Resiliency Does Not Correlate With Outcome Scores After Meniscectomy

Austin G. Hughes,* Sudarsan Murali, MBA,* James T. McMurtrie, MD, Wesley R. Stroud, MD, Alexandra M. Arguello, Gerald McGwin, PhD, Eugene W. Brabston, MD, Brent A. Ponce, MD, and Amit M. Momaya, MD

Abstract

Background: Resilience is a psychometric parameter defined as one's ability to recover or bounce back from stressful events and has been shown to correlate with better outcomes following multiple orthopedic procedures. The purpose of this study was to analyze the correlation between resiliency, as measured using the Brief Resiliency Scale (BRS) and various knee outcome scores, including the International Knee Documentation Committee (IKDC), Lysholm, Single Assessment Numeric Evaluation (SANE), and Return to Work, following isolated partial meniscectomy.

Methods: One hundred patients who had undergone an isolated partial meniscectomy during a 3-year period at a single institution were successfully recruited to participate in the study. The BRS and knee outcome scores (IKDC, Lysholm, SANE, Return to Work) were obtained via phone. Radiographs for each patient were obtained and graded for arthritis severity using the Kellgren-Lawrence classification system.

Results: Brief Resiliency Scale scores ranged 15.0 to 23.0 with a mean of 18.2 ± 1.3. Mean knee outcome scores for IKDC, Lysholm, SANE, and Return to Work were 66.3, 77.1, 70.6, and 41.0, respectively. Outcome scores did not correlate with BRS scores. The severe arthritis group significantly correlated ($p < 0.05$) with worse IKDC, Lysholm, and Return to Work scores compared to mild arthritis scores. Additionally, analysis of the mild arthritis group revealed that resiliency significantly correlated with higher Return to Work scores compared to low resilience groups.

Conclusion: This study suggests that there is no significant relationship between patient resiliency and outcomes following partial meniscectomy. However, those with poorer outcomes had more severe arthritis.

With an incidence of 12% to 14%, meniscal injury is one of the most common orthopedic conditions presenting to emergency departments, primary care, and orthopedic clinics across the USA each year.[1] Mechanisms of meniscal injury differ between the young and elderly populations. In younger, more active individuals, these injuries are typically secondary to trauma.[2] In contrast, meniscal injuries in older individuals are more likely to be secondary to cumulative stress and degeneration over time.[2] While some meniscal injuries can be managed conservatively, others may require surgical intervention. Arthroscopic surgery to treat meniscal pathology is the most common operation performed in orthopedic surgery.[3] Arthroscopic partial meniscectomy has been the standard of care for surgical treatment of irreparable meniscal tears, however, a recent randomized study has called into question the usefulness of partial meniscectomy.[4] As a result, it is important to identify patient factors that will help predict those who may benefit from surgical intervention.

Resiliency, defined as the ability to bounce back after a stressful event,[5] has been shown to correlate with outcomes in health conditions including quality of life or recovery after hospital stays. The Brief Resiliency Scale (BRS) is a six item Likert scoring scale that has been shown to be a reliable tool for assessing resiliency in a person's ability to bounce back or recover from coping from a health-related stressor.[6] Recently,

Austin G. Hughes, and Sudarsan Murali MBA, University of Alabama at Birmingham, School of Medicine, Birmingham, Alabama, USA. James T. McMurtrie, MD, Wesley R. Stroud, MD, Alexandra M. Arguello, Eugene W. Brabston, MD, Brent A. Ponce, MD, and Amit M. Momaya, MD, Department of Orthopedic Surgery, and Gerald McGwin, PhD, Department of Epidemiology, University of Alabama at Birmingham, Birmingham, Alabama, USA.

*Austin G. Hughes and Sudarsan Murali MBA contributed equally to this work.

Correspondence: Amit M. Momaya, MD, University of Alabama at Birmingham, Department of Orthopedic Surgery, Birmingham, Alabama, USA; amit.momaya@gmail.com.

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resiliency has been correlated with better outcomes following orthopedic procedures like total shoulder arthroplasty.[7] This suggests that resilience might serve as a valuable psychosomatic property that might help surgeons better understand and identify patients who will better benefit from meniscus repair. To date, the effect of patient resiliency on outcomes following arthroscopic partial meniscectomy for irreparable meniscal injury has not been studied.

The purpose of this study was to evaluate the relationship between resiliency and outcomes following partial meniscectomy. Consistent with current literature, we hypothesized that patients who were more resilient would have better outcomes.[7]

Methods

Demographic

With institutional review board approval, our database was searched for patients who underwent partial meniscectomy from 2016 to 2018 using charge service codes 27332, 29880, 29881, 29882, and 29883 at our level one academic center. Inclusion criteria required patients to be at least 1-year post-surgery. Patients who had undergone subsequent procedures on the knee of interest were excluded. Additionally, patients were excluded if they were unable or unwilling to participate in the outcome scoring.

Outcome Scores

Patients were retrospectively contacted to assess psychometric characteristics during their postoperative recovery. Through phone call follow-up, each patient participated in a BRS survey and the following outcomes scores: International Knee Documentation Committee (IKDC), Tegner Lysholm Knee Scoring Scale (Lysholm), Single Assessment Numeric Evaluation (SANE), and Return to Work. All surveys were administered according to guidelines prescribed within the survey documentation. For the BRS, question stems were modified to prevent confusion, but scoring was preserved so that a score of five represented high resiliency while a one represented low resiliency. Scores on the BRS range from six to 30. No official definitions exist regarding BRS scores for groups of normal resilience (NR), low resilience (LR), and high resiliency (HR). Therefore, scores one standard deviation below the mean were categorized as LR while scores one standard deviation above the mean were categorized as HR. Additionally, scores within one standard deviation of the mean were labelled as NR. Mean scores and distribution were collected for each outcome survey (IKDC, Lysholm, SANE, Return to Work). Outcome score and resiliency score results were documented within a REDcap database (Vanderbilt University, Nashville, Tennessee, USA).

Radiographic Scoring

Standing anteroposterior and lateral knee radiographs for patients in our study were obtained and analyzed by two orthopedic resident physicians using the Kellgren-Lawrence classification system.[8] Image analysis was performed by each physician on two separate occasions, with a minimum of 1 month between each session. Scores between the four separate radiographic reviews were analyzed to ensure inter-rater and intra-rater reliability. These four scores were then averaged to derive a composite score for each patient. The patients were then separated into mild arthritis (scores < 3) and severe arthritis (scores 3 to 4) groups to assess for correlation with each respective outcome score measure.

Statistical Analysis

Statistical analyses were performed using SAS (SAS Institute Inc., Cary, North Carolina, USA). Outcome scores from the four surveys were compared between the three resiliency groupings using an analysis of variance (ANOVA) and a Pearson correlation to determine the relationship between resiliency and outcomes. Significance was set as $p < 0.05$.

Results

From an initial database search, 178 patients were delineated, and 100 patients were enrolled in the study (100 total knees: 47 left knees, 53 right knees). The mean age of this study population was 60.3 years (SD: 10.6) and included 42 males and 58 females. The demographic breakdown of these patients was as follows: 57% white, 40% African American, 2% Hispanic, and 1% Asian. The mean body mass index (BMI) was 33.4 (SD: 7.0). The mean follow-up time for patients was 24 months (range: 12 to 36 months). The BRS scores ranged from 15.0 to 23.0 with a mean of 18.2 ± 1.3. Scores less than 17 were considered LR while scores greater than 19 were considered HR. Score of 17 through 19 were determined to be NR. International Knee Documentation Committee scores ranged from 20.7 to 100.0 with a mean of 66.3 ± 20.5. Lysholm scores ranged from 18.0 to 100.0 with a mean of 77.1 ± 22.7. Single Assessment Numeric Evaluation scores ranged from 10.0 to 100.0 with a mean of 70.6 ± 22.5. Return to Work scores ranged from 0 to 118.0 with a mean of 41.0 ± 32.1. Kellgren-Lawrence grading for 94 patients revealed 73 patients (77.7%) with mild arthritis and 21 patients (22.3%) with severe arthritis. We were unable to obtain radiographs for six of our patients during chart review. Outcome scores did not correlate with BRS scores. However, patients with severe arthritis were found to have significantly ($p < 0.05$) worse IKDC and Lysholm scores (Table 1). Within the mild arthritis group, patients with higher resilience scores tended to have significantly higher Return to Work scores (Table 2). Additionally, BMI was not found to correlate with outcome scores (Table 1).

Discussion

The results of our study suggest that that resilience does not affect outcome scores following isolated partial meniscectomy. In addition, those with more severe arthritis tend to have poorer outcome scores following partial meniscectomy.

Table 1 Resilience, Arthritis, and Body Mass Index Versus Outcomes Measures

	IKDC	Lysholm	SANE	Return to Work
Resilience				
Brief Resiliency Scale	-0.09	-0.06	-0.04	0.09
P-Value*	0.39	0.54	0.66	0.33
Arthritis Scoring				
Mild	68.4	80.0	72.4	35.1
Severe	56.2	67.4	61.6	62.7
P-Value*	0.013*	0.021*	0.051	0.0005*
Body Mass Index				
Normal Weight	64.4	75.2	69.6	43.2
Overweight	68.7	79.9	71.8	37.9
P-Value*	0.31	0.32	0.64	0.43

IDKC: International Knee Documentation Committee score; SANE: Single Assessment Numeric Evaluation; *P-Values less than 0.05 were considered significant.

Table 2 Resilience Versus Outcomes Measures (Mild Arthritis)

Resilience	IKDC	Lysholm	SANE	Return to Work
Brief Resiliency Scale	-0.19	-0.13	-0.14	0.25
P-Value*	0.12	0.27	0.26	0.04*

IDKC: International Knee Documentation Committee score; SANE: Single Assessment Numeric Evaluation; *P-Values less than 0.05 were considered significant.

Many factors are known to affect recovery following surgery. Age, sex, smoking, and medical comorbidities are commonly recognized factors that can affect a patient's surgical outcome.[9] Several psychological factors, such as confidence, anxiety, and depression, have been shown to affect recovery after major orthopedic procedures, including total shoulder arthroplasty and total knee arthroplasty.[10,11] Additionally, other psychiatric comorbidities, such as dementia and schizophrenia, have been shown to increase the rate of adverse events and non-routine discharge.[10] These correlations between psychological factors and surgical outcomes show the necessity of developing ways to assess a patient's psychometric characteristics in order to better advise and select potential surgical candidates. Resilience is a psychosocial factor that has been shown to positively correlate with quality of life in diabetic and breast cancer patients.[12,13] Resilience has also been shown to be a main factor influencing psychological distress and side effects in patients with digestive tract cancer.[14] As such, resilience is emerging as an important factor in determining how a patient might respond to various health stressors, such as cancer, chronic disease, and surgery.

Recently, resilience has been shown to correlate with better outcomes following total joint arthroplasty.[7] Tokish et al.[7] showed that resilience is a patient-specific psychosocial parameter that can help predict postoperative outcomes in patients undergoing total shoulder arthroplasty (TSA). Similar results have also been shown in studies evaluating resiliency in rehabilitation after hip fractures, total hip arthroplasty (THA), and total knee arthroplasty (TKA).[15] While such procedures are often reliable in improving patient outcomes, outcomes after partial meniscectomy in the literature are mixed, particularly in regard to addressing perceived pain.[16] Furthermore, no one predictor has been shown to delineate which patient group will receive the most benefit from partial meniscectomy. In the current study, resiliency did not predict outcomes scores after isolated partial meniscectomy. While procedures such as TKA and THA have more clear indications and the source of pain is more apparent, it may be that many of the individuals who underwent partial meniscectomy may not have had pain secondary to the meniscus tear but rather another source.

There has been ample research investigating the long-term outcomes following meniscal debridement. Studies have shown patients may develop significant osteoarthritic changes following meniscectomy.[17] Contact pressures are increased within the knee after meniscectomy, leading to altered knee biomechanics and, ultimately, chondral damage.[18] In addition, there is growing suspicion that a degenerative meniscal tear represents an early sign of osteoarthritis (OA) rather than an isolated clinical entity.[4] In our study, all patients who had reviewable radiographs had at least mild OA, and 21 (22%) were found to have severe OA. Furthermore, the variable degrees of OA among the participants of this study may have confounded the correlation between resiliency and outcomes. Patients with significant arthritis simply may not benefit from an arthroscopic procedure, regardless of their resilience. The pain or dysfunction these

patients experience may be due to their advanced arthritic changes rather than their meniscal injury. Thus, undergoing a partial meniscectomy would fail to address the etiology of their symptoms. This is consistent with our statistical analysis that showed patients belonging to the severe arthritis group had significantly lower outcome scores. Additionally, analysis of our mild arthritis group revealed that resiliency significantly correlated with higher Return to Work scores compared to low resilience groups, further supporting the idea that degree of arthritis impacted outcomes after meniscectomy (Table 2).

Similarly, there has been extensive research investigating the relationship of BMI on recovery after meniscal debridement, suggesting that significant obesity hinders outcomes after surgery.[19] One study found that, among patients with radiographic evidence of knee osteoarthritis, those who had pain had higher average BMIs (30.4 kg/m^2) compared to patients with no pain (mean BMI: 27.5 kg/m^2).[20] A patient's BMI is also associated with the incidence and progression of knee OA.[21] The average participant in this study had a BMI of 33.4 kg/m^2 (SD: 7.0); however, this did not correlate with outcome scores.

There are several limitations in this study. This study was retrospective and subject to bias. No preoperative outcome scores or Kellgren-Lawrence scores were obtained. Evaluating the change in outcome scores from preoperative to postoperative in these patients and comparing the delta to resilience may have provided more insightful information. Having preoperative Kellgren-Lawrence scores would have allowed better analysis of partial meniscectomy's effect on pre-existing knee arthritis, whether or not this pathology is worsened by the procedure itself and more information about its role as a confounding variable in our study. In addition, preoperative resiliency scores were not obtained. The procedure itself and its outcome may affect one's resiliency score. In addition, an isolated partial meniscectomy is a controversial procedure in terms of reliable outcomes. Thus, it may be simply that patients had other sources of pain not addressed by the partial meniscectomy. No matter how resilient such patients are, inability to address the actual etiology of the pain may have confounded the findings.

Conclusion

This study found that there was no significant relationship between patient resiliency and outcomes following isolated partial meniscectomy. However, those with more severe arthritis had worse outcomes. Further studies are warranted to identify the impact of psychometric properties and their potential impact on predicting outcomes after meniscal surgery.

Disclosure Statement

None of the authors have a financial or proprietary interest in the subject matter or materials discussed herein, including, but not limited to, employment, consultancies, stock ownership, honoraria, and paid expert testimony.

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