Previous Isolated Medial Bucket-Handle Meniscus Repair Significantly Increases Risk of Subsequent Ipsilateral Anterior Cruciate Ligament Reconstruction

William M. McLaughlin, M.D., Stephen M. Gillinov, A.B., Peter Y. Joo, M.D., M.P.H., Jay Moran, B.S., Andrew E. Jimenez, M.D., Jonathan N. Grauer, M.D., and Elizabeth C. Gardner, M.D.

Purpose: (1) To define the incidence of surgically treated isolated bucket-handle meniscus tears (BHMTs); (2) to investigate risk of subsequent ipsilateral anterior cruciate ligament reconstruction (ACLR) in patients who underwent previous isolated bucket handle (BH) meniscus repair; and (3) to investigate the risk of subsequent ACLR for various types of surgically treated meniscal tears. **Methods:** A retrospective review of a national database was conducted to identify patients, aged 10 to 40 years, who underwent primary isolated BH meniscus surgery from 2015 to 2020. Patients were stratified by operative method. A control group of 500,000 age-matched patients was randomly selected to establish a benchmark rate of ACLR. Kaplan−Meier analysis was performed to compare the timing and incidence of subsequent ipsilateral ACLR after primary isolated BH meniscus surgery to the control group within 2 and 5 years. **Results:** In total, 1,767 patients with isolated BHMTs treated with surgery were identified and met inclusion criteria. The incidence of isolated BHMTs among all surgically treated (repair or meniscectomy) meniscal injuries was 1.67%. Isolated BH repairs had significantly greater odds of ACLR within 5 years compared to the control group (odds ratio [OR] 6.09; 95% confidence interval [CI] 2.86-12.99; $P < .001$). Medial BH repairs had the greatest odds of ACLR within 5 years (OR 9.15; 95% CI 4.27-19.57; $P < .001$). Lateral BH repair was not associated with subsequent ipsilateral ACLR within 5 years (OR 2.63; CI 0.37-18.90; $P = .340$). **Conclusions:** Isolated BHMTs comprised 1.67% of all surgically treated meniscal injuries. Patients who underwent prior surgery for isolated BHMT were at increased risk of undergoing subsequent ipsilateral ACLR compared with the general population. Isolated medial BHMTs treated with repair had the highest risk for subsequent ACLR. **Level of Evidence:** Level III, retrospective cohort study.

The menisci are important to many aspects of knee function, including load sharing, shock absorption, joint stability, reduction in joint contact stresses, increasing congruity and contact area, limitation of extremes of flexion and extension, and proprioception.[1] Meniscus tears in the young population are often traumatic and many occur from a rotational movement on a loaded flexed knee.[2] They can occur in isolation but more often with concomitant ligamentous injury.[3]

A bucket-handle meniscal tear (BHMT) is a more severe subgroup of meniscal injury involving a vertical or oblique longitudinal tear with a fragment that may displace away from the periphery of the meniscus; it is estimated to occur in up 10% to 26% of all tears.[4-6] These tears usually begin adjacent to the posterior meniscal root and can propagate anteriorly past the anterior-body junction. The majority of traumatic bucket handle tears occur in a young population and are associated with concomitant anterior cruciate ligament (ACL) injury approximately 40% to 50% of the time. In this population, BHMTs more commonly occur on the medial side, as the result of the inherent reduced mobility of the meniscus.[4,6,7]

From the Department of Orthopaedics and Rehabilitation, Yale School of Medicine, New Haven, Connecticut, U.S.A.

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Address correspondence to Elizabeth C. Gardner, M.D., Department of Orthopaedics and Rehabilitation, Yale School of Medicine, 47 College St., New Haven, CT 06510. E-mail: Elizabeth.Gardner@yale.edu

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The medial meniscus's critical role in joint stability, as a secondary stabilizer, has been well documented throughout the literature.[8-11] The synergistic mechanical relationship between the ACL and medial meniscus has been proven in the ACL-deficient knees.[12] Delayed anterior cruciate ligament reconstruction (ACLR) significantly increases the risk of medial meniscus tears, due to the instability and added stress on the medial meniscus as it becomes a primary restraint to anterior translation and rotation.[5,13-15] Although less well studied, the lateral meniscus also may play an important role in rotational stability of the knee. In a biomechanical study, Musahl et al.[16] found that anterior tibial translation was greater with the pivot shift maneuver after lateral meniscectomy compared with medial. They hypothesized that the lateral meniscus appeared to be a more important restraint to anterior tibial translation during a combined valgus and rotatory load.[16] Recently, Cui et al.[17] identified that a lateral meniscus tear was a risk factor for a greater pivot shift test that may concur with anterolateral rotatory instability.

To date, much of the research on meniscus tears has focused on factors that affect outcomes and healing,[18] as well as advocating repair over meniscectomy to preserve meniscal tissue, when possible, in order to decrease risk of developing osteoarthritis.[19] However, further research is necessary to assess the risk of subsequent ACLR after previous isolated BHMT.

The purposes of this study were (1) to define the incidence of surgically treated isolated BHMTs; (2) to investigate risk of subsequent ipsilateral ACLR in patients who underwent previous isolated bucket handle (BH) meniscus repair; and (3) to investigate the risk of subsequent ACLR for various types of surgically treated meniscal tears. We hypothesized that the presence of an isolated BHMT treated surgically—in particular a medial-sided BHMT—would increase the likelihood of subsequent ipsilateral ACLR compared with that of the age-matched population without previous BHMT.

Methods

Study Population

The current study used the 2015-2020 PearlDiver Mariner 91 national database (PearlDiver Technologies, Colorado Springs, CO), which is a large administrative dataset containing records of 91 million patients. The dataset allows for longitudinal follow-up of patients insured by both commercial and public insurances. Studies using the PearlDiver system and associated databases were granted exemption from our institution's institutional review board.

Primary isolated meniscus repairs and meniscectomies performed for all meniscus tears were identified using the patient's first instance of the Current Procedural Terminology (CPT) codes for repair (29882, 29883) and meniscectomy (29880, 29881). The CPT codes were matched to *International Classification of Diseases, Tenth Revision* (ICD-10) diagnosis codes specific for medial and lateral bucket handle tears of the meniscus. These cohorts were termed: "BH Repair" and "BH Meniscectomy," respectively. Only patients with laterality-specific ICD-10 codes were included so that analysis of ipsilateral outcomes could be performed.

Exclusion criteria were then applied. These included (1) age <10 years and >40 years; (2) any previous cruciate or ligamentous or meniscus surgery of the knee that occurred before 2015; (3) any previous ACL reconstruction surgery; (4) any staged/delayed ACLR that occurred within 3 months from index meniscus surgery (to avoid confounding from patients who underwent planned or staged ACLR after meniscus surgery); (5) other concurrent arthroscopic procedure of the knee apart from meniscus repair or meniscectomy (including ligament/capsule repairs [CPT CPT-27405, CPT-27407, CPT-27409, CPT-29888], ligament reconstruction [CPT-27427, CPT-27428, CPT-27429], or arthroscopic-coded procedures [CPT-29889]); and (6) any concurrent fractures of the femur, tibia, fibula, or patella. Apart from those state, patients with certain concurrent procedures at the time of index meniscus surgery (e.g., simple synovectomy, loose body removal) were included in analysis. In addition, any patients who did not remain in the insurance coverage dataset for at least 2 years were excluded, ensuring that all patients had full follow-up for at least 2 years. Sex, age, body mass index (BMI) ≥35, and Elixhauser Comorbidity Index (ECI, a commonly used and validated comorbidity index made up of 31 comorbidity categories) were abstracted from the dataset for all patient cohorts. These patient characteristics also were extracted for laterality, medial and lateral, subcohorts of the repair, and meniscectomy cohorts. Absolute counts, percentages, means, and standard deviations for the patient demographic and comorbidity variables were reported when appropriate. Further, all other meniscus tear pathology treated with repair or meniscectomy, aside from BH tears, using relevant ICD-10 diagnosis codes was identified to determine the incidence of BHMT (Appendix Table 1, available at www.arthroscopyjournal.org).

General Incidence of ACR

A comparative control cohort made up of a subset of the overall Mariner 91 population, was created to estimate the general population's ACLR incidence rate. This population was age-matched to the other cohorts by including only the age ranges of 10-40 years during 2015-2020. PearlDiver allows for a maximum of

500,000 random patients to be used for control cohorts, and the rate of first-time ACLR in this cohort was assessed using any instance of an ACLR CPT code (29888) among the cohort during the study period. Identical exclusion criteria between the control and comparative cohorts were employed.

Subsequent ACLR

The primary outcome of interest was subsequent ipsilateral ACLR within 2 years and within 5 years after isolated BHMT surgery. Ipsilateral cases of ACLR were obtained by matching the CPT code for ACLR (29888) with ICD-10 codes for ACL pathology based on laterality (as described above), then ensuring that those with left-sided meniscus surgery were matched to those with left-sided ACLR, and similarly for right-sided surgeries. Rates of ACLR after medial versus lateral sided BH tears were assessed, as were rates of ACLR after BH tears in particular.

Rates of ACLR in the meniscus pathology cohorts and the control cohort were then compared within 2 and 5 years. Comparisons with the control included those with BH tears (with stratification of medial and lateral tears) and patients undergoing BT repair (with stratification of medial and lateral tears). To avoid confounding by patients who underwent staged ACLR after meniscus surgery, any patients who underwent ACLR within 3 months of index meniscus surgery were excluded from analysis.

ACLR Timing After Index BH Meniscus Repair

The timing at which ACLR was likely to occur after medial-sided, lateral-sided, and non-BH repairs was assessed with Kaplan–Meier analysis.

Statistical Analysis

The χ^2 and Student independent *t*-tests were performed to compare proportions and means of the patient characteristics. Multivariable logistic regression analysis was performed, controlling for patient age, sex, ECI, and BMI $\geq$35 to ascertain odds ratios (OR) and 95% confidence intervals (CI). An alpha of 0.05 and significance of $P < .05$ were set for both the univariate and multivariate analyses. Statistical calculations were performed using the built-in PearlDiver statistical functions using the R programming language. Forest plots were created using Excel (Microsoft Corporation, Redmond, WA). The Kaplan–Meier function of the PearlDiver software censored patients who lacked further follow-up at the time point when data became unavailable (e.g., due to change in insurance coverage, no further physician follow-up, or death). Incidence of each year following index meniscus surgery were abstracted from Kaplan–Meier analysis.

Results

Study Population

A total of 106,213 isolated meniscus tears that underwent repair or meniscectomy were identified and met inclusion criteria. For non-BH repairs, 9,913 patients were identified, whereas the non-BH meniscectomy population consisted of 94,533 patients. For BH repair, 438 patients were included, whereas the BH meniscectomy population consisted of 1,329 patients. A BHMT incidence accounted for 1.67% of all meniscus tears reported over the study period. Patient characteristics for both the non-BH tear and BH tear cohorts are summarized in Table 1.

Among those with BH repair, medial cases were identified in 297 patients and lateral cases in 154 patients. For those with BH meniscectomy, medial cases were identified for 891 patients and lateral cases for 470 patients. Patient characteristics for the medial and lateral subcohorts within the BH repair and BH meniscectomy cohorts are summarized in Table 2.

General Incidence of ACL

The control population incidence of first-time ACLR for patients aged 10-40 years during 2015-2020 was determined to be 0.2%. Demographics of this cohort population are presented in Table 3.

Subsequent ACLR

Subsequent ipsilateral ACLR within 2 years after a BH repair or meniscectomy was identified for 23 of 1767 (1.3%) patients (OR 3.80; 95% CI 2.24-6.43; $P < .001$) and within 5 years for 31 (1.8%) patients (OR 5.60; 95% CI 3.59-8.71; $P < .001$). Medial BH tear that was surgically treated was identified for 19 of 1188 (1.6%) patients (OR 4.22; 95% CI 2.29-7.77; $P < .001$) within 2 years and 26 (2.2%) patients (OR 6.56; 95% CI 3.98-10.79; $P < .001$) within 5 years. Lateral BH tear that

Table 1. Characteristics of Patients With BH Tears Who Underwent Repair and Meniscectomy

	BH Repair		BH Meniscectomy	
Characteristics	Value	% or SD	Value	% or SD
Total, n	438		1,329	
Sex				
Female	170	38.8%	509	38.3%
Male	268	61.2%	820	61.7%
Age, y	22.4	7.6	27.6	8.4
10-19	220	50.2%	338	25.4%
20-29	128	29.2%	382	28.7%
30-40	94	21.5%	620	46.7%
BMI >35	<10	<2%	55	4.1%
ECI	1.2	1.5	1.7	2.0

BH, bucket handle; BMI, body mass index; ECI, Elixhauser Comorbidity Index; SD, standard deviation.

Table 2. Characteristics of Patients With BH Tears Who Underwent Medial Versus Lateral Repair and Meniscectomy

	BH Repair				BH Meniscectomy			
Characteristics	Medial	% or SD	Lateral	% or SD	Medial	% or SD	Lateral	% or SD
Total, n	297		154		891		470	
Sex								
Female	109	36.7%	66	42.9%	329	36.9%	197	41.9%
Male	188	63.3%	88	57.1%	562	63.1%	273	58.1%
Age, y	22.4	7.6	22.1	7.8	28.0	8.3	26.8	8.5
10-19	149	50.2%	79	51.3%	215	24.1%	128	27.2%
20-29	88	29.6%	43	27.9%	252	28.3%	143	30.4%
30-40	64	21.5%	33	21.4%	433	48.6%	200	42.6%
BMI >35	<10	<1%	<10	<2%	32	3.6%	24	5.1%
ECI	1.2	1.5	1.1	1.5	1.6	2.0	1.9	2.1

BH, bucket handle; BMI, body mass index; ECI, Elixhauser Comorbidity Index; SD, standard deviation.

was surgically treated was significantly associated with subsequent ipsilateral ACLR within 2 years (OR 2.99; 95% CI 1.10-8.08; $P = .031$) and within 5 years (OR 3.74; 95% CI 1.53-9.14; $P = .004$). Subsequent ipsilateral ACLR within 2 years after BH repair was identified for 2.3% of patients (OR 3.45; 95% CI 1.28-9.30; $P = .014$), and within 5 years for 2.7% of patients (2.7%) (OR 6.09; 95% CI 2.86-12.99; $P < .001$).

Next, risk of ACLR in the meniscus pathology cohorts was compared with that of the control cohort within 2 and 5 years. Subsequent ACLR after medial BH repair occurred in 3.3% of patients within 2 years (OR 5.15; 95% CI 1.91-13.94; $P < .001$) and 4.0% of patients within 5 years (OR 9.15; 95% CI 4.27-19.57; $P < .001$), both rates significantly greater than that of the general population. ACLR after lateral BH repair was not significantly associated with subsequent ipsilateral ACLR within 2 years (OR 2.63; 95% CI 0.37-18.90; $P = .336$) and within 5 years (OR 2.63; CI 0.37-18.90; $P = .340$) compared with the general population. Multivariable logistic regression for odds of undergoing ACLR within 2- and 5-year time points, relative to the general population and adjusting for age, sex, ECI, and BMI, are summarized in Table 4 and Table 5.

ACLR Timing After Index BH Meniscus Repair

The incidence of subsequent ipsilateral ACLR plateaued at 4 years after index medial BH meniscus repair. Subsequent ipsilateral ACLR after index meniscus repair for medial-sided BH repairs, lateral-sided BH repairs, and all non-BH repairs is depicted as cumulative incidence of ACLR over 5 years by Kaplan–Meier analysis in Figure 1. Patients who underwent medial-sided BH repair were significantly more likely to require subsequent ACLR within 5 years than were patients who underwent lateral-sided BH repair or non-BH meniscus repair ($P < .001$).

Table 3. A Control Group of Age-Matched Patients Was Randomly Selected to Establish a Benchmark Rate of First-Time ACLR

Control Population Demographics	Value	% or SD
Total, n	500,000	
Age, mean, y	22.5	
Sex		
Male	288,353	57.7%
Female	211,640	42.3%

ACLR, anterior cruciate ligament reconstruction; SD, standard deviation.

Discussion

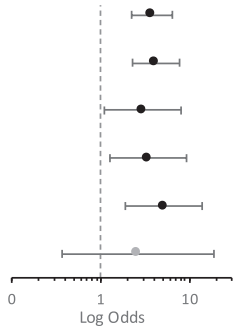
In this study, we found a 1.67% incidence of isolated BHMTs after previous isolated BH meniscus surgery. An isolated BHMT, specifically a medial BHMT, that was surgically repaired was highly associated—significantly more so than repaired lateral BHMTs or non-BH meniscal tears—with subsequent ipsilateral ACLR. These results raise awareness of isolated medial BHMTs treated with repair as a potential risk factor for subsequent ipsilateral ACLR.

Isolated BH tears are an exceedingly rare injury to occur in isolation. This study's estimate of the incidence of isolated BHMT at 1.67% is significantly less than that of previous literature, which has reported that approximately 10% of all meniscus tears are BHMT, with concomitant ACL injury occurring around half of the time.[20] This raises the concern that an isolated BHMT is an exceedingly rare event to occur.

Compared with the age-matched general incidence of ACLR, medial BH tears that were surgically treated had almost 7 times greater odds within 5 years of undergoing an ipsilateral ACLR. When we assessed time, in the present study we found that most of the subsequent ACLR procedures occurred within the first 4 years postoperatively. The reason for this temporal association is uncertain; it is possible that some partial ACL tears present at the time of initial BH tear were missed; however, further research is necessary to assess this association. These findings are similar to Kramer et al.,[4] who reported outcomes after operative treatment of BH tears in patients <19 years of age. Of the 185 patients,

Table 4. Odds of ACLR Within 2 Years

Variable Incidence (%)	*(Referent)* Incidence (%)	OR	95%	CI	p-value
BH Surgeries 23 (1.3%)	*(Population Incidence)* 1080 (0.2%)	**3.80**	2.24	6.43	**<0.001**
Medial BH Surgeries 19 (1.6%)	*(Population Incidence)* 1080 (0.2%)	**4.22**	2.29	7.77	**<0.001**
Lateral BH Surgeries <10 (<1.6%)	*(Population Incidence)* 1080 (0.2%)	**2.99**	1.10	8.08	**0.031**
BH Repair <10 (<2.3%)	*(Population Incidence)* 1080 (0.2%)	**3.45**	1.28	9.30	**0.014**
Medial BH Repair <10 (<3.3%)	*(Population Incidence)* 1080 (0.2%)	**5.15**	1.91	13.94	**0.001**
Lateral BH Repair <10 (<6.5%)	*(Population Incidence)* 1080 (0.2%)	2.63	0.37	18.90	0.336



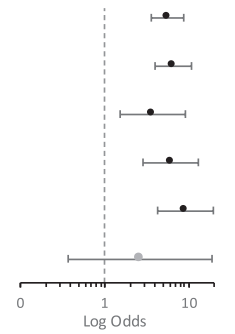
NOTE. Controlling for age, sex, ECI, and BMI >35. Italics indicate excluding BH tears; bold indicates statistical significance ($P < .05$).
ACLR, anterior cruciate ligament reconstruction; BH, bucket handle tear; CI, confidence interval; OR, odds ratio.

they reported that approximately 2% sustained a new ACL tear. However, more interestingly, they noted in the group that had a concomitant ACL injury + BH tear, 15% of these were partial ACL tears. This suggests a potential spectrum of BH injury severity—from isolated BH tear, to BH tear with partial ACL tear, to BH tear with complete ACL tear. This also raises the question of how many partial, or low-grade, ACL injuries are unrecognized at the time of BH meniscus treatment. This study should raise awareness to treating physicians to critically evaluate the ACL when isolated BHMT are present.

This study found that meniscus tears treated with repair had the greatest rates of subsequent ACLR. BHMT treated with surgical repair had 6 times increased odds within 5 years when compared with the age-matched general incidence of ACLR. Medial BH repairs had the greatest risk with 9 times increased odds within 5 years. The reason for this risk association with repair is unclear. It is possible that there is selection bias, in that repair may be preferentially performed in a more active patient population, who in turn would be more at risk for subsequent ACL injury. It may also be due to the challenges in healing of a BHMT. It may also be due to the location of BHMT that are deemed repairable. These are generally peripheral tears in red—red or red—white zones compared with a tear in the white—white zone, which would be treated by meniscectomy. The medial meniscus is anchored to the tibial plateau and further secured by the meniscotibial ligaments and peripheral meniscocapsular ligaments.[21] The reduced mobility of the medial meniscus allows it to function as a secondary stabilizer. A more peripheral tear has the potential to affect knee

Table 5. Odds of ACLR Within 5 Years

Variable Incidence (%)	*(Referent)* Incidence (%)	OR	95%	CI	p-value
BH Surgeries 31 (1.7%)	*(Population Incidence)* 1080 (0.2%)	**5.60**	3.59	8.71	**<0.001**
Medial BH Surgeries 26 (2.2%)	*(Population Incidence)* 1080 (0.2%)	**6.56**	3.98	10.79	**<0.001**
Lateral BH Surgeries <10 (<1.6%)	*(Population Incidence)* 1080 (0.2%)	**3.74**	1.53	9.14	**0.004**
BH Repair 12 (2.7%)	*(Population Incidence)* 1080 (0.2%)	**6.09**	2.86	12.99	**<0.001**
Medial BH Repair 12 (4.0%)	*(Population Incidence)* 1080 (0.2%)	**9.15**	4.27	19.57	**<0.001**
Lateral BH Repair <10 (<6.5%)	*(Population Incidence)* 1080 (0.2%)	2.63	0.37	18.90	0.340



NOTE. Controlling for age, sex, ECI, and BMI >35. Italics indicate excluding BH tears; bold indicates statistical significance ($P < .05$).
ACLR, anterior cruciate ligament reconstruction; BH, bucket handle tear; CI, confidence interval; OR, odds ratio.

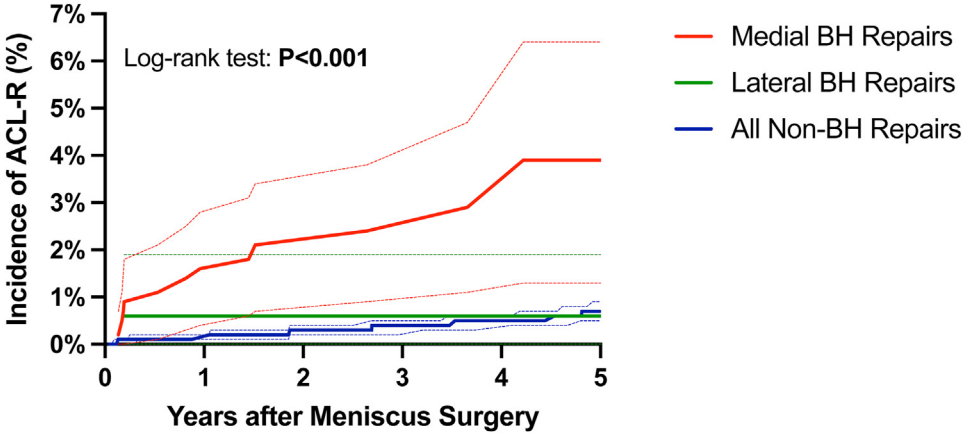


Fig 1. Kaplan–Meier survivorship plot of conversion to ACLR within 5 years for medial-sided BH tears treated with meniscal repair, lateral-sided BH tears treated with meniscal repair, and all non-BH tears treated with meniscal repair. Log-rank test showed $P < .001$ for difference between cohorts in risk of subsequent ACLR within 5 years. (ACLR, anterior cruciate ligament reconstruction; BH, bucket handle.)

stability. In a biomechanical study done by DePhillipo et al.,[22] they showed peripheral meniscal lesions lead to increase anterior tibial translation in ACL-intact knees.

Previous outcome studies on BH meniscus repairs have only focused on failure of surgery and not of potential risk of subsequent knee injury.[7,23,24] Recently, Kalifis et al.[19] found a total failure of 33% at median time of 19 months. They noted patients with medial meniscus repair had 4.8 greater relative likelihood of failure compared to lateral. In a recent clinical outcome and failure analysis of medial meniscus BH tear repairs, Thaunat et al.[23] found that after 2 years, postoperative failure rates did not stabilize. They hypothesized that sufficient and complete healing of the medial meniscus BH tear treated with repair is more challenging to achieve than other limited meniscal tear patterns. This study found that the majority of subsequent ipsilateral ACLR after medial BH repairs plateaued after 4 years postoperatively.

The present data raise the concern that although a repair may decrease risk of joint degeneration by preserving meniscus, some of the underlying rotatory knee instability from a BHMT may persist. Whether neuromuscular or anatomic, these underlying factors from the index BHMT may predispose to future similar injury. Thus, during rehabilitation following BHMT surgery, evaluation for these risk factors—as occurs following ACLR—could be helpful, although further research is warranted to assess the optimal rehabilitation program. Furthermore, a medial BHMT, even when repaired, might weaken the meniscus's ability to act as a secondary restraint to anterior tibial translation. The result is that more stress is transferred to the ACL, as the primary restraint, which potentially exposes it to injury. Future studies could investigate the role of adding an additional stabilizing procedure, either medially or laterally when a medial BH tear is present. In addition, it could be studied whether the use of exercises traditionally seen in an ACL injury-prevention program, such as neuromuscular retraining and strength training, may decrease the risk of subsequent ACL injury after treatment for BHMT.

Limitations

Our study has several limitations that are important to mention. As with other administrative database studies, this study was reliant on the accuracy of administrative coding, which is prone to error. First, when using PearlDiver, the accuracy of the data is directly related to the accuracy of the coding process, as ICD and CPT codes were used to identify the patients for this study. Second, as data from this national administrative database are based on insurance claims data, variables are limited to those coded within the database, and factors such as patient-reported outcomes and radiologic data are not documented. Another major limitation of this study is we were unable to assess any sort of pathology in the ACL at the time index meniscus surgery aside from that an ACLR was not performed. Specifically, co-diagnoses, like partial ACL tear, may not be consistently listed, thus limiting our ability to identify risk factors for future injury. To avoid confounding by patients who underwent staged ACLR after meniscus surgery, any patients who underwent ACLR within 3 months of index meniscus surgery were excluded from analysis. Lastly, a limitation of a large database study is the finer details of mechanism and operative procedures such as surgical technique, meniscus tear zone/location, or surgeon competency cannot accurately be assessed.

Conclusions

Isolated BHMTs comprised 1.67% of all surgically treated meniscal injuries. Patients who underwent previous surgery for isolated BHMT were at increased risk of undergoing subsequent ipsilateral ACLR compared with the general population. Isolated medial BHMTs treated with repair had the highest risk for subsequent ACLR.

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Appendix Table 1. ICD and CPT Codes Used in Analyses

Buckle Handle Tears	
ICD code	Description
ICD-10-D-S83211A	Bucket-handle tear of medial meniscus, current injury, right knee [initial encounter]
ICD-10-D-S83212A	Bucket-handle tear of medial meniscus, current injury, left knee [initial encounter]
ICD-10-D-S83251A	Bucket-handle tear of lateral meniscus, current injury, right knee [initial encounter]
ICD-10-D-S83252A	Bucket-handle tear of lateral meniscus, current injury, left knee [initial encounter]
Meniscus Tears (Not Specific for Buckle Handle Tears)	
Injury	Codes
Lateral meniscus tear, right	ICD-10-D-S83.261A, ICD-10-D-S83.271A, ICD-10-D-S83.281A
Lateral meniscus tear, left	ICD-10-D-S83.262A, ICD-10-D-S83.272A, ICD-10-D-S83.282A
Medial meniscus tear, right	ICD-10-D-S83.221A, ICD-10-D-S83.231A, ICD-10-D-S83.241A
Medial meniscus tear, left	ICD-10-D-S83.222A, 10-D-S83.232A, ICD-10-D-S83.242A
ACL Tears	
ICD code	Description
ICD-10-D-S83511A	Sprain of anterior cruciate ligament of right knee, initial encounter.
ICD-10-D-M23611	Other spontaneous disruption of anterior cruciate ligament of right knee.
ICD-10-D-S83512A	Sprain of anterior cruciate ligament of left knee, initial encounter
ICD-10-D-M23612	Other spontaneous disruption of anterior cruciate ligament of left knee
Surgeries	
Surgery	Codes
Meniscus repair	CPT-29882, CPT-29883, CPT-27403
Meniscectomy	CPT-27332, CPT-27333, CPT-29880, CPT-29881
ACL reconstruction	CPT-29888

ACL, anterior cruciate ligament; CPT, Current Procedural Terminology; ICD-10, *International Classification of Diseases, Tenth Revision.*