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A BRIEF UPDATE ON THE EFFECT OF THE COVID-19 PANDEMIC ON HIP AND KNEE ARTHROPLASTY PATIENTS IN THE UNITED STATES A Multicenter Update to a Previous Survey Study of Patients Postponed by the Pandemic

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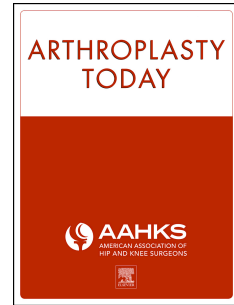
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A Multicenter Update to a Previous Survey Study of Patients Postponed by the Pandemic

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Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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6 ABSTRACT

7

8 Background

9

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

15

16 Methods

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

22 Results

23 In total, surveys were distributed to 2135 patients and completed by 848 patients (40%)
24 from 15 institutions. Most patients (728/848, 86%) had their surgery postponed or canceled by
25 the surgeon or hospital. Unknown length of surgical delay remained the highest source of anxiety
26 among survey participants. Male patients were more likely to be willing to proceed with surgery
27 in spite of COVID-19. There were minimal regional differences in responses. Only 61 patients
28 (7%) stated they will continue to delay surgery for fear of contracting COVID-19 while in the
29 hospital.

30 Conclusion

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

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36 **Introduction**

37

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

53

54 **Methods**

55 We previously obtained Institutional Review Board (IRB) approval to administer a
56 questionnaire to patients with hip and knee arthritis that had planned for elective hip or knee
57 arthroplasty but were rescheduled due to the pandemic (Figure 1 – Survey). Participating centers
58 were identified through the AAHKS Research Committee and Research Consortium. In total,
59 fifteen institutions obtained local IRB approval and distributed the survey items to patients.

60 These institutions represented both academic and private medical centers, in varied regions of the
61 United States (Table 1 – Participating Institutions).

62 The survey was distributed to patients via telephone or electronically with REDCap
63 (Research Electronic Data Capture, Nashville, TN, USA) hosted at the University of Iowa. The
64 survey contained questions regarding the prior planned operation, questions on a 5-point Likert
65 scale [5] addressing anxiety around COVID-19, the canceled operation, questions about the
66 patient's disease state, and socioeconomic concerns. Data were collected from April 6 to June 15,
67 2020 before analysis.

68 Descriptive statistics performed for frequency of survey responses and reported as mean
69 +/- standard deviation. For the Likert scale questions that addressed anxiety around COVID-19,
70 responses were analyzed as categorical responses and also turned to a continuous variable and
71 mean presented (1 = no anxiety to 5 = severe anxiety). Univariate analyses were performed with
72 age (younger than 65 versus 65 years and older), procedure (hip versus knee), and US
73 geographic region (Midwest, Northeast, South, West). We used Chi-square test to detect
74 relationship between age and region group for each of the categorical variables. Wilcoxon rank
75 sum test was used for continuous variable analysis. All statistical analyses were performed using
76 SAS 9.4 (SAS Inc., Cary, NC, USA) with significance level $p < 0.05$.

77

78 **Results**

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

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

88

89 *Anxiety Around COVID-19*

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

94 Younger patients (<65 yo) were significantly more likely to have more anxiety overall
95 and specifically with finances (mean of 2.5 vs 1.9, $p < 0.0001$), Job Security/leave/disability
96 (mean of 2.2 vs 1.4, $p < 0.0001$), and length of surgical delay (mean of 3.5 vs 3.1, $p < 0.0001$)
97 (Table 3). There were no significant differences in response by patient sex or by procedure type.

98

99 *Arthritis Symptoms in Light of COVID-19*

100 Patients reported being at the same symptom level (37%) or had worsening arthritis
101 symptoms during the pandemic (54%). Very few had improved hip or knee arthritis symptoms
102 during the pandemic. Most patients report becoming less active during the pandemic (50%) and
103 there were no differences in age or sex (Table 4). Patients with hip arthritis were more likely to
104 report worsening symptoms during the pandemic compared to knee patients (67% vs 48%, $p <$
105 0.0001).

106

107 *Patient perceptions of surgical delay*

108 Male patients were more likely to be willing to proceed with surgery in spite of COVID-
109 19 risk (47% vs 30%, $p < 0.0001$) and less likely to agree that elective surgery should be stopped
110 to help limit the spread of COVID-19 (71% vs 85%, $p < 0.0001$). Younger patients (< 65) were
111 significantly more likely to accept the risk of COVID-19 and pursue surgery during the
112 pandemic (44% vs 31%, $p < 0.0001$).

113 There were minimal regional differences in responses, with the only significant
114 differences coming in regional response to the question “I agree with the importance of stopping
115 elective surgery during the pandemic to minimize infection risk” (Midwest 77% yes, Northeast
116 82% yes, South 83% yes, West 60% yes; $p = 0.0018$).

117

118 *Patient Plans for Future Treatment*

119 When asked about future plans for arthritis treatment, 736 patients (87%) stated
120 they will reschedule surgery in the near future. Only 61 patients (7%) stated they will delay
121 surgery for fear of contracting the virus while in the hospital. There were not regional differences
122 to the survey responses for this question.

123

124 **Discussion**

125 As of July 31, 2020 the US has surpassed 4 million cases and 150,000 deaths from the
126 SARS-CoV-2 virus pandemic [6]. As transmission has continued throughout the spring and
127 summer of 2020, decisions about elective surgery have been made increasingly difficult [7-9].
128 Our survey cannot help guide the resumption of elective orthopedic surgery, nor can it predict

129 the backlog of elective cases as a result of the elective deferments as other studies have done[10].
130 However, our updated results reflect a large cross-section of hip and knee patients that have been
131 affected by the pandemic and provide insight to their concerns and goals of care during these
132 unprecedented times.

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

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

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

150

151 **Conclusion**

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

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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

Table 2: Patient Demographics

Overall Survey Respondent Characteristics	
Respondent Characteristic	n=848
Average Age	62.6 (\pm 16.8)
Female (%)	480 (56.6)
Male (%)	328 (43.4)
Procedure Delayed	
THA (%)	426 (50.2)
TKA (%)	422 (49.8)
Month of cancelled Surgery	
March (%)	282 (33.2)
April (%)	429 (50.6)
May (%)	122 (14.4)
June or later (%)	15 (1.8)
Who cancelled 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)

Table 3: Anxiety Responses According to Patient Age

Covid-19 Related Anxiety Severity Reported by Age Group			
Question Topic	Age Group	Mean Anxiety Score (\pm SD)	P-Value
Becoming Infected with COVID-19	≤ 65 (N=407)	3.0 (± 1.3)	0.3228
	> 65 (N=441)	3.1 (± 1.3)	
Spreading Covid-19 to others	≤ 65 (N=407)	3.1 (± 1.4)	0.5783
	> 65 (N=441)	3.2 (± 1.4)	
Finances	≤ 65 (N=407)	2.5 (± 1.4)	< 0.0001
	> 65 (N=441)	1.9 (± 1.1)	
Job Security, FMLA, disability	≤ 65 (N=407)	2.2 (± 1.4)	< 0.0001
	> 65 (N=441)	1.4 (± 0.9)	
Unknown length of surgical delay	≤ 65 (N=407)	3.5 (± 1.3)	< 0.0001
	> 65 (N=441)	3.1 (± 1.4)	

SD = standard deviation

Table 4: Arthritis Symptoms and the Pandemic

Table 4a

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 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 onset of pandemic	Female (N=480)	9% (41)	55%(262)	37% (177)	0.5248
	Male (N=328)	10% (32)	51% (166)	40% (130)	

Table 4b

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)	<0.0001
	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)	0.005
	Male (N=328)	71% (234)	29% (94)	
Feelings of isolation present due to pandemic restrictions	Female (N=480)	24% (116)	76% (364)	0.2704
	Male (N=328)	15% (49)	85% (279)	
Necessary help available at home	Female (N=480)	86% (413)	14% (67)	0.6935
	Male (N=328)	85% (279)	16% (54)	

Table 5a

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 onset of pandemic	≤65 (N=407)	63% (255)	4% (17)	33% (135)	0.2674
	>65 (N=441)	53% (234)	4% (19)	43% (188)	
Change in activity level since onset of pandemic	≤65 (N=407)	11% (46)	53% (215)	36% (146)	<0.0966
	>65 (N=441)	8% (32)	53% (233)	40% (176)	

Table 5b

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)	<0.0001
	>65 (N=441)	30% (133)	70% (308)	
Agree with	≤65 (N=407)	75% 307	25% 100	0.005

importance of stopping elective surgery during pandemic to minimize infection risk	>65 (N=441)	83% 367	17% 74	
Feelings of isolation present due to pandemic restrictions	≤65 (N=407)	22% (89)	78% (318)	0.2704
	>65 (N=441)	78% (344)	14% (63)	
Necessary help available at home	≤65 (N=407)	85% (344)	15% (63)	0.6935
	>65 (N=441)	85% (377)	15% (64)	

Table 6a

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 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 onset of pandemic	Midwest (N=268)	12% (32)	48% (128)	40% (108)	0.0383
	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)	
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Table 6b

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	Midwest (N=268)	43% (115)	57% (153)	0.0857
	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)	0.0018
	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)	0.8581
	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)	0.1109
	Northeast (N=280)	83% (233)	20% (47)	
	South (N=252)	88% (221)	14% (31)	
	West (N=48)	94% (45)	7% (3)	

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