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Original research

The Effect of the COVID-19 Pandemic on Hip and Knee Arthroplasty Patients in the United States: A Multicenter Update to the Previous Survey

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ABSTRACT

Background: In March 2020, elective total hip and knee arthroplasty (THA and TKA) were suspended across the United States in response to the COVID-19 pandemic. We had previously published the results of a survey to the affected patients from 6 institutions. We now present the results of a larger distribution of this survey, through May and June 2020, to electively scheduled patients representing different regions of the United States.

Methods: Fifteen centers identified through the American Association of Hip and Knee Surgeons Research Committee participated in a survey study of THA and TKA patients. Patients scheduled for primary elective THA or TKA but canceled due to the COVID-19 elective surgery stoppage (3/2020-5/2020) were included in the study. Descriptive statistics along with subgroup analysis with Wilcoxon rank were performed.

Results: In total, surveys were distributed to 2135 patients and completed by 848 patients (40%) from 15 institutions. Most patients (728/848, 86%) had their surgery postponed or canceled by the surgeon or hospital. Unknown length of surgical delay remained the highest source of anxiety among survey participants. Male patients were more likely to be willing to proceed with surgery in spite of COVID-19. There were minimal regional differences in responses. Only 61 patients (7%) stated they will continue to delay surgery for fear of contracting COVID-19 while in the hospital.

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Conclusion: Similar to the previous study, the most anxiety-provoking thought was the uncertainty, over if and when the canceled joint replacement surgery could be rescheduled. Patients suffering from the daily pain of hip and knee arthritis who have been scheduled for elective arthroplasty remain eager to have their operation as soon as elective surgery is allowed to resume.

Introduction

In response to the novel coronavirus SARS-CoV-2 and the global pandemic, we saw the cancellation of elective surgery across the United States starting in March 2020 [1,2]. Hip and knee arthroplasty (THA and TKA) are 2 commonly performed elective procedures in the United States, and an estimated 30,000 primary procedures were canceled per week because of the national elective surgery stoppage [3]. In an attempt to quantify and understand the effect this had on our patients with hip and knee arthritis, the American Association of Hip and Knee Surgeons (AAHKS) Research Committee designed and distributed a novel survey in early April 2020. Results of this multicenter distribution to 360 patients across 6 institutions were published online in late April 2020 [4]. The purpose of the present study was to provide an updated and expanded report of the same survey instrument, now including 15 institutions across the United States, with a variety of different regions and practice types. Specific aims of the study were to identify THA and TKA patients who had their scheduled primary joint arthroplasty postponed or canceled because of the COVID-19 pandemic guidelines for elective surgery and assess their pain, anxiety, physical function, and economic ability to undergo a delayed operation once the threat of COVID-19 has subsided.

Methods

We previously obtained institutional review board approval to administer a questionnaire to patients with hip and knee arthritis that had planned for elective hip or knee arthroplasty but were rescheduled because of the pandemic (Fig. 1—Survey). Participating centers were identified through the AAHKS Research Committee and Research Consortium. In total, 15 institutions obtained local institutional review board approval and distributed the survey items to patients. These institutions represented both academic and private medical centers, in varied regions of the United States (Table 1—Participating Institutions).

The survey was distributed to patients via telephone or electronically with REDCap (Research Electronic Data Capture, Nashville, TN) hosted at the University of Iowa. The survey contained questions regarding the prior planned operation, questions on a 5-point Likert scale [5] addressing anxiety around COVID-19, the canceled operation, questions about the patient's disease state, and socioeconomic concerns. Data were collected from April 6 to June 15, 2020, before analysis.

Descriptive statistics were performed for frequency of survey responses and reported as mean ± standard deviation. For the Likert scale questions that addressed anxiety around COVID-19, responses were analyzed as categorical responses and also turned to a continuous variable and mean presented (1 = no anxiety to 5 = severe anxiety). Univariate analyses were performed with age (younger than 65 vs 65 years and older), procedure (hip vs knee), and US geographic region (Midwest, Northeast, South, West). We used chi-square test to detect relationship between age and region group for each of the categorical variables. The Wilcoxon rank sum test was used for continuous variable analysis. All statistical analyses were performed using SAS 9.4 (SAS Inc., Cary, NC) with significance level $P < .05$.

Table 1
Participating institutions.

Region classification of participating institutions	
Region	Institution
Midwest	University of Iowa Hospitals and Clinics
	University of Arkansas
	Loyola University Chicago
	Cleveland Clinic- Ohio
Northeast	Rothman Institute
	New York University Langone Health
	University of Maryland Medical Center
	University of Vermont
South	Duke University
	West Virginia University
	Cleveland Clinic-Florida
	University of Florida
	Louisiana State University
West	Colorado Joint Replacement
	University of California San Francisco

Results

Fifteen centers distributed surveys to 2135 patients, and they were successfully completed by 848 patients (40%). Mean age of the patients was 63 years, 480 (57%) were women, and 426 were scheduled for THA (50%). Most patients were originally scheduled in April (51%), followed by March (33%) and May (14%). Only one

Table 2
Patient demographics.

Overall survey respondent characteristics	
Respondent characteristic	n = 848
Average age	62.6 (±16.8)
Female (%)	480 (56.6)
Male (%)	328 (43.4)
Procedure delayed	
THA (%)	426 (50.2)
TKA (%)	422 (49.8)
Month of canceled surgery	
March (%)	282 (33.2)
April (%)	429 (50.6)
May (%)	122 (14.4)
June or later (%)	15 (1.8)
Who canceled surgery?	
Surgeon (%)	728 (86)
Patient (%)	120 (14)
Geographical region	
Midwest (%)	268 (31.6)
Northeast (%)	280 (33.0)
South (%)	252 (29.7)
West (%)	48 (5.7)

THA, total hip arthroplasty; TKA, total knee arthroplasty.

Table 3
Anxiety responses according to patient age.

COVID-19–related anxiety severity reported by age group			
Question topic	Age group	Mean anxiety score (±SD)	*P*-value
Becoming infected with COVID-19	≤65 (N = 407)	3.0 (±1.3)	.3228
	>65 (N = 441)	3.1 (±1.3)	
Spreading COVID-19 to others	≤65 (N = 407)	3.1 (±1.4)	.5783
	>65 (N = 441)	3.2 (±1.4)	
Finances	≤65 (N = 407)	2.5 (±1.4)	<.0001
	>65 (N = 441)	1.9 (±1.1)	
Job security, FMLA, disability	≤65 (N = 407)	2.2 (±1.4)	<.0001
	>65 (N = 441)	1.4 (±0.9)	
Unknown length of surgical delay	≤65 (N = 407)	3.5 (±1.3)	<.0001
	>65 (N = 441)	3.1 (±1.4)	

SD, standard deviation.

percent of the patients who responded were scheduled for June or later. Most patients had their surgery postponed or canceled by the surgeon or hospital (728 patients, 86%), whereas 14% of patients initiated the cancellation. The patients were evenly distributed from the Midwest, Northeast, South US geographical regions, but only 5% of respondents were from the US West (Table 2—87 Demographics).

Anxiety around COVID-19

Unknown length of surgical delay remained the highest source of anxiety among survey participants (mean of 3.3 ± 1.3). Finances and job security remained the lowest sources of anxiety (mean of 2.2 ± 1.3 and 1.8 ± 1.9, respectively). These results were not changed with the wider survey distribution.

Younger patients (<65 yo) were significantly more likely to have more anxiety overall and specifically with finances (mean of 2.5 vs 1.9, $P < .0001$), job security/leave/disability (mean of 2.2 vs 1.4, $P < .0001$), and length of surgical delay (mean of 3.5 vs 3.1, $P < .0001$) (Table 3). There were no significant differences in response by patient sex or by procedure type.

Arthritis symptoms in light of COVID-19

Patients reported being at the same symptom level (37%) or had worsening arthritis symptoms during the pandemic (54%). Very few had improved hip or knee arthritis symptoms during the pandemic. Most patients report becoming less active during the pandemic (50%) and there were no differences in age or sex (Tables 4 and 5). Patients with hip arthritis were more likely to report worsening symptoms during the pandemic than patients with knee arthritis (67% vs 48%, $P < .0001$) (Table 6).

Table 4
Arthritis symptoms and the pandemic.

Respondent thoughts on COVID-19–related issues, by sex					
Question issue	Sex	Possible responses (n)			*P*-value
		Increased	Decreased	Stayed the same	
Change in joint pain since the onset of pandemic	Female (N = 480)	58% (277)	5% (24)	37% (179)	0.2674
	Male (N = 328)	56% (183)	3% (10)	41% (135)	
Change in activity level since the onset of pandemic	Female (N = 480)	9% (41)	55% (262)	37% (177)	0.5248
	Male (N = 328)	10% (32)	51% (166)	40% (130)	

Table 5
Survey responses according to patient sex.

Respondent thoughts on COVID-19–related issues, by sex				
Question issue	Sex	Possible responses (n)		*P*-Value
		Yes	No	
Moving forward with surgery with elevated COVID-19 and/or death risk	Female (N = 480)	30% (145)	70% (335)	<.0001
	Male (N = 328)	47% (155)	53% (173)	
Agree with importance of stopping elective surgery during pandemic to minimize infection risk	Female (N = 480)	85% (408)	15% (72)	.005
	Male (N = 328)	71% (234)	29% (94)	
Feelings of isolation present due to pandemic restrictions	Female (N = 480)	24% (116)	76% (364)	.2704
	Male (N = 328)	15% (49)	85% (279)	
Necessary help available at home	Female (N = 480)	86% (413)	14% (67)	.6935
	Male (N = 328)	85% (279)	16% (54)	

Patient perceptions of surgical delay

Male patients were more likely to be willing to proceed with surgery in spite of COVID-19 risk (47% vs 30%, $P < .0001$) and less likely to agree that elective surgery should be stopped to help limit the spread of COVID-19 (71% vs 85%, $P < .0001$). Younger patients (<65) were significantly more likely to accept the risk of COVID-19 and pursue surgery during the pandemic (44% vs 31%, $P < .0001$) (Table 7).

There were minimal regional differences in responses, with the only significant differences coming in regional response to the question "I agree with the importance of stopping elective surgery during the pandemic to minimize infection risk" (Midwest 77% yes, Northeast 82% yes, South 83% yes, West 60% yes; $P = .0018$) (Table 8).

Patient plans for future treatment

When asked about future plans for arthritis treatment, 736 patients (87%) stated they will reschedule surgery in the near future. Only 61 patients (7%) stated they will delay surgery for fear of contracting the virus while in the hospital. There were no regional differences to the survey responses for this question (Table 9).

Table 6
Arthritis symptoms according to patient age.

Respondent thoughts on COVID-19–related issues, by age					
Question issue	Age	Possible responses (n)			*P*-value
		Increased	Decreased	Stayed the same	
Change in joint pain since the onset of pandemic	≤65 (N = 407)	63% (255)	4% (17)	33% (135)	.2674
	>65 (N = 441)	53% (234)	4% (19)	43% (188)	
Change in activity level since the onset of pandemic	≤65 (N = 407)	11% (46)	53% (215)	36% (146)	<.0966
	>65 (N = 441)	8% (32)	53% (233)	40% (176)	

Table 7
Pandemic-related scheduling and isolation responses, according to age.

Respondent thoughts on COVID-19–related issues, by age				
Question issue	Age	Possible responses (n)		*P*-value
		Yes	No	
Moving forward with surgery with elevated COVID-19 and/or death risk	≤65 (N = 407	44% (181)	56% (226)	<.0001
	>65 (N = 441)	30% (133)	70% (308)	
Agree with importance of stopping elective surgery during pandemic to minimize infection risk	≤65 (N = 407	75% 307	25% 100	.005
	>65 (N = 441)	83% 367	17% 74	
Feelings of isolation present due to pandemic restrictions	≤65 (N = 407	22% (89)	78% (318)	.2704
	>65 (N = 441)	78% (344)	14% (63)	
Necessary help available at home	≤65 (N = 407	85% (344)	15% (63)	.6935
	>65 (N = 441)	85% (377)	15% (64)	

Discussion

As of February 1, 2021, the United States has surpassed 25,800,000 cases of COVID-19 and 430,000 deaths from the SARS-CoV-2 virus (6). As transmission has continued throughout the spring and summer of 2020, decisions about elective surgery have been made increasingly difficult [7-9]. Our survey cannot help guide the resumption of elective orthopaedic surgery, nor can it predict the backlog of elective cases as a result of the elective deferments as other studies have done [10]. However, our updated results reflect a large cross-section of patients with hip and knee arthritis who have been affected by the pandemic and provide insight to their concerns and goals of care during these unprecedented times.

Similar to the previous study, the most anxiety-provoking thought for patients was the uncertainty over if and when the canceled joint replacement could be rescheduled. Increasing the number of respondents and analyzing by age / region did not change this result. Younger patients consistently worried more about finances and job security relative to the retirement age respondents. As the pandemic spread more broadly throughout the United States, the regional differences in responses seen in the April survey results were no longer significant.

Table 8
Arthritis symptoms by patient region.

Respondent thoughts on COVID-19–related issues, by region					
Question issue	Age	Possible responses (n)			*P*-value
		Increased	Decreased	Stayed the same	
Change in joint pain since the onset of pandemic	Midwest (N = 268)	61% (164)	4% (10)	35% (94)	.0598
	Northeast (N = 280)	58% (163)	2% (6)	40% (111)	
	South (N = 252)	52% (132	6% (16)	41% (104)	
	West (N = 48)	63% (30)	8% (4)	29% (14)	
Change in activity level since the onset of pandemic	Midwest (N = 268)	12% (32)	48% (128)	40% (108)	.0383
	Northeast (N = 280)	6% (16)	56% (156)	39% (108)	
	South (N = 252)	9% (22)	57% (143)	35% (87)	
	West (N = 48)	17% (8)	44% (21)	40% (19)	

Table 9
Pandemic-related scheduling and isolation responses, according to US region.

Respondent thoughts on COVID-19–related issues, by region				
Question issue	Region	Possible responses (n)		*P*-Value
		Yes	No	
Moving forward with surgery with elevated COVID-19 and/or death risk	Midwest (N = 268)	43% (115)	57% (153)	.0857
	Northeast (N = 280)	35% (97)	65% (183)	
	South (N = 252)	33% (83)	67% (169)	
	West (N = 48)	40% (19)	60% (29)	
Agree with importance of stopping elective surgery during pandemic to minimize infection risk	Midwest (N = 268)	77% (206)	23% (62)	.0018
	Northeast (N = 280)	82% (229)	18% (51)	
	South (N = 252)	83% (210)	17% (42)	
	West (N = 48)	60% (29)	40% (19)	
Feelings of isolation present due to pandemic restrictions	Midwest (N = 268)	19% (50)	81% (218)	.8581
	Northeast (N = 280)	21% (58)	79% (222)	
	South (N = 252)	21% (53)	79% (199)	
	West (N = 48)	23% (11)	77% (37)	
Necessary help available at home	Midwest (N = 268)	83% (222)	21% (46)	.1109
	Northeast (N = 280)	83% (233)	20% (47)	
	South (N = 252)	88% (221)	14% (31)	
	West (N = 48)	94% (45)	7% (3)	

There are limitations to our work. The most significant was the slow resumption of elective surgery starting in May 2020. As states began reopening and surgeons began operating electively, patients were less likely to participate in the survey and more likely to seek immediate rescheduling of their planned operation.

The results of this large nationwide survey provides insight to patient's perceptions of the need to postpone surgery due to COVID-19 and help us to better understand their concerns and desires regarding rescheduling their hip or knee arthroplasty. Overall, patients suffering from the daily pain of hip and knee arthritis who have been scheduled for elective arthroplasty remain eager to have their operation (87%) as soon as it is deemed safe. As we continue to experience a rise in COVID-19 cases throughout the United States, the data from this survey can help guide future communications with patients should the need to halt elective surgery become necessary.

Conclusions

Although there is anxiety around the SARS-CoV-2 virus and the uncertainty in the economy, patients with hip and knee arthritis continue to suffer from the symptoms of the chronic disease and remain eager to have their quality of life improved with THA and TKA. As the global health situation continues to evolve, orthopaedic surgeons need to carefully plan how to deliver care to these patients in a safe and responsible way.

Conflicts of Interest

The authors declare there are no conflicts of interest.

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