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Patient satisfaction in shoulder arthroscopy: telemedicine versus clinic follow-up visits

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Background: The use of telemedicine for postoperative visits is increasing, especially in rural areas. Few studies have investigated its use for arthroscopic shoulder patients. This study aims to evaluate patient satisfaction with telemedicine for postoperative clinic visits following arthroscopic shoulder procedures in a rural setting.
Methods: Patients were prospectively enrolled using the following exclusion criteria: <18 years, open procedures, and non-compliance follow-up at 6 weeks postoperatively. All patients completed a 13-question satisfaction survey, while telemedicine patients completed an additional, separate seven-question survey. Patients who switched groups completed a four-question prompt to determine the reasons for switching. Differences between groups were evaluated by either Student t-test or Mann-Whitney U-test.
Results: The study enrolled 32 patients, with five patients following up by telemedicine and 27 in person. Age and distance from clinic were similar between patients who were assigned to the telemedicine group, completed the telemedicine visit, and opted for in-person visits (all $p>0.05$). Patient satisfaction did not vary significantly based on care by the surgeon, concerns being addressed, thoroughness of visit, overall clinical assessment at a prior visit, and improvements in pain and physical function (all $p>0.05$). Among patients who opted out of telemedicine visits, the most common reason was a preference to meet in-person but these patients agreed that telemedicine visits are a good idea.
Conclusions: Regardless of type of follow-up, individuals reported similar levels of satisfaction with treatment during the visit and improvements in pain and physical function.

Keywords: Telemedicine; Shoulder; Arthroscopy

INTRODUCTION

Traditional assessments of postoperative progress involve in-person clinical visits. However, due to the rapid development of telecommunication technologies, additional options are available for patients unwilling or unable to honor their appointments. Telemedicine involves the use of high-quality audio and video to connect patients and physicians via Health Insurance Portability and Accountability Act-compliant virtual conferencing. Although this novel technology is increasingly applied for patient care, its clinical use, especially in the context of orthopedic surgery, remains limited. The coronavirus disease 2019 (COVID-19) pandemic has highlighted the utility of telemedicine, and it has been suggested that its role may be permanent rather than tran-

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sient within the surgical field [1].

Prior studies have investigated the use of telemedicine or telerehabilitation for total knee and total hip arthroplasty [2-8], shoulder replacement [9], and rotator cuff tear patient populations [10,11], with a systematic review demonstrating stronger evidence for its use in hip and knee arthroplasty patients as compared to shoulder patients [12]. Other studies among subacromial decompression patients have also highlighted the equivalence of telemedicine visits to that of in-person clinic visits [13], which is further supported by a meta-analysis of patient and surgeon satisfaction with the use of telemedicine in orthopedic care demonstrating non-significant differences from traditional modes of care [14].

Although virtual visits are a potential benefit in orthopedic care, few studies have investigated the use of telemedicine among rotator cuff tear patients. For this surgical population, the postoperative recovery period serves as a key factor in the success of the procedure, as it requires considerable time for healing [15]. Kane et al. [11] performed a randomized controlled trial of telemedicine among this surgical subpopulation and demonstrated that a significant proportion of patients were not only satisfied with but preferred the virtual format over an office visit. While these results for the use of telemedicine among arthroscopic shoulder patients are encouraging, there remains a dearth of evidence that either supports or denies its validity. Moreover, few, if any, studies have evaluated the use of telemedicine within rural patient populations. Individuals living in rural communities may not have the same access to in-person visits as those living in more urban settings, making the use of telemedicine potentially more crucial to honoring their periodic postoperative assessments. Virtual visits may offer additional benefits such as reduced travel, minimal waiting times, and reduced overall cost to both patients and health-care payers [16,17]. Therefore, the aim of this study is to evaluate patient satisfaction with the use of telemedicine as a medium for postoperative appointments among arthroscopic shoulder patients.

METHODS

Prior to initiation of the current study, appropriate Institutional Review Board approval the Guthrie Clinic (IRB No. 2001-03) and written informed consent from patients were obtained.

Inclusion and Exclusion Criteria

Patients who underwent eligible shoulder arthroscopic procedures from December 2019 to March 2021 were prospectively enrolled in the study. Participants were assigned to one of two groups (telemedicine or clinic follow-up) using simple randomization. Inclusion criteria were adult patients who underwent arthroscopic rotator cuff repair. Exclusion criteria were patients <18 years, who underwent an open procedure, or failed to follow-up by 6 weeks postoperatively. The appropriate sample size for this pilot study was calculated using the two means equation with a power and sample size calculator.

Data Collection

Baseline characteristics were recorded for all patients including, age, self-identified gender, ethnicity, distance from their home to clinic, and current accessibility to an internet connection. Clinical data pertaining to baseline shoulder function and pain were also collected using the modified American Shoulder and Elbow Surgeons (ASES) score and Numerical Rating Scale (NRS). The primary outcome of interest was overall patient satisfaction with postoperative visits. Satisfaction was evaluated using a 13-question survey (Supplementary Material 1) that was administered to all patients in both groups following their second postoperative visit at 6 weeks, which was the time point at which they were permitted any type of range of motion. The survey was not administered at the first postoperative visit (2 weeks), to accurately capture each patient's interpretation of their shoulder pain improvement due to the procedure rather than due to the acuity of the procedure. The secondary outcome of interest was satisfaction with the use of telemedicine for postoperative visits. This seven-item questionnaire (Supplementary Material 2) was administered only to patients who completed their 6-week postoperative visit using telemedicine. Additionally, in instances when patients who were originally randomized into the telemedicine group opted for a regular in-person clinic visit instead, a four-item questionnaire (Supplementary Material 3) was administered to better evaluate their preferences.

Statistical Analysis

Sample size calculation was performed using the two means equation in the Power and Sample Size Calculation program [18]. Following Dallolio et al. [19], we used the mean increase in total functional independence at 6 months in the telemedicine group and the smallest effect size required to detect a difference. Two-tailed hypothesis testing concluded that given a standard deviation of 6.88, each group needed 26 subjects to achieve a power of 80%, with an error rate of 5%. Therefore, our study sought to enroll a total of 58 subjects with an estimated loss to follow-up of 10% (29 subjects enrolled in each group). Due to restrictions related to the COVID-19 pandemic, the total enrollment calculated was not reached.

Summary statistics were performed for baseline characteristics for all groups and subgroups. To evaluate differences in key demographics (age and distance from clinic), pain, and shoulder functional status between groups, two-tailed Student t-tests were used. Differences in mean overall patient satisfaction between groups were evaluated by Mann-Whitney U-tests. All statistical tests were performed in RStudio (RStudio; PBC, Boston, MA, USA) using an α value of 0.05.

RESULTS

A total of 32 patients were enrolled in the study, with 10 patients in the telemedicine follow-up group and 22 opting for in-person follow-up. A total of five patients opted to switch from telemedicine to in-person, with a total of five patients ultimately having their follow-up virtually and 27 in-person at the clinic. The mean age was 59.9 years with the majority of patients being male (65.6%) and of white ethnicity (90.6%). The majority of patients fell between the ages of 50–59 years (46.8%). Patients typically lived an average of 67.4 km from the clinic. Patients assigned to the in-person group had mean baseline ASES and NRS of 48.8±29.1 and 6.2±2.6, respectively. Patients assigned to the telemedicine group had mean baseline ASES of 40.6±29.8 and NRS of 6.7±2.2. No significant differences in ASES scores or NRS were observed between groups (p=0.555 and p=0.697). A summary of patient baseline characteristics can be found in Table 1.

Patients assigned to virtual postoperative visits did not significantly differ in age from those assigned to in-person postoperative visits (58.4±9.0 vs. 60.5±7.9 years; p=0.501). The ages of patients who completed virtual visits and in-person clinic visits did not significantly differ (54.6±7.1 vs. 60.9±8.1 years (p=0.118). Finally, patients who switched from virtual to in-person visits did not differ significantly in age (62.2±9.7 vs. 54.6±7.1 years; p=0.195). Differences in age between groups are summarized in Table 2.

Patients who were assigned to a virtual visit did not live significantly further from the clinic than patients who were assigned an in-person clinic visit (53.3±36.0 vs. 76.3±51.4 km, p=0.212). The same was demonstrated for patients who completed virtual vs. in-person clinic visits (57.3±30.1 vs. 71.2±50.6 km, p=0.557). Among patients who switched from a virtual visit to an in-person clinic visit, mean distance from the clinic was shorter than for patients who completed their virtual visit (49.1±44.3

Table 1. Patient demographics

Characteristics	Total (n=32)	Clinic (n=27)	Telemedicine (n=5)	p-value
Age (yr)	59.9±8.2	60.9±8.1	54.6±7.1	0.501*
Stratified age (yr)				0.443†
<50	3.1 (1)	3.7 (1)	20.0 (1)	
50–59	46.8 (15)	44.4 (12)	60.0 (3)	
60–69	34.3 (11)	37.0 (10)	20.0 (1)	
≥70	15.6 (5)	14.8 (4)	0	
Sex				0.257†
Female	34.4 (11)	66.7 (18)	40.0 (2)	
Male	65.6 (21)	33.3 (9)	60.0 (3)	
Ethnicity				0.999†
White	90.6 (29)	88.9 (24)	100.0 (5)	
Black	6.3 (2)	7.4 (2)	0	
Hispanic	0	0	0	
Asian	0	0	0	
Other	3.1 (1)	3.7 (1)	0	
Distance from clinic (km)	67.4±47.8	71.2±50.6	57.3±30.1	0.557*
Insurance				0.296†
Medicare/Medicaid	25.0 (8)	29.6 (8)	0	
Private	75.0 (24)	70.4 (19)	100.0 (5)	
NRS	6.3±2.4	6.2±2.6	6.7±2.2	0.697*
ASES score	46.8±28.9	48.8±29.1	40.6±29.8	0.555*

Values are presented as mean±standard deviation or percent (number).
NRS: Numerical Rating Scale, ASES: American Shoulder and Elbow Surgeons.
p-value was calculated using *Student t-test or †Fisher exact test.

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Table 2. Age and distance from clinic

Follow-up type	Age (yr)	p-value*	Distance to clinic (km)	p-value*
Assigned follow-up		0.501		0.212
Clinic (n = 22)	60.5 ± 7.9		76.3 ± 51.4	
Telemedicine (n = 10)	58.4 ± 9.0		53.3 ± 36.0	
Completed follow-up		0.118		0.557
Clinic (n = 27)	60.9 ± 8.1		71.2 ± 50.6	
Telemedicine (n = 5)	54.6 ± 7.1		105.3 ± 30.1	
Switched from virtual to clinic FU	62.2 ± 9.7	0.195†	49.1 ± 44.3	0.745†

Values are presented as mean±standard deviation.
FU: follow-up.
*p-value was calculated using Student t-test; †p-value reflects comparison between individuals who switched to clinic visit (n=5) and final telemedicine group (n=5).

km); however, this difference was not significant (p = 0.745) (Table 2).

Patient satisfaction was not significantly different between groups when prompted regarding satisfaction with care from the surgeon (p = 0.244), patient concerns being addressed by the clinical team (p = 0.205), thoroughness of the clinical team (p = 0.058), overall clinical assessment at a prior visit (p = 0.307), or improvement in pain and physical function (p = 0.788 and p = 0.899) (Table 3). Follow-up with patients who opted out of a telemedicine visit revealed that the most common reason for the switch was that meeting with the physician in-person was preferred. Interestingly, when prompted for their opinion whether telemedicine visits are good for clinical care, the majority of respondents agreed that the technology serves as an excellent alternative to in-person clinical visits.

Table 3. Patient satisfaction

Category	Clinic (median)	Telemedicine (median)	p-value*
Care by surgeon	10	10	0.244
Care by clinical team	10	10	0.205
Thoroughness of clinical team	9	10	0.058
Prior clinical assessment	10	10	0.307
Pain	9	7	0.788
Physical function	8.5	8	0.899

*p-values calculated using Mann-Whitney U-test.

DISCUSSION

No significant differences were noted between patients who opted for telemedicine follow-up versus in-person. Five patients opted out of telemedicine visits in favor of in-person visits. We originally hypothesized that study participants would be more satisfied with virtual follow-up for two main reasons: (1) Virtual follow-up offered increased social distancing during the COVID-19 pandemic, and thus was believed to be "safer" follow-up compared to an in-person visit. (2) This study was conducted in a rural setting, and it was believed that participants would prefer to cut travel time and expenses by having virtual follow-up, as many participants would spend more time traveling to and from the office than the actual time with the physician.

Previous studies showed that telemedicine visits increased among rural Medicare beneficiaries in the United States from 7015 in 2004 to 107,955 in 2013 [20]. Studies have also found evidence for increased patient satisfaction and cost-effectiveness associated with telemedicine visits. For example, a systematic review conducted by Ajrawat et al. [21] indicated reduced costs for orthopedic patients with telemedicine visits in the range of $85 to $211. In addition, telemedicine visits offered reduced costs for the provider as well, with a range savings of $1,259 to $2,155 per clinic [21]. Thus, our results are unexpected given previous studies indicating increased telemedicine usage among rural patients to reduce patient costs.

Other recent studies have shown patients to favor in-person follow-ups over telemedicine. For instance, Marsh et al. [17] compared patient satisfaction between telemedicine and in-person visits for 1-year follow-up of total hip arthroplasty. Their results showed that 82% of the in-person group indicated that they were either extremely or very satisfied with the follow-up process, compared to 76% of the telemedicine group. Furthermore, the in-person group was more satisfied with the actual care they received during follow-up, 93% indicating higher satisfaction versus 74% telemedicine. However, the study found that among all participants, 42% patients preferred telemedicine follow-up compared to 36% for in-person and 16% with no preference [17].

There are many potential reasons why our study found no differences in patient satisfaction between in-person and telemedicine visits. Based on our four-item follow-up questionnaire to patients who opted to switch to an in-person visit, the prevailing idea was that patients, especially in a rural setting, may place higher value on seeing a physician face-to-face. Rural patients tend to have fewer social interactions on a day-to-day basis compared to patients living in an urban setting.

These types of patients may also not be technological "savvy" when it comes to telemedicine, and thus might opt for in-person visits due to the perceived amount of difficulty with telemedicine, whether it be difficulty related to navigating telemedicine software or simply having adequate internet access. Participants may also feel they are not receiving adequate care through a telemedicine visit for a surgical follow-up, as indicated by Marsh et al.'s previous study [17] of 1-year follow-up for total hip replacement. Moreover, the same group also reported no significant difference in observed preferences for follow-up visit type (web based vs. in-person), which is in line with our results. We observed that 50% of our telemedicine cohort switched to in-person visits, which resembles the distributions of patient preferences reported by a number of prior studies [17,22-24]. However, while prior studies reported reasons for interest in telemedicine, our cohort provided us with reasons why they were not interested in virtual visits. More specifically, patients who switched groups strongly preferred to physically see their providers, similar reason to observations by Marsh et al. [17], who found that 42% of patients outlined this reason for not wanting to try a web-based visit. Furthermore, previous large scale telemedicine studies also noted that only 32% of patients expressed a preference for telemedicine. Conversely, other investigators determined that a majority of their cohort preferred telemedicine visits (58.8%), with 56.8% of patients stating they would be less likely to come into the clinic [22]. Such discrepancies in preference could once again be attributed to the differences in demographics, with our cohort being from a rural setting and others being from more urban areas. However, our results and others bring to light the need for future studies to elucidate the key factors that determine preferences for telemedicine vs. in-person follow-up.

Future studies should focus on comparing telemedicine visits between surgical and non-surgical follow-ups in a rural setting. This would elucidate whether patients truly feel that telemedicine visits are inadequate for surgical follow-ups with regard to the quality of care received. Furthermore, future studies should compare patient satisfaction and utilization of telemedicine follow-up between rural and urban settings and explore factors that place patients at a higher probability of choosing a telemedicine visit.

This study was limited by small sample size and a lack of overall statistical power. Furthermore, there were numerous guideline changes during the study period due to the evolving nature of the COVID-19 pandemic. This forced several appointment cancellations and subsequent rescheduled appointments, both of which could have influenced patient satisfaction. Moreover, this also limited our ability to prospectively enroll patients during this time and limits the power of the study. Another difficulty was our inability to directly compare time spent with patients during in-person and virtual clinic visits. Future studies should be mindful of this data point, as it could help highlight additional benefits associated with the telemedicine format. Finally, the data were not gathered during the actual follow-up visit, and the time elapsed between visits and data collection could have influenced patient responses.

Patients did not differ in demographic characteristics regardless of whether they completed telemedicine or in-person follow-up visits. Patients in the two groups demonstrated similar levels of satisfaction with treatment during their visit and their individual improvement in both pain and physical function. Not all telemedicine patients remained in their assigned group, and stated that their choice to switch was in order to meet with the physician in-person rather than over videoconferencing. Our results suggest that in rural settings, telemedicine offers some unique advantages to patients who are unwilling or unable to attend postoperative appointments following arthroscopic shoulder procedures.

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SUPPLEMENTARY MATERIALS

Supplementary materials can be found via https://doi.org/10.5397/cise.2021.00619.

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