ORIGINAL ARTICLE

ARTHROSCOPIC PREVALENCE OF RAMP LESION IN PATIENTS PRESENTING WITH ANTERIOR CRUCIATE LIGAMENT (ACL) TEAR OF THE KNEE JOINTS

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ABSTRACT

Objective: To determine the frequency of arthroscopic RAMP lesions in patients presenting with Anterior Cruciate Ligament (ACL) tear of the knee joints.

Methodology: This cross-sectional study was conducted at the Department of Orthopedic Surgery, Khyber Teaching Hospital Peshawar from 06 August 2019 to 06 February 2020. The patients were prepared for Arthroscopy under Spinal anesthesia by a consultant orthopedic surgeon, who had a fellowship in arthroscopy and sports medicine and had a minimum of three years` experience post-fellowship. All procedures were performed by the same surgeon. Standard two ports (anteromedial and anterolateral) arthroscopic technique was adopted and the inside of the knee was thoroughly examined for any ramp lesion in the posteromedial corner as per operational definition. The positive cases were recorded and one with no ramp lesion was labeled as negative.

Results: 19 (17.1%) patients were recorded with ramp lesions diagnosed on knee arthroscopy undergoing Anterior Cruciate Ligament reconstruction of the knee.

Conclusion: The RAMP lesion is a common meniscal injury that can occur at the time of ACL rupture or as a result of knee laxity associated with ACL insufficiency. The prevalence of ramp lesions in this study was 17.1%. Patients younger than 30 years of age and male patients had a higher prevalence of ramp lesions.

Keywords: Anterior Cruciate Ligament, RAMP Lesions, Arthroscopy

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INTRODUCTION

Patients sustaining anterior cruciate ligament (ACL) rupture commonly present with concomitant intra-articular lesions. Approximately 43% of all ACL injured patients have been reported to have an associated lateral or medial meniscal injury[1]. Currently, known as a RAMP lesion, a pathology that has been historically under-recognized because it is commonly located within a posteromedial "blind spot" of the knee joint. The potential difficulty in its diagnosis is vital as RAMP lesions have been reported to be present in 9% to 17% of all ACL tears[2]. Furthermore, the use of imaging modalities such as magnetic resonance imaging (MRI) to detect RAMP lesions has a low reported sensitivity [3]. Due to the limited utility of MRI and the difficulty of identifying RAMP lesions through arthroscopy, it is important to perform a systematic arthroscopic exploration of the knee joint to diagnose these "hidden" lesions[4]. The medial meniscus acts as a secondary stabilizer to anterior tibial translation. With anterior cruciate ligament (ACL) injury, the medial meniscal tear occurs in approximately 47% to 61% of cases [5- 9]. In 1982, Strobel et al. initially coined the term "Ramp Lesion" to describe a tear in the attachment between the posteromedial meniscus and knee capsule in ACL deficient knees. Since that time, multiple authors have described similar injuries to the posteromedial meniscus-capsular attachment in conjunction with ACL injury[6]. Further, it is noted that in a chronically ACL deficient knee, the medial meniscus experiences increased loads with repetitive anterior tibial subluxations and rotation during sports. These repeated stresses across the posterior meniscus-capsular attachment lead to tears in the posterior horn of the medial meniscus or the development of ramp lesions. Cottet et al identified significantly more RAMP lesions in ACL deficient knees repaired after 6 weeks compared to acute ACL reconstruction before 6 weeks[7]. Song et al. observed significantly more RAMP lesions in knees undergoing ACL reconstruction greater than 6 months from the time of injury [8]. The great majority of ACL tears occur from athletic injuries. Football players sustain the greatest number of ACL tears, but these predominately contact injuries. Fe-

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male athletes sustain higher rates of ACL injury per athletic exposure across sports. The association of ACL tears with RAMP lesion, later on, is well documented in literature which further increases the morbidity, cost, and risk of osteoarthritis [9]. The reported incidence of RAMP lesion varies between 9.3-17% in the published literature [9]. In a study of 868 patients, with a co-existing ACL tear, the incidence of ramp lesion was 16.6% [10]. In another study on 301 patients, meniscal ramp lesions were present in approximately 17% of patients undergoing ACL reconstruction surgery[1]. J. song GY et al showed a prevalence of these lesions in ACL-injured patients to be 29.7%[8]. Sports injuries to the knee joint are very common in our population, especially in the young age group. Most patients present with an ACL tear on the initial MRI and the RAMP lesion remain undiagnosed[3]. These tears are visible on arthroscopy in the posteromedial corner of the knee joint. As these lesions are quite repairable but due to lack of initial diagnosis and pre-operative planning, we do not timely repair them which later on results in reconstructed ACL failure and early osteoarthritis.

This study will find the frequency of this specific injury in our population. In light of this study, we can modify the existing protocols regarding the management of knee sports injuries so we can repair them in a time before or at the time of ACL reconstruction. Furthermore, this study will provide local statistics and a base for further research.

MATERIAL AND METHODS

This Cross-sectional study was conducted at the Department of Orthopedic Surgery, Khyber Teaching Hospital Peshawar from 06 Aug 2019 to 06 Feb 2020. After getting permission from the Ethical & Research Approval Committee of our institution. Patients were selected from the outpatient and Emergency department. The purpose and benefits of the study were explained to all patients, included in the study. Patients having Multi-ligament injury and associated fractures were excluded. Written informed consent was taken from all patients. A detailed clinical history was taken followed by a general physical and systemic examination from all patients presenting with MRI diagnosed anterior cruciate ligament tear. A plain radiograph of the involved knee was taken in sagittal and coronal planes, to identify any fracture or dislocations and make necessary exclusions. The selected patients were enrolled and a specific data sheet purposely designed, was filled for each of them. The patients were prepared for Arthroscopy under Spinal anesthesia by a consultant orthopedic surgeon who had a fellowship in arthroscopy and sports medicine, having a minimum of three years of experience post-fellowship. All procedures were performed by the same surgeon. Standard two ports (anteromedial and anterolateral) arthroscopic technique was adopted and the inside of the knee was thoroughly examined for any RAMP lesion in the posteromedial corner as per operational definition. The positive cases were recorded and one with no ramp lesion was labeled as negative. After confirming of ramp lesion, the frequency of ramp lesion was calculated among the total subjects included in the study. All data were recorded in the form of charts and tables. Confounder was controlled by strictly following exclusion criteria

Data were analyzed using statistical software SPSS version 21. All the quantitative variables like age, weight (Kg), time since ACL tear (months) were analyzed by Mean and standard deviation. Frequencies and percentages were calculated for qualitative variables like gender, type of sports injury (Cricket, Foot Ball, Hockey, Skiing, and others), Knee involved (right or left). RAMP lesion was stratified among age, gender, time since ACL tear, right or left side, weight, and type of sport to see effect modifications. Another effect modifier like obesity was controlled through stratification. Post-stratification chi-square test was applied keeping P value equal to or less than 0.05. All the results were presented in tables and graphs.

RESULTS

This study was carried out on 111 patients. Mean and SDs for age and weight turned out to be 35 (SD$\pm$25.35 correct) and 77.32$\pm$7.560 respectively (Table-1). Sixty (54.1%) patients were reported in the 16-25 years' age group and 51 (45.9%) patients were in the 26-40 years, age group. Ninety-two (82.9%) were male and 19 (17.1%) patients were female. Sixteen (14.4%) patients were recorded as obese and 95 (85.6%) patients were non-obese. Sixty (54.1%) patients had right knee involved and 51 (45.9%) patients had left knee involved. In 62 (55.9%) patients knee injury from football, 19 (17.1%) from cricket, and 30 (27.0%) from playing hockey. Fifty-three (47.7%) patients had injuries of less than 1 month, 29 (26.1%) patients had injuries between 1-6 months whereas 29 (26.1%) patients' injuries were for more than 6 months. Nineteen (17.1%) patients were recorded with ramp lesions presenting with Anterior Cruciate Ligament tear of the knee (Table No. 2). Ramp Lesions were cross-tabulated with age, gender, obesity, knee involved, type of sports, and time since ACL tear at Table No. 3 to 8.

DISCUSSION

In this study, 19 (17.1%) patients were recorded with ramp lesions presenting with Anterior Cruciate Ligament tear of the knee. Cottet et al identified significantly more ramp lesions in ACL deficient knees repaired after 6 weeks compared to acute ACL reconstruction before 6 weeks[7]. Song et al. observed significantly more ramp lesions in knees undergoing ACL reconstruction greater than 6 months from the time of injury [8]. The association of ACL tear with ramp lesion is well documented in literature which further increases the morbidity, cost, and risk of osteoarthritis[9]. The reported incidence of ramp lesions varies

Table No. 1: age and weight distribution of patients

	N	Minimum	Maximum	Mean	Std. Deviation
Age	111	16	35	25.35	5.267
Weight	111	68	98	77.32	7.560
Valid N (list wise)	111				

Table No. 2: RAMP Lesions identified

		Frequency	Percent	Percent
	Yes	19	17.1	17.1
Validt	No	92	82.9	100.0
	Total	111	100.0	

Table No. 3: Ramp Lesion-Age Groups

		Age Groups		Total
		25-16 Years	40-26 Years	
RAMP Lesion	Yes	10	9	19
	No	50	42	92
Total		60	51	111

Table No. 4: Ramp Lesion-Gender

		Gender		Total
		Male	Female	
RAMP Lesion	Yes	14	5	19
	No	78	14	92
Total		92	19	111

Table No. 5: Ramp Lesion-Obesity

		Obesity		Total
		Yes	No	
Ramp Lesion	Yes	6	13	19
	No	10	82	92
Total		16	95	111

Table No. 6: Ramp Lesion-Knee Involved

		Knee Involved		Total
		Right	Left	
Ramp Lesion	Yes	10	9	19
	No	50	42	92
Total		60	51	111

Table No. 7: Ramp Lesion-Type of Sports

		Type of Sports			Total
		Football	Cricket	Hockey	
RAMP Lesion	Yes	12	3	4	19
	No	50	16	26	92
Total		62	19	30	111

Table No. 8: Ramp Lesion-Time since ACL Tear

		Time Since ACL Tear			Total
		< 1 month	6-1 month	> 6 month	
RAMP Lesion	Yes	7	5	7	19
	No	46	24	22	92
Total		53	29	29	111

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between 9.3-17% in the published literature [9]. In a study of 868 patients with a co-existing ACL tear, the incidence of ramp lesion was found to be 16.6% which is comparable to the current study [10]. In another study on 301 patients, meniscal ramp lesions were present in approximately 17% of patients undergoing ACL reconstruction[1]. J. Song GY et al showed a prevalence of these lesions in ACL-injured patients to be 29.7% while it turned out to be 19 (17.1%) in our study [8]. Sports injuries to the knee joint are very common in our population, especially in the young age group. Most patients present with an ACL tear on the initial MRI and the ramp lesion remains undiagnosed. These tears are visible on arthroscopy in the posteromedial corner of the knee joint.

In 1988, Strobe first described a longitudinal meniscal lesion involving the peripheral union of the PHMM, typically associated with ACL injuries, which he termed ramp lesion to distinguish it from other types of posterior tears[l3]. The choice of the name reflects the ramp appearance of the posteromedial zone, which is named as ramp zone when seen from the intercondylar notch toward the posteromedial compartment. This ramp zone corresponds to the peripheral union of the medial meniscus with the posteromedial meniscal-tibial ligament.[4]

Sometimes, ramp lesions are underdiagnosed, owing to the incomplete preliminary study or an incomplete diagnostic arthroscopy during ACL reconstruction surgery. Before surgery, magnetic resonance imaging is done for ACL tear but its ability to pick RAMP lesions is not very good[3]. Hence, it is not easy to make a diagnosis of this lesion beforehand.[6,7,8,11] Therefore, an accurate diagnosis is necessary during the arthroscopy, looking for the ramp lesion using an intercondylar notch view of the posteromedial compartment, and adding a posteromedial portal for direct vision. Literature is evident of the importance of detecting RAMP lesion in case of ACL deficiency and reconstruction while doing arthroscopy[12]. Likewise, several methodologies for the management of ramp-type meniscal lesions have been described with variable results comprising of all-inside and inside-out techniques[13-17].

CONCLUSION

The ramp lesion is a common meniscal injury that can occur at the time of anterior cruciate ligament rupture or as a result of knee laxity associated with anterior cruciate ligament insufficiency. The prevalence of ramp lesions in this study was 17.1. Patients younger than 30 years of age and male patients had a higher prevalence of ramp lesions. It is, therefore necessary to scrutinize for RAMP lesion while diagnosing or reconstructing ACL arthroscopically to prevent the sequel of its negligence.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

Akhtar W: Conception, data collection, writing up

Shah SDBA: Data collection, statistical analysis

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.