognition influences surgical planning, promotes repair over meniscectomy when feasible, and may help reduce long-term degenerative changes.

CONCLUSION:

Bucket-handle tears represent a significant pattern of meniscal injury frequently associated with cruciate ligament damage. MRI reliably

demonstrates characteristic signs and accurately defines tear morphology and associated injuries. Early and accurate MRI diagnosis aids surgical planning and may help preserve meniscal function and prevent long-term degenerative changes.

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