https://doi.org/10.29309/TPMJ/2023.30.05.7322

The Professional Medical Journal
www.theprofesional.com
2023, Volume, 30 Issue, 05

ORIGINAL ARTICLE

Arthroscopic evaluation of articular cartilage in knee injuries: A predictor of early osteoarthritis in young population.

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Article Citation: Anwar W, Aziz Z, Rahman N, Khattak SK, Ahmad I, Khan AH. Arthroscopic evaluation of articular cartilage in knee injuries: A predictor of early osteoarthritis in young population. Professional Med J 2023; 30(05):654-658.
https://doi.org/10.29309/TPMJ/2023.30.05.7322

ABSTRACT… Objective: To evaluate articular Cartilage after Knee injuries in young population as predictor of early Osteoarthritis, to pave the much more effective OA preventive measures in young population. **Study Design:** Descriptive Case Series. **Setting:** Department of Orthopedics, Hayatabad Medical Complex, Peshawar. **Period:** 2020 to 2021. **Material & Methods:** One hundred forty five patients was conducted in Early Osteoarthritis was defined as a diffuse and ill-defined involvement, but originated in the cartilage surrounding a focal lesion, considered to include a maximal involvement of 50% of the cartilage thickness (ICRS Grade II) based on the macroscopic ICRS classification. Articular cartilage evaluation (Chondral lesions and OA) were recorded on set proforma according to ICRS grading system. **Results:** Mean age was 32 years. Significant risk for early osteoarthritis was 17.9%; female had higher risk for early osteoarthritis as compared to male with p value of 0.03. Correlation between patient's age and grade of chondral lesion with risk for early Osteoarthritis were significant with p value of 0.00 and .002 respectively. Significant risk for early osteoarthritis was 10.25%, 23.08% and 15.38% respectively for anterior cruciate ligament tear, medial meniscus, and lateral meniscus injury. 42.65% anterior cruciate ligament injuries were associated with concomitant injuries, whereas significant risk for early OA was 17.24% as compared to isolated ACL injuries of 57.35% with significant risk for early OA of 10.25%. Concomitant meniscal and ACL injuries had significant risk for early OA was 23.53%. **Conclusion:** Arthroscopic evaluation of articular Cartilage damage after Knee injuries is good predictor of early Osteoarthritis in young population.

Key words: Cartilage, Chondral Lesion, Osteoarthritis.

INTRODUCTION

Detecting the early stages of the degenerative process of knee osteoarthritis (OA) is of great importance. At early stages, the treatment may prevent the onset of the disease. According to the macroscopic ICRS (International Society for Cartilage Regeneration and Joint Preservation) classification, early osteoarthritis begins in the cartilage around a focal lesion and covers up to 50% of the cartilage thickness and is a diffuse, incomplete osteoarthritis.[1]

Age, overweight or obesity, female sex, high physical loading, and joint injury are well-established risk factors for knee OA.[2,3] Especially, injuries in childhood and early adulthood is the major risk factor for developing OA.[4,5] However, most of the studies that consider knee injury as a risk factor are often associated with middle-aged or older adults and are largely based on retrospective analyses. It means that people who rely on self-reports of past knee injuries are more susceptible to memory distortions and may exaggerate the association between injury and osteoarthritis. Misclassification is another factor that may overestimate the relationship between knee injury and osteoarthritis. The amount of danger in the younger population is still unknown due to the lack of substantial prospective studies on this subject.[5]

On average, half of all people have been found to acquire radiographic knee OA within 10–20 years following a particular knee injury of the anterior

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Article received on: 11/10/2022
Accepted for publication: 01/02/2023

cruciate ligament (ACL) and/or a meniscal rupture.[6] As a result, many people may already have 'old' knee when they are still relatively young. [7] Aside from cruciate ligament injury and meniscal tears, it is still unknown how other knee injuries that occur at a young age increase the risk of knee OA.[8] It is uncertain whether the time it takes to develop clinically obvious knee OA at a young age differs between injured and healthy people. Snoeker B, et al. found that the frequency of knee osteoarthritis was 10.5% after knee trauma in a young population.[9] With the growing knowledge of the importance of detecting early stages of degenerative processes (OA) in young people, it is possible to arrest the disease process, block its progression, and start therapy. Arthroscopic evaluation of articular Cartilage after Knee injuries in young population as predictor of early Osteoarthritis will pave the way to inform more effective OA preventive strategies in young population.

MATERIAL & METHODS

This descriptive case series was conducted in the Orthopedic Department, Hayatabad Medical Complex Peshawar from 2020 to 2021. One forty five patients were included in the study after approval from hospital ethical committee. Informed consent was taken from patient both verbally and in written form. Non-probability consecutive sampling technique was used.

Inclusion Criteria

Patients age 18 to 50 years; both gender and history of knee injuries were included in the study.

Exclusion Criteria

Patients with intra-articular fracture, malignant neoplasms, pathological fracture and skeletally immature were excluded from study.

Knee injury is define as any injury to the knee, which results in injury to menisci, cruciate/ collateral ligaments/multi-ligaments, contusion and knee dislocation. Significant risk for early Osteoarthritis were defined a diffuse and ill-defined involvement that originated in the cartilage surrounding a focal lesion, considered to include a maximal involvement of 50% of the cartilage thickness (ICRS Grade II) based on the macroscopic ICRS classification.[1]

Data Collection Procedure

Patients fulfilling inclusion criteria were admitted. Magnetic resonance Imaging (MRI), routine investigations were performed. Patients were prepared for next operating list and arthroscopy and subsequent procedures were performed by two senior sports consultants. Articular cartilage evaluation (chondral lesions and OA) were recorded on set proforma according to ICRS grading system.

Data Analysis

Data were entered and analyzed with statistical analysis program (IBM-SPSS 23). Frequency and percentages were computed for qualitative variables like gender, type of knee injuries and chondral lesions/Knee Osteoarthritis. Mean ±SD presented for quantitative variables. Chondral lesions/Knee Osteoarthritis was stratified among age, gender and type of knee injuries. Post stratification chi square test were applied, $p \leq 0.05$ were considered statistically significant.

RESULTS

Inclusion criteria was fulfilled by 145 patients. Mean age was 32 years, 31(21.4%) patients were in age group < 20 years, 100(69%) patients were in age group 21-40 years and 14(9.7%) patients were in age group >40 years. There were 118(81.4%) male and 27(18.6%) female. Female had significantly higher risk for early osteoarthritis (37.03%) as compared to male (13.56%) with p value of 0.00.

Risk for Early Osteoarthritis based on the macroscopic ICRS classification (Grade II or > II) was 17.9%. Chondral lesions were classified (Table-I). Regarding the correlation between patient's age and risk for early Osteoarthritis, it was demonstrated that patient's age had significant impact on risk for early osteoarthritis with p value of .002 (Table-II).

88(60.70%) patients had meniscal injuries, isolated meniscal injuries were recorded in 71(48.7%) patients with 21.13% significant risk for

early OA. Isolated Medial meniscus injuries were 52(35.89%) with 23.08 % significant risk for early OA. Lateral meniscus injuries were 13(8.96%) with 15.38% significant risk for early OA. 6 (4.14%) patients had both medial and lateral meniscal injuries with 16.7% significant risk for early OA.

Anterior cruciate ligament tear was recorded in 68(46.7%) along with other knee injuries, isolated ACL tear was 39(26.7%) patients with significant risk for early osteoarthritis were 10.25%. 17(11.72%) Concomitant meniscal and ACL injuries had significant risk for early OA was 23.53%. 4 (2.8%) patients had Posterior Cruciate tears with neither of the patients had risk for early OA. 42.65% anterior cruciate ligament injuries were associated with concomitant injuries, whereas significant risk for early OA was 17.24% as compared to isolated ACL injuries of 57.35% with significant risk for early OA of 10.25%.

Classification of Chondral Lesion	Frequency (%)
Grade 1	15(10.3)
Grade 2	20(13.8)
Grade 3	6(4.1)
Grade 4	0(00)

Table-I. Classification of chondral lesions according to ICRS Grading System

Age Groups	Frequency (%)	Prediction of OA Knee (% within age group)	P-Value
Below 21 years	31(21.4)	4(12.9)	0.009
21 – 40 years	100(69.0)	16(16)	
Above 40 years	14(9.7)	6(42.9)	

Table-II. Relation of age with knee osteoarthritis (ICRS Grade >2).

DISCUSSION

Acute, repetitive impact and torsional loading of joints in young, active individuals, especially during sports participation, can damage joint surfaces and causes pain, joint dysfunction, and effusion. In some cases, damage to joint surfaces leads to progressive joint degeneration.[10]

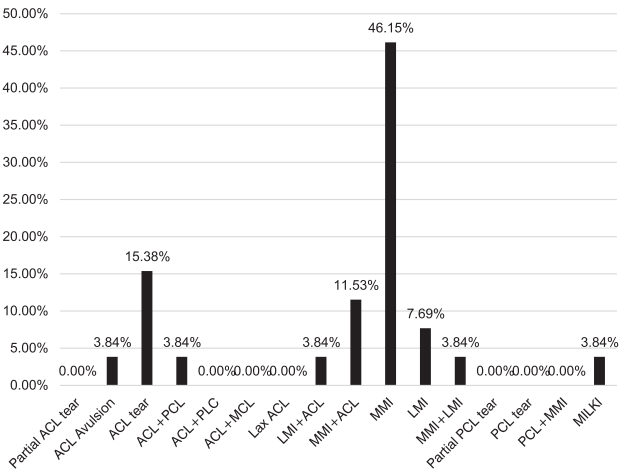

Figure-1. Predictive risk of Osteoarthritis in ACL, Medial and lateral Menisci injury (ICRC≥2)

The ICRS arthroscopic classification system has good inter- and intra-observer reliability. A high correlation with depth histological assessment demonstrates the validity of this classification system. Either plain radiographs or MRI. Arthroscopic classification of knee articular cartilage is influenced by several factors, including: B. Lesion location, depth, size, natural variation in cartilage thickness across the knee, and rater experience.[12] 50% of cartilage thickness based on ICRS gross classification (ICRS grade II). In our study, 17.9% patients were significant risk for early osteoarthritis. Age had significant impact on osteoarthritis, patient's age < 20 years had 12.9%, age 20-40 had 16% and age > 40 years had 42.9% significant risk for early osteoarthritis with p value of 0.00. Significant correlation was also demonstrated between grade of chondral lesion and osteoarthritis with p value of .002.

Anterior cruciate ligament ruptures are commonly associated with meniscal and articular cartilage injuries and presence of these defects influence both shot and long term outcomes. Multiple variables are predictive of this pathology including time from injury, age and sex. Maintaining meniscal integrity may be protective of joint surface; high-grade chondral defects have the most consistent and potentially largest negative effect on long term patient reported outcomes.[13]

In our study, significant risk for early osteoarthritis

was 10.25%, 23.08% and 15.38% respectively for anterior cruciate ligament tear, medial meniscus, and lateral meniscus injury were comparable to Snoeker et al.[9]

Concomitant presence of meniscal and chondral damage has potential to influence patient outcomes following ACL reconstruction surgery. Patients with meniscal pathology had significantly lower Marx, KOOS-QOL and SANE scores than patients without. High grade chondral defects have the most consistent and potentially largest negative effect on long-term patient reported outcome.[13,14] In our series, 42.65% anterior cruciate ligament injuries were associated with concomitant injuries, whereas significant risk for early OA was 17.24% as compared to isolated ACL injuries of 57.35% with significant risk for early OA of 10.25%. Concomitant meniscal and ACL injuries had significant risk for early OA was 23.53%.

Though arthroscopic evaluation is gold standard in evaluating knee articular cartilage, however accuracy of grading defect size and depth by arthroscopy was questioned due to magnification at arthroscopy as well as inherent difficulty of evaluating the depth of lesions relative to subchondral bone and location of cartilage lesions are limitation of our study.[15-17]

CONCLUSION

Arthroscopic evaluation of articular Cartilage damage after Knee injuries is good predictor of early Osteoarthritis in young population. It is safer, sensitive and well tolerated tool for evaluating patients with osteoarthritis of the knee than either plain radiographs or MRI.

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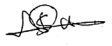
4	Sabir Khan Khattak	Statistical analysis, Proof reading.	
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