

Prevalence and Associated Injuries in Patients with Knee Cysts: An Epidemiological Study

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INTRODUCTION: With the growing utilization of magnetic resonance imaging (MRI) for assessing the knee joint, the findings of incidental cystic and “cyst-like” lesions have also seen an increase. [1-3,6,7] Associated symptoms vary depending on the size, location, and association with adjacent anatomic structures and span a diverse group of entities ranging from benign cysts to complications of underlying disease processes. [3,4] These lesions can be further subclassified into true cysts (synovial cysts, bursae, ganglia, and meniscal cysts) and lesions that mimic cysts (hematomas, seromas, abscesses, vascular lesions, and neoplasms). [5] Determining the associated symptoms and findings that correspond to these various cystic and cyst-like lesions within the knee joint, compared to more advanced pathologies, is clinically important. Although many studies have examined the appearance of benign cystic masses on knee MRI, few studies have evaluated associations between these lesions and their corresponding injuries - information that could guide future diagnostic and clinical decision-making processes. The aim of this study is to assess the incidence of various cysts in the knee and evaluate associated injuries, such as concomitant joint effusion, meniscal tears, and knee OA. Our study will aid physicians in appropriate characterization of cysts within the knee and prevention of misdiagnosis or unnecessary clinical work up.

METHODS: This was a retrospective review of knee MRIs from January 1st, 2022 to January 1st, 2023. Inclusion criteria included patients aged over 18 years old and presence of a “cyst” noted on report. Exclusion criteria included patients without identified cyst on MRI or subchondral cysts. Data that was collected included demographics, cyst type, and associated injuries.

RESULTS SECTION: When assessing patients with Baker’s cysts, the average age of patients with a cyst was 61.49 (12.01) vs. no Baker’s cyst 57.75 (14.01) (p < 0.001). Furthermore, the prevalence of female patients (591) vs. male patients (331) (p=0.042). Notable associated injuries for those with Baker’s cysts vs. no Baker’s cyst include bursitis (59:30) (p=0.027), cartilage damage (672:186) (p=0.017), effusion (619:165) (p=0.006), medial meniscal tear (661:185) (p=0.032), PCL injury (22:18) (p=0.002), and subchondral fracture (53:5) (p=0.004). Notable associated injuries for those with Ganglion cysts vs. no Ganglion cysts include ACL injury (50:111) (p=0.002), medial meniscal tear (159:687) (p=0.002), osteoarthritis (145:448) (p=0.009), PCL injury (21:19) (p < 0.001), plica (7:8) (p=0.024), synovitis (43:91) (p=0.002), tendinopathy (62:143) (p < 0.001). Notable associated injuries for those with Meniscal cysts vs. no Meniscal cysts include medial meniscal tear (9:837) (p=0.002). The average age of a patient with a parameniscal cyst 58.15 (14.14) vs. patients with no parameniscal cyst 61.02 (12.29) (p=0.039). Notable associated injuries for those with a Parameniscal cyst vs. no Parameniscal cyst include bursitis (24:65) (p=0.001), effusion (88:696) (p < 0.001), lateral meniscal tear (87:354) (p < 0.001), medial meniscal tear (139:707) (p < 0.001), osteoarthritis (68:525) (p=0.008).

DISCUSSION: From our study, we observed that Baker’s cysts were most common of the cyst type and had a prevalence amongst older female patients. Seen with these Baker’s cysts, we noted increased rates of bursitis, cartilage defects, effusion, medial meniscal tears, PCL injuries, and subchondral fracture. Ganglion cysts were noted to have ACL and PCL injuries, medial meniscal tears, osteoarthritis, plica, and tendinopathy. Meniscal cysts are associated with medial meniscus tears. Parameniscal cysts were commonly found amongst younger male patients, and associated with bursitis, effusion, lateral and medial meniscal tears, and osteoarthritis. One question is the dichotomous pondering of which came first, the injury or the cyst? Current literature suggests that these cysts are a secondary phenomenon. [4] Our study was limited by a sample size from a singular institution, MRI reports from numerous different radiologists, and our patient population being predominantly white, making these data more difficult to generalize. Moving forward, we aim to analyze the incidence of isolated cysts vs. multiple associated injuries and to assess the economic impact of incidental knee cyst findings.

SIGNIFICANCE/CLINICAL RELEVANCE: Through gaining a better understanding of the epidemiological aspects of some of the more prevalent knee cysts in our patient population, and their associated injuries, we hope to aid in clinical determination and insight into identifying potentially sources of knee pain. [7]

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IMAGES AND TABLES:

Table 2. Associated injury by Baker's Cyst Presence.					Table 4. Associated Injury by Ganglion Cyst Presence.					Table 6. Associated Injury by Parameniscal Cyst Presence.						
No Baker's Cyst (N=285)		Baker's Cyst (N=923)		P-value	No Ganglion Cyst (N=511)		Ganglion Cyst (N=257)		Total (N=1208)	P-value	No Parameniscal Cyst (N=1036)		Parameniscal Cyst (N=172)		Total (N=1208)	P-value
ACL Injury	311 (3.9%)	127 (13.8%)	161 (13.3%)	0.485	ACL Injury	117 (11.7%)	50 (19.5%)	161 (13.3%)	0.002	ACL Injury	346 (24.1%)	15 (8.7%)	361 (23.9%)	0.068		
Bone Lesion	3 (1.1%)	20 (2.2%)	23 (1.9%)	0.322	Bone Lesion	19 (2.0%)	41 (6.0%)	60 (5.0%)	0.800	Bone Lesion	2 (2.0%)	2 (1.2%)	4 (1.9%)	0.761		
Bone Marrow Injury	42 (14.7%)	159 (13.2%)	159 (13.2%)	0.368	Bone Marrow Injury	127 (12.4%)	32 (12.5%)	159 (13.2%)	0.756	Bone Marrow Injury	138 (13.3%)	21 (12.2%)	159 (13.2%)	0.808		
Bursitis	20 (5.3%)	59 (6.4%)	89 (7.4%)	0.077	Bursitis	70 (7.4%)	19 (7.4%)	89 (7.4%)	1.000	Bursitis	65 (6.3%)	24 (14.0%)	89 (7.4%)	0.001		
Cartilage Defect	186 (65.3%)	672 (72.8%)	858 (71.0%)	0.017	Cartilage Defect	682 (71.7%)	176 (68.5%)	858 (71.0%)	0.315	Cartilage Defect	746 (72.0%)	112 (65.1%)	858 (71.0%)	0.070		
Effusion	165 (57.3%)	619 (67.1%)	784 (64.9%)	0.006	Effusion	618 (65.0%)	166 (64.6%)	784 (64.9%)	0.941	Effusion	696 (67.2%)	88 (51.2%)	784 (64.9%)	<0.001		
Hoffa Fat Pad Edema	29 (10.2%)	76 (8.2%)	105 (8.7%)	0.336	Hoffa Fat Pad Edema	78 (8.2%)	27 (10.5%)	105 (8.7%)	0.261	Hoffa Fat Pad Edema	95 (9.2%)	10 (5.8%)	105 (8.7%)	0.187		
LCL Injury	9 (3.2%)	32 (3.5%)	32 (2.6%)	0.530	LCL Injury	21 (2.2%)	32 (6.2%)	53 (4.3%)	0.079	LCL Injury	28 (2.7%)	4 (2.3%)	32 (2.6%)	1.000		
Lipoma Arborescens	0 (0.0%)	5 (0.5%)	5 (0.4%)	0.597	Lipoma Arborescens	5 (0.5%)	0 (0.0%)	5 (0.4%)	0.591	Lipoma Arborescens	4 (0.4%)	1 (0.6%)	5 (0.4%)	0.537		
Loose Body	10 (3.5%)	24 (2.6%)	34 (2.8%)	0.415	Loose Body	27 (2.8%)	7 (2.7%)	34 (2.8%)	1.000	Loose Body	24 (2.3%)	34 (19.8%)	58 (4.8%)	0.132		
MCL Injury	23 (8.1%)	120 (13.2%)	145 (12.0%)	0.021	MCL Injury	121 (11.7%)	24 (9.3%)	145 (12.0%)	0.160	MCL Injury	127 (12.3%)	18 (10.5%)	145 (12.0%)	0.612		
Lateral Meniscus Tear	109 (38.2%)	332 (36.0%)	441 (36.5%)	0.483	Lateral Meniscus Tear	350 (36.8%)	91 (35.4%)	441 (36.5%)	0.715	Lateral Meniscus Tear	354 (34.2%)	87 (50.6%)	441 (36.5%)	<0.001		
Medial Meniscus Tear	185 (64.9%)	661 (71.6%)	846 (70.0%)	0.032	Medial Meniscus Tear	687 (72.2%)	159 (61.9%)	846 (70.0%)	0.002	Medial Meniscus Tear	707 (68.2%)	139 (80.8%)	846 (70.0%)	<0.001		
Osteoarthritis	135 (47.4%)	458 (49.6%)	593 (49.1%)	0.542	Osteoarthritis	448 (47.1%)	145 (56.4%)	593 (49.1%)	0.009	Osteoarthritis	525 (50.7%)	68 (39.5%)	593 (49.1%)	0.008		
PCL Injury	18 (6.3%)	22 (2.4%)	40 (3.3%)	0.002	PCL Injury	19 (2.0%)	21 (8.2%)	40 (3.3%)	<0.001	PCL Injury	35 (3.4%)	5 (2.9%)	40 (3.3%)	1.000		
Plica	4 (1.4%)	11 (1.2%)	15 (1.2%)	0.762	Plica	4 (0.4%)	7 (2.7%)	11 (0.9%)	0.074	Plica	12 (1.2%)	3 (1.7%)	15 (1.2%)	0.461		
Subchondral Fracture	5 (1.8%)	53 (5.7%)	58 (4.8%)	0.004	Subchondral Fracture	47 (4.9%)	58 (4.8%)	105 (8.7%)	0.744	Subchondral Fracture	53 (5.1%)	5 (2.9%)	58 (4.8%)	0.251		
Synovitis	34 (11.9%)	100 (10.8%)	134 (11.1%)	0.591	Synovitis	91 (9.0%)	43 (16.7%)	134 (11.1%)	0.002	Synovitis	119 (11.5%)	15 (8.7%)	134 (11.1%)	0.358		
Tendinopathy	54 (18.9%)	151 (16.4%)	205 (17.0%)	0.321	Tendinopathy	145 (14.5%)	62 (24.1%)	205 (17.0%)	<0.001	Tendinopathy	179 (17.3%)	26 (15.1%)	205 (17.0%)	0.583		