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Clinical, MRI findings and arthroscopic correlation of the posterior horn meniscal injuries of the knee joint

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Abstract
The knee joint is one of the most commonly injured joint due to sports activities fall from a bike and fall at home so they come with pain especially in acute condition its very difficult to rely only on the clinical examination to accurately find the diagnosis so the patient is subjected to many investigation like radiographs, ultrasonography and MRI later invasive modality like diagnostic arthroscopy.so we conducted a study to compare all the three modalities to arrive at the diagnosis like clinical examination, MR imaging and diagnostic arthroscopy to know the accuracy of each modality of diagnosis to detect the posterior horn meniscal injuries of the knee joint. There were 30 patients with 26 male and 4 female patients age ranging from 18 to 55 years. History of fall from a bike with twisting injury was most common. The sensitivity and specificity of clinical examination and MR imaging with respect to arthroscopy was 83.3% and 77.78% and 91.67% and 55.56% respectively. So diagnosing meniscal injuries is of great significance to decrease the morbidity of the patient.

Keywords: clinical examination, MRI, diagnostic arthroscopy, postrior horn meniscal injuries

Introduction
The knee joint is one of the most commonly injured joint due to sports activities fall from a bike and fall at home so they come with pain especially in acute condition its very difficult to rely only on the clinical examination to accurately find the diagnosis so the patient is subjected to many investigation like radiographs, ultrasonograpgy and MRI later invasive modality like diagnostic arthroscopy. So we conducted a study to compare all the three modalities to arrive at the diagnosis like clinical examination, MR imaging and diagnostic arthroscopy to know the accuracy of each modality of diagnosis to detect the posterior horn meniscal injuries of the knee joint. Clinical examination findings for detecting meniscal injuries presented reasonably good accuracy and significant value, especially in ruling out meniscal injuries. For detecting the medial meniscus, good consistency was observed between arthroscopy and MRI and also for the lateral meniscus injuries. Magnetic resonance imaging has a better soft tissue delineation which is routinely done to the complex anatomy of the knee joint and to detect the meniscal injuries prior to diagnostic arthroscopy which can be diagnostic and therapeutic tool [1-5].

Magnetic Resonance Imaging is important in preoperative planning tool to address the posterior horn meniscal injuries and to whether it is amenable to repair or meniscectomy or to know the root of the menisci are avulsed. The sensitivity and specificity to detect medial and lateral meniscal injuries is 86-96%, 84-94% and 68-86%, 92-98% respectively. Apart from these other meniscal lesions like parmeniscal cyst can also be diagnosed.

Aims and Objectives
This study is aimed at comparing and correlating the clinical examination findings and MRI findings and the diagnostic arthroscopic findings to arrive at diagnosis of posterior horn meniscal injuries of the knee joint.

Materials and Methods
This study comprised 30 patients who were admitted in our hospital later subjected

MRI after thorough clinical examination where some patients had MRI done elsewhere were not excluded in our study followed by diagnostic arthroscopy after taking the written informed consent from the patients.

Study design: Comparative study

Place of study JSS: Hospital department of orthopedics

Study population: Patients with history of injury and pain in the knee joint suggestive of meniscal injuries subjected to arthroscopy after thorough clinical examination with a set of five tests and MRI

Period of study: September 2014 to May 2016

Inclusion criteria
1. 1 Pain in the knee suggestive of meniscal injuries
2. 2 Locking of the knee joint
3. 3 Age of the patients between 18 to 50

Exclusion criteria
1. Those patients who had underwent meniscetomy ACL and PCL reconstruction.
2. Patients underwent MCL and LCL repair or reconstruction using suture anchors or bio absorbable screws.
3. Patients symptoms suggestive of tumors of the knee joint structures like synovioma etc.
4. Patient undergone surgeries like aneurysmal clips pacemakers etc.
5. Patients directly undergoing arthroscopy without prior MRI done.

Mechanism of Injury
Meniscal injuries occur secondary to trauma produced by the compressive load with a flexed knee and where as the type and location of the meniscal tear depends on the direction and magnitude of the force acting on the knee. Twisting injuries of the and sudden fall at home will also lead to tear in a degenerative knee joint. Seventy five percent of meniscal tears occurred in the absence of sporting activities, it can occur frequently with every day activities and in the absence of the classic injury mechanism. Getting up from a squat is also common mechanism of injury not widely described or emphasized especially in our Indian community in which this position is commonly used [6].

Classification
Classified on the basis of etiology, site of the tear and radiological type of the tear and arthroscopic anatomical type of the tear like longitudinal, transverse, oblique, flap, parrot beak tear combination of tears and tears associated with meniscal cyst and discoid meniscus and also there is separate 2 classification systems for meniscal root injuries described by LaPrade *et al* and Forkel and Petersen which says divided into 3 sub categories like, Type 1 is avulsion of the root at the attachment on the tibial plateau with an intact meniscofemoral ligament. Type 2 is a radial tear of the posterior horn with an intact meniscofemoral ligament. Type 3 is a complete injury of the posterior horn of the lateral meniscus with rupture of the meniscofemoral ligament [7, 8].

Clinical examination
Palpatory findings like clicking, medial joint line or lateral joint line tenderness with the set of following tests Apleys grinding test, Mc Murray test Childress and Steinmann 1 and 2. The analysis showed that the set of five meniscal tests presented sensitivity of 89%, specificity of 42%, accuracy of 75% where as individually, the tests had less diagnostic value presented accuracy of between 48% and 53% [4].

Results
There were 30 patients with 26 male and 4 female patients age ranging from 18 to 50 years. History of fall from a bike with twisting injury was most common and the right knee being more commonly injured. The sensitivity and specificity of physical and clinical examination for the posterior horn lateral meniscal injuries with respect to arthroscopy is 75% and 77.27% respectively. The sensitivity and specificity for the posterior horn lateral meniscal injuries of the MRI findings with respect to arthroscopy is 62.5% and 72.73% respectively. The sensitivity and specificity of the physical and Clinical examination findings of the posterior horn medial meniscal injuries when compared to arthroscopy is 83.3% and 77.78% respectively. The sensitivity and specificity of the posterior horn medial meniscal injuries of the MRI findings when compared to arthroscopy is 91.67% and 55.56% respectively.

Discussion
This study is basically conducted to compare the how reliable the physical and clinical examination with set of five tests mainly McMurray, Apley, Childress and Steinmann 1 and 2 finding and the MRI findings of the posterior horn meniscal injuries with the diagnostic arthroscopic findings of the athroscopy. After a thorough clinical examination and noting down the type and site of the posterior horn meniscal tears on MRI, patient is subjected to diagnostic arthroscopy followed by therapeutic procedures if required. Totally there were 30 patients with 26 male and 4 female patients age ranging from 18 to 50 years. Males were commonly injured as study conducted by Fritz *et al* showed males are commonly injured as they are more involved in sports activities where as in our study it was fall from a bike with the twisting injury was the commonest mode of injury, posterior horn Medial meniscus was more commonly injured than posterior horn lateral. We found only 12 cases being diagnosed by arthroscopy when compared 14 cases which were clinically diagnosed so the sensitivity and specificity of the posterior horn medial meniscal injury of the clinical examination findings will be is 83.33% and 77.78% when compared to diagnostic arthroscopic findings. Where as the MRI detected 19 cases so the sensitivity and specificity of MRI findings will be 91.67% and 55.56% when compared to diagnostic arthroscopic findings. Mohan *et al* study also concludes 88%accuracy of the clinical examination findings in diagnosing medial meniscal injuries where as Pappenport *et al* showed an accuracy of 90%in detecting meniscal injuries on MRI. Elvenes *et al* found sensitivity and specificity of 100% and 77% respectively where as positive and negative predictive value of MRI findings for medial meniscus tears was 71% and 100%. In our study we have Sensitivity and specificity of 91.56% and 55.56% where as positive and negative predictive value is 57.89% and 90.91%. In our present study we found that sensitivity, specificity, positive and negative predictive value of physical and clinical examination compared to diagnostic arthroscopy arthroscopy findings was less compared to the other studies where as in a study conducted by Ricardo *et al* The analysis showed that the set of five

meniscal tests presented sensitivity of 89%, specificity of 42%, accuracy of 75%, positive likelihood of 1.53 and negative likelihood of 0.26. Individually, the tests presented accuracy of between 48% and 53%. In our study we found that sensitivity, specificity, positive and negative predictive value of MRI compared to arthroscopy was less compared to the other studies.

Diagnostic arthroscopy confirmed only 8 cases for posterior horn lateral meniscal injuries out of the 11 cases which was diagnosed clinically and again arthroscopy confirmed 8 cases out of the 11 cases which was detected as per the MRI findings so sensitivity and specificity of clinical examination is 75%and 77.27% with respect to arthroscopy and sensitivity and specificity of the MRI is 62.5% and 72.73% with respect arthroscopy for the lateral meniscal injuries. Mohan *et al* in their study found 92% accuracy of the clinical examination findings for the lateral meniscal injury.So if the MRI is used only in preoperative screening conditions this can be avoided provided the patients agree for diagnostic arthroscopy and proceed as they can save the expense of the MRI especially patients from rural side who belong to the low socioeconomic class.As described by Mink *et al* there are misinterpretation of the meniscofemoral ligaments injury osteochondral flap avulsion which can mimic meniscal injuries and sometime as described by Crues *et al* MR imaging can separate the cases which are surgically significant from nonsignificant meniscal linjuries may be useful in the noninvasive preoperative screening of suspected meniscal injuries of the knee joint [9, 10] Rose *et al* also said MRI not necessary in the view of high cost in diagnosing meniscal injuries if clinically found suspicion of meniscal tears. Gillies *et al* concluded sometimes negative findings by arthroscopy and MRI may be necessary to occasionally to remove a meniscus if the symptoms of knee pain persisting. Simonsen *et al* says arthroscopy should be conducted if there clinical evaluation of traumatic hemarthrosis present. Boden *et al* supports that treatment plan will not change if the MRI is done after suspecting meniscal injuries clinically. Overall accuracy of arthroscopy varies between 70% to 100% which depends on the skill and experience,this again keeps us in doubt regarding the MRI with arthroscopy findings and diagnosing through arthroscopy very much depend on the surgical skill and experience of the operating surgeon as it is very difficult to reach the posterior horn of the menisci. [11-14]

Conclusion

It's very important to diagnose and treat posterior horn meniscal injuries if not diagnosed properly it will lead to morbidity with chronic pain with difficulty in managing activities of daily living especially sitting cross legged and squatting and later leading to degenerative joint disease by after eroding the articular cartilage. Clinical examination plays a crucial role in diagnosing posterior horn meniscal injuries with the set of five clinical tests including Apley's test, MRI is an aid in radiological diagnosis especially in an acute condition and radiological classification of the meniscal injuries and to preoperatively plan for repair or meniscectomy but arthroscopy is the gold standard to arriving at the diagnosis and also to address the posterior horn meniscal injuries at the same time. Where as in a clinically proven case of meniscal injury directly diagnostic arthroscopy can be done and will be able to avoid the expensive radiological investigative tool like MRI especially patients from rural side who belong to the low socioeconomic class and also in patients working in fields who squat regularly to carry out their work to earn their livelihood. Surgeons skill and experience will carry great value in diagnosing and treating such injuries since the demands of the patient is increasing especially in the persons involved in sports activities in such patients it's better to get the MRI done prior to explain to the patient in detail. Ultimately it's the surgeon who has to decide depending on his good clinical acumen and then correlating his findings with MRI and proceeding for the diagnostic arthroscopy and therapeutic procedures for the posterior horn meniscal injuries either with meniscetomy or meniscal repairs. As the numbers are less in this study is the drawback and requires multicentre study with the large numbers to accurately say which is the best method to diagnose posterior horn meniscal and injuries and can we really avoid the need of MRI and to directly address the posterior horn meniscal injuries with arthroscopy to decrease the morbidity of the patients.

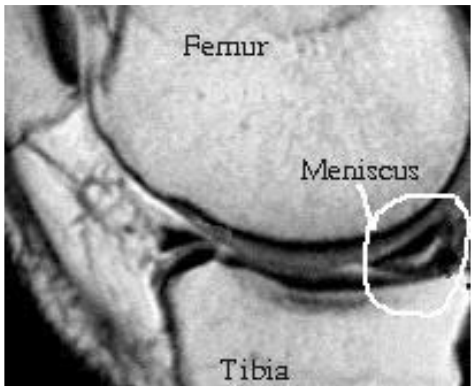

Fig 1: posterior horn medial meniscal tear

Fig 2: Apleys grinding test

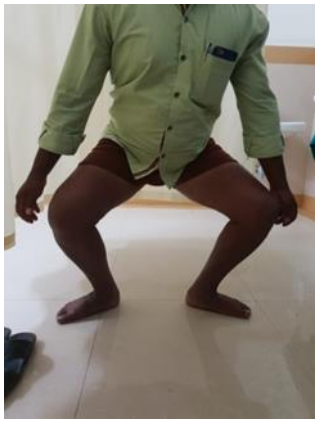

Fig 3: Childress test

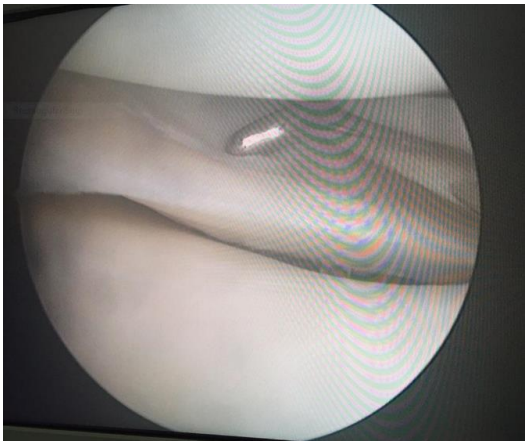

Fig 4: posterior horn tear extending to the body

Fig 5: posterior horn medial meniscal injury

Conflict of Interest
None

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