

Sensitivity Of Knee Physical Examination And Magnetic Resonance Imaging In Diagnosing Meniscus And Cruciate Ligament Injuries

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INTRODUCTION:

Knee injuries constitute 6% of acute injuries treated at the emergency department¹. It causes significant morbidity², thus comprehensive diagnosis is crucial in the management³. This study was conducted to compare the sensitivity of knee physical examination(PE) and magnetic resonance imaging(MRI) in diagnosing meniscus and cruciate ligament injuries in comparison to definitive diagnosis obtained from arthroscopy.

METHODS:

In this prospective study, all patients who underwent arthroscopy for knee injuries between January 2015 and December 2016 were selected. Patients with bilateral or recurrent injuries; previous knee surgeries or fractures; knee diseases or neurological deficit; or contraindicated for MRI were excluded. McMurray, Lachman and pivot shift test findings performed by 3 orthopaedic surgeons were documented. All patients had an MRI done at one centre using 1.5 Tesla Siemens scanner with 5 mm thick T1/T2 weighted coronal and sagittal slices. The images were interpreted by 4 radiologists. Meniscal and ligamentous tears diagnosed using arthroscopy performed by 3 surgeons were taken as the definite diagnosis for comparison with PE and MRI diagnosis. Sensitivity, specificity, positive(PPV) and negative predictive value(NPV) and accuracy were calculated.

RESULTS:

34 out of 40 patients were selected for this study. 24(71%) were males and 10(29%) females. Average patient age was 27.6 years(range 15-42 years). Sports activities were the commonest cause of injury(20/34=59%). 27 anterior cruciate ligament(ACL), 8 posterior cruciate ligament(PCL), 14 medial meniscus(MM) and 6 lateral meniscus(LM) tears were diagnosed using arthroscopy.

PE showed 43% sensitivity, 70% specificity and 59% accuracy in diagnosing MM tears. It was 33% sensitive, 89% specific and 79% accurate in diagnosing LM tears. For ACL tears, PE showed 89% sensitivity, 42% specificity and 79% accuracy. It was 88% sensitive, 100% specific and 97% accurate in diagnosing PCL tears.

MRI was 86% sensitive, 55% specific and 68% accurate for diagnosing MM tear, while it was 100% sensitive, 68% specific and 76% accurate for diagnosing LM tears. For ACL tears MRI was 96% sensitive, 29% specific and 82% accurate. It was 88% sensitive, 85% specific and 85% accurate in diagnosing PCL tears.

Table 1: Sensitivity, Specificity, PPV, NPV and accuracy of physical examination in diagnosing knee meniscus and cruciate ligament tears

Type of knee injury	ACL tears	PCL tears	MM tears	LM tears
Sensitivity	89%	88%	43%	33%
Specificity	42%	100%	70%	89%
PPV	86%	100%	50%	40%
NPV	50%	96%	64%	86%
Accuracy	79%	97%	59%	79%

Table 2: Sensitivity, Specificity, PPV, NPV and accuracy of MRI in diagnosing knee meniscus and cruciate ligament tears

Type of knee injury	ACL tears	PCL tears	MM tears	LM tears
Sensitivity	96%	88%	86%	100%
Specificity	29%	85%	55%	68%
PPV	84%	64%	57%	36%
NPV	67%	96%	85%	100%
Accuracy	82%	85%	68%	76%

DISCUSSIONS:

Patients age range, gender distribution, mechanism, and type of common injuries in this study was found similar to other studies². However, their presentation was late(average 12 months post-injury) thus allowing knee swelling and pain to subside making cruciate ligament PE more sensitive. Muscle spasm⁴ or fibrosis of the torn cruciate stumps causes firm end point clinically³ creating false negative results.

MRI is sensitive in diagnosing cruciate ligament tears, however rupture near ligament