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Symptom Challenges after Atrial Fibrillation Ablation

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INTRODUCTION

Atrial fibrillation (AF) is the most common arrhythmia seen worldwide; and has significant economic impact on health care costs.[1–4] Catheter ablation is a widely accepted treatment whose primary benefit is to decrease AF episodes and symptoms.[1–4] Researchers have reported that recovery after supraventricular tachycardia (SVT) ablation is fairly rapid (return to work at 2–4 days post-ablation) with rare extended adverse effects.[5,6] However, AF ablation frequently results in temporary increased atrial arrhythmias and worsened symptoms in the first three to six months after the procedure with reported incidence ranging from 1.2–40%.[3,4] The first three months after AF ablation are referred to as the "3-month blanking period", where recurrences of AF or other atrial arrhythmias are common and do not necessarily indicate procedure failure.[3,4] These early episodes of AF or other atrial arrhythmias, which can be associated with rapid ventricular rates, predispose patients to a variety of difficult symptom challenges.[4,7] The current guidelines advise electrophysiology (EP) physicians to judge the success of the AF ablation procedure no earlier than six months post-ablation because patients could be experiencing recurrences of AF during the entire six month period. It is currently unknown which symptoms and time points are most difficult for AF patients during this recovery. The purpose of this small-scale exploratory study was two-fold: (1) to examine symptom trajectories (both affective and physical symptoms) patients experience during the initial six months following an AF ablation, and (2) to examine the

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feasibility of recruitment/retention and the appropriateness of the measurement tools for a larger study. Because the literature reflects no data on the patient perspective of recovery following an AF ablation, we wanted to explore the patient perspective of this six month period.

METHODS

Design and Sample—This was a descriptive pilot study to explore patient experiences and symptoms during the first six months following an AF ablation. The study included questionnaires and telephone interviews (pre-ablation, and one, three, six months after the procedure). Demographics and clinical history were collected by self-administered questionnaire and verified during telephone interviews. All patients were recruited over a one year period from two settings: from our clinical setting at an academic medical center in the southeastern U.S. and online from an AF disease-specific patient website. Patients were screened during outpatient EP clinic visits approximately two to four weeks before their ablation. Once referred to an EP physician for an ablation, patients are seen in outpatient clinic and the ablation is scheduled as soon as feasible, which is typically between two to four weeks later. Our concurrent online approach used a popular AF patient website, StopAFib.org to recruit. After reviewing the aims and procedures for our study, the webmaster at this site gave us permission to recruit for our study on their site. We posted the Investigational Review Board (IRB) approved advertisement, which presented an overview of study aims, procedures, inclusion/exclusion criteria, and contact information for the study office. Interested individuals were directed to contact the research team by telephone or email to learn more about the study.

Because of our interest in the patient's initial perspective of their experiences during this six month recovery period, only adult patients ≥ 18 years old who were scheduled for their first AF ablation were eligible for participation. Patients with prior cardiac ablation(s), other atrial arrhythmias such as atrial flutter, recent myocardial infarction or heart surgery (within the last six months), unstable angina, active heart failure (> NYHA class II), or a terminal diagnosis were excluded. Paroxysmal AF was defined as self-terminating without intervention and with episode duration < 7 days.[3] Persistent AF was defined as sustained AF lasting > 7 days, and requiring intervention for termination.[3] Patients with permanent AF, defined as continuous AF for longer than 12 months in duration, were excluded because of reported lower efficacy and higher recurrence rates after AF ablation.[3] The study protocol and recruitment brochures/advertisements were approved by the university IRB before study initiation and written informed consent was obtained from all patients prior to participation. The study was carried out in accordance with the ethical principles of the Declaration of Helsinki.

Variables and Measures

Severity of Atrial Fibrillation—Canadian Cardiovascular Society's Severity of Atrial Fibrillation Scale (CCS-SAF) score was measured at each interview. Scores range from Class 0 (no symptoms at all with AF) to 4 (symptoms from AF have a severe impact on the patient's quality of life) where a higher score indicates a worse severity of AF.[8,9] The

validity and reliability of the CCS-SAF scale for patients with AF has been established previously showing an inverse relationship with global well-being in patients with AF. For each unit increase in CCS-SAF score, there is a decrease in the SF-36 physical component score of 0.36 SD units and a 0.40 SD unit decrease in the SF-36 mental component score.[9] Patients with persistent AF have been found to score worse on quality of life measures than patients with paroxysmal AF for each CCS-SAF Class score.[9]

Patient Perspective of Arrhythmia Questionnaire (PPAQ)—The PPAQ was used to assess disease-specific symptoms and the impact of AF episodes on routine activities of life for the prior month.[10] This questionnaire has been validated in a range of arrhythmia patients and measures frequency (scored from 0–9; higher = more frequent) and duration of AF episodes (range from 0–8; higher = longer duration); the number, presence, and bothersomeness of a range of symptoms; and impact of arrhythmia subscale (0–100, higher scores = worse impact) that measures functioning in areas of daily life potentially affected by AF (ie., physical, social, and emotional functioning; driving; sleep; mood; recreational activities; and work); and restrictions on activities (ie., the number of days patients had to miss work or school) due to AF.[6, 7, 11–13] The number of arrhythmia related symptoms could range from 0 (no symptoms) to 18 (all symptoms). Evaluation of severity of each symptom ranged from 0–4, with higher scores indicating higher severity. The 10-item Impact of Arrhythmia subscale scores ranged from 0 to 100, with higher scores indicating a worse impact of the AF on their life. Each restricted activity day question ranged from 0–31 days where higher scores showed more days per month affected by AF. Reliability of the symptom subscale and Impact subscales in this population has been good and reported to range from 0.84 to 0.93.[6,10–12]

Patient Health Questionnaire (PHQ-9)—The PHQ-9 is an 9-item screening tool to measure depressive symptoms.[13] Patients are asked about the presence of a variety of depressive symptoms and response options range from 0 (not at all) to 3 (nearly every day). Item scores are summed for total score that ranges from 0–24, with higher scores indicating more severe depression. In validation studies of the PHQ-9, scores of 5, 10, 15, and 20 represented mild, moderate, moderately severe, and severe depression, respectively.[13]

Profile of Mood States (POMS)—The POMS questionnaire is a 65-item list of transient moods that includes Anxiety and Fatigue subscales.[14] The 9-item Anxiety (POMS-A) subscale asks patients the degree to which they feel “tense”, “shaky”, “on edge”, “panicky”, “relaxed”, “uneasy”, “restless”, “nervous”, “anxious” on a 0 (not at all) to 4 (extremely) scale. Scores are summed and range from 0–36 with higher scores denoting more anxiety. The Fatigue subscale (POMS-F) includes 7 items and asks patients to rate their feelings of being “worn out”, “listless”, “fatigued”, “exhausted”, “sluggish”, “weary”, and “bushed” on a 0 (not at all) to 4 (extremely) scale. Scores are summed and range from 0–28 with higher scores denoting greater fatigue.[14–16]

Telephone Interviews—The purpose of the interview was to gain a deeper understanding of the patient’s perspective of the process of recovery during the six months following an AF ablation, such as what symptoms and time points were most difficult, to identify the timing

of improvement during the recovery period, and any self-care challenges patients noted. Open-ended questions were used with probes specific to explore any issues identified by the subject or categories that began to develop as data collection occurred.

Upon enrollment, we contacted the subjects at baseline by email or phone approximately 2–3 weeks prior to their ablation. Interviews were scheduled within one week before or after their target due date for the interview (at baseline [approximately two weeks prior to the ablation], and one, three, and six months after the ablation). The interviews ranged in length from twenty to sixty minutes at each measurement point, and were all conducted via telephone by one researcher (XX), audiotaped, and transcribed verbatim.

Procedure

Patients' clinical history was obtained through chart review or patient self-report and, once enrolled, was confirmed using two methods: from completed written demographic questionnaire forms at baseline and verbal review with subjects during each telephone interview. Patients were asked about their clinical history, any recent changes in their health (ie. cardiac procedures, hospitalizations, changes in medications), and comorbid conditions at each interview (pre-ablation or baseline, and at one, three, and six months after ablation).

Consecutive patients with a diagnosis of AF who met inclusion criteria were identified from outpatient EP office visit schedules a week in advance and approached in the clinic setting to explain the study and obtain informed consent. Interested patients recruited from StopAFib.org were screened over the phone for inclusion by study staff before the study procedures and aims were explained. Questionnaires were mailed to patients and the telephone interviews scheduled after receipt of the signed consent form as approved by the IRB. The type of ablation performed was obtained from review of the medical record or patient interview. For patients enrolled from the StopAFib.org website, a letter was sent to the EP physician who performed the ablation procedure providing information about the study aims/procedures with a copy of the study brochure, to inform him/her that their patient was enrolled and requesting verification of clinical history and procedure. Verification was obtained by return communication (letter, email, telephone call) from the subject's EP physician, EP nurse practitioner/physician assistant, or EP office personnel.

Data Analysis

Quantitative data were analyzed using SPSS for Windows (version 23, IBM, Inc., Armonk, NY). Descriptive statistics were used to characterize the demographics, clinical characteristics, and questionnaire subscale scores ± standard deviation (SD). Despite the small sample size (n=20) parametric statistics were used in these calculations because the primary outcome data were normally distributed. Longitudinal outcomes were analyzed using repeated measures ANOVA. For all statistical tests, a *P*-value of ≤ 0.05 was considered significant. Because of the small sample size, 95% Confidence Intervals were obtained to assist in interpretation of the results. To account for multiple time point comparisons in the longitudinal analysis, a Bonferroni post-hoc correction was used.

Directed content analysis, as described by Hsieh and Shannon,[17] was used to analyze qualitative interview data to develop a beginning understanding of the symptom challenges

patients face during the first six months of recovery after an AF ablation. Although existing research addresses symptoms before and after SVT ablation procedures,[5–6] these findings may not apply to patients undergoing AF ablation who have anecdotally reported different experiences. Additionally, the ablation procedures for SVT and AF are very different anatomically and procedurally. We therefore chose to use directed content analysis to conceptually extend our understanding of the adaptive challenges patients undergoing an AF ablation may have that would be similar or dissimilar to patients following a SVT ablation.

In directed content analysis,[17] a pre-existing framework is used to guide the analysis. We used the prior SVT findings about ablation recovery as our pre-existing template for categorizing our data. Data that did not fit into pre-existing categories were revisited later in the content analysis process to determine if they represented a new category or a subcategory of an existing code. For example, if a participant at one month after AF ablation described her symptoms the day after an episode as “such fatigue where I couldn’t get out of bed much less return to work”, this was coded as ‘returning to work–difficulty’ and ‘severe fatigue.’ We also had a parallel analysis process to show the temporality of events in the recovery trajectory such as ‘one month after ablation’. If another participant described similar fatigue severity but later in the recovery, these data were placed in similar categories, but the temporal code reflected ‘three months post-ablation’. To complete the analysis, we interwove the categories and the temporal structure to develop a trajectory of recovery after an AF ablation. No qualitative coding software was used.

We took several steps to ensure the quality and trustworthiness of the data analysis. For instance, one interviewer conducted all interviews for consistency, all interviews were digitally recorded, transcribed verbatim by a professional transcription service, and the transcripts were checked for accuracy by two researchers. We also had an objective auditor experienced in content analysis review the categories and operational definitions before the study began. The investigators maintained an audit trail of definitions of data categories and all coding decisions. Interim participant emails/questions were included as part of data analysis.

RESULTS

Sample Characteristics

The final study sample consisted of 20 patients. We had a 26% attrition rate for the study with four patients enrolled from the clinical site (1 completed study, 3 withdrew before data collected), and 23 enrolled from the online website (19 completed the study, 4 withdrew at various follow up points). Demographics, co-morbidity, and AF ablation procedure details are presented in Table 1. No subjects had diabetes, renal or liver disease; however one patient did have a pacemaker for sick sinus syndrome, one had mild chronic obstructive pulmonary disease not requiring oxygen, and three subjects reported a history of depression that had been treated in the past. Patients were recruited from across the U.S.: California (n=3), Florida (n=2), Georgia (n=2), Illinois (n=2), Massachusetts (n=1), Minnesota (n=1), New Hampshire (n=1), North Carolina (n=6), and Virginia (n=2). As is shown in Table 1, the sample included subjects with paroxysmal and persistent AF. Two patients who had

atrial flutter induced at the time of ablation also underwent atrial flutter ablation at the time of the AF ablation procedure.

Table 1 also lists the most frequent medications used by the sample at baseline. Most patients (95%) were maintained on their same pre-ablation antiarrhythmic drug combination (antiarrhythmic drug and beta blocker) and anticoagulant medications for at least the first 2 months after ablation. The most frequent rhythm and rate control medication combination noted was flecainide plus metoprolol (n=6). Antiarrhythmic medications were continued unchanged in sixteen subjects after ablation for at least six months regardless of symptoms. Antiarrhythmic drugs were stopped at one month in 1 patient, three months in 3 subjects, and six months in 3 patients. Ten patients continued on antiarrhythmic drugs after the six month point. In the subjects who had hemodynamically unstable, recurrent arrhythmias (n=3), additional antiarrhythmic drugs were then added and/or repeatedly changed. Most subjects (75%) were on newer non-Vitamin K antagonist oral anticoagulants. Thirteen (65%) patients were continued on oral anticoagulation after the six month point, even when not experiencing frequent, symptomatic AF episodes. Four patients (20%) had their anticoagulation agents stopped at six months and were switched to one adult aspirin daily. Anticoagulation was stopped completely in two patients (10%) at three months and one (5%) at six months. No subjects were on triple therapy anticoagulation after ablation.

Severity of Atrial Fibrillation

As presented in Table 2, most (85%, n=17) patients did improve at least one CCS-SAF class after ablation. At baseline, 70% (n=14) were CCS-SAF Class 3 and no subjects were Class 0; whereas at six months, only 10% were Class 3 and the majority (n=11) were Class 0. Three patients went from Class 3 pre-ablation to Class 4 at six months due to recurrent atrial tachyarrhythmias. All patients reported feeling at least some rare to occasional skipped beats or heart flutters during the first two months. These episodes were reported to range from seconds to hours, and mostly occurred within the three month blanking period, decreasing in frequency over time. During the first three months, three subjects were hospitalized for cardioversions and/or to begin a new antiarrhythmic medication, two others underwent electrical cardioversion on an outpatient basis at months two and five, and one additional subject was treated in the emergency department with intravenous medication for rapid atrial arrhythmias at month four. At six months, the three subjects who had been hospitalized reported learning that a repeat AF ablation would be necessary.

Patient Perspective of Arrhythmia Questionnaire (PPAQ)

Reliability of the PPAQ and symptom list was good as evidenced by Cronbach’s alpha scores of 0.91 and 0.96 at baseline and 6 months respectively. Fatigue, pre-syncope, palpitations, and trouble sleeping were the most prevalent symptom challenges during the first one to three months post-ablation. Symptoms decreased in prevalence over time. At six months, the most prevalent symptoms were palpitations and trouble sleeping; however, fatigue continued to be reported by 25% of the sample. Immediately after ablation, 12 patients (60%) reported the fatigue to be “quite a bit” or “extremely bothersome”. This more severe level of fatigue improved over time and was reported by less than 10% of sample at six months. Mean number of symptoms decreased over time from baseline to six months

(See Table 2). Frequency and severity of episodes varied over time. Mean reported frequency of AF episodes went from at least 2–4 times per week at baseline (range 2–4 times per year to > 3 times daily) to 2–3 times/month at one month, once a month at three months and at six months (range 2–4 times per year to > 3 times daily). Mean duration of episodes was 30–40 minutes at baseline (range of a few seconds to longer than an hour), 5–10 minutes at one month, 1–5 minutes at three months and 1–5 minutes at six months (range of a few seconds to longer than an hour). Patients cut down on normal activities a mean of 10 (± 9.4) days per month due to fatigue prior to ablation and this decreased over time post-procedure to a mean of 2 (± 6.6) days/month at six months. Restricted activity days decreased at one month to 8 (±11) days and to 2 (±5) days at three months. Patients missed work or school a mean of 16 days (± 2.8) days during the first month after ablation.

Table 2 presents all symptom subscale scores and significance test results from the repeated measures ANOVA. Longitudinal analyses of the outcomes (anxiety, fatigue, depressive symptoms, Impact of Arrhythmia) indicated significant change over time. All scores were the highest at baseline with decreasing trends over the one, three, and six months post-ablation. Particularly, pairwise comparisons indicated that the six month post ablation scores were significantly improved compared to the baseline scores. The PHQ-9 scores for the sample improved significantly over time after ablation ($t= 3.1$, P-value <0.01). Adequate internal consistency (Cronbach's alpha) was seen with all of the POMS subscales at baseline and six months (POMS-A: Baseline= 0.85, 6 months =0.73; POMS-F: Baseline = 0.96, six months = 0.95). The mean POMS-A anxiety subscale score significantly improved at the six month time point (See Table 2). Mean POMS-F fatigue subscale scores significantly decreased over time (see Table 2). The POMS-F score was positively correlated with days cut down on activities at baseline, but not for other time points. ($r=0.6$, $p=0.011$).

Telephone Interviews

Directed content analysis of the interviews revealed numerous areas of patient concerns that occurred throughout the six months of recovery. Main concerns during the first month post-procedure included severe bruising, high resting heart rate, exercise intolerance, fatigue, sore throat and migraines. Although the incidence of patient reported large groin hematomas (bruising around the ablation puncture site down to the knees and including a large portion of the thigh area) was low (n=2) considering 100% of the sample was on oral anticoagulation, the presence of any amount of bruising around the ablation puncture site was a concern for 80% of the sample. The bruising was unexpected, alarming, and felt to be "internal bleeding" or a "problem that could kill me" because all were on blood thinners post ablation. Patients felt that they had not been warned to expect the extent of bruising or bruising that would last as long as three weeks before dissipating.

Only two patients were formally taught by nurses to take their pulse; however, four others learned from online videos and/or family members in the health care field. All patients reported taking their pulse multiple times a day during the first three months by palpation (n=6) or blood pressure machines at their local drugstore (n=7), firemen at local fire station (n=2), or smart phone apps (n=5). All patients reported anxiety related to their perception of a higher than normal heart rate (range of 84–100, 20–40 beats higher than prior to ablation)

for several weeks after the procedure. No patients recalled being told this would happen. Subjects reported receiving a range of unsatisfactory explanations from providers as to why this occurred or when this would return to normal. It was not until two to three months post-ablation, that subjects noted a slowing of their heart rates back to what they considered a “normal” range.

Exercise intolerance during the first 3–4 months was also reported by 100% of subjects. Most remember being warned this would happen, but were not told how long it would take to improve. At three months, 80% of subjects reported that they were able to start back to physical activity (such as walking down the street or biking short distances) for short periods of time, but none could return to their pre-ablation activity level in less than four months. Three subjects (15%) could not return to their previous level of activities by five months due to recurrent atrial flutter or AF.

Another unexpected concern that the majority of patients expressed was a scratchy, sore throat and weakened voice during the first three to eight days after the procedure. These subjects all had undergone general anesthesia during their ablation procedures. Subjects recalled being taught this may happen, but it was perceived as more severe and prolonged than expected. These subjects reported increased anxiety because the laryngitis was another unexpected challenge they felt they had to manage on their own.

Three subjects reported anxiety-provoking migraine headaches following ablation that occurred weekly or several times weekly and persisted up to three months post-procedure. Only one of these subjects had previously experienced migraines (as a child). No visual disturbances or auras in association with the migraines were noted; migraines were worse during the mornings, and subsided within one to two days. Main associated symptoms were slight nausea, extreme photosensitivity, and severe headache pain, which patients treated with acetaminophen. All migraines decreased in frequency and intensity over two to three months.

Prolonged fatigue was consistently the most concerning symptom that 80% of subjects reported. All patients reported no information was given to them prior to the ablation procedure that spoke to the occurrence, severity, or duration of fatigue. All reported being told that they could return to normal activities within a few days to a week, but they found this impossible. Confronting the severe, prolonged fatigue heightened their anxiety during the first three to four weeks that their recovery was not progressing as normal.

When asked to describe the recovery process looking back from the six month point, subjects used terms such as “struggle”, “challenge”, “biphasic”, “very long but worth it”, “exhausting”, “first three months were hell”, and “glad it is over”. All subjects initially perceived that their expectations of ablation outcomes were very similar to their EP physicians. But at six months, 55% (n=11) perceived their physicians’ expectations seemed to change about the outcome after ablation. Before the ablation, all subjects consistently defined success as “cured of AF”, “off anticoagulation with no AFib” or “no medicines and no atrial fibrillation”. All subjects described one of their primary motivators for undergoing the AF ablation as the desire to stop the anticoagulants. Only 10 subjects (50%) reported that

their EP physician had warned them the anticoagulation agents may need to be continued indefinitely. At 3–6 months, physician discussions about the need to remain on antiarrhythmics or anticoagulants indefinitely and/or possible additional procedures, were associated with patient feelings of discouragement, frustration, and defeat. Two subjects reported feeling a sense of betrayal by their EP physician when the anticoagulants were not discontinued at six months.

DISCUSSION

This is the first study to longitudinally investigate the experience of recovery after an AF ablation from the patients' perspective using a variety of symptom instruments and qualitative interviews following subjects over the six months post-procedure. The main study results demonstrated a range of symptoms that patients felt were more challenging to manage than they had expected. We have presented a beginning understanding of the trajectory of recovery after an AF ablation which presents a picture of rocky, slow improvement with many self-care challenges that ebb and flow during the first three months. The last three months (months 4–6) demonstrate improvement that occurs more quickly than over the first three months, but slower than previously understood, and that is if the ablation procedure was successful.

The majority (85%) of the study sample did improve at six months, but the process was much slower and more difficult than expected. Although the symptom burden post-ablation did decrease over the six months, only 50% of subjects (n=10) were symptom-free and off anti-arrhythmic medications at six months. The remaining 35% (n=7) were somewhat improved, but still on antiarrhythmic or rate control agents at the six month point. In the 85% of subjects who did improve, they reported that most improvements were not seen until 4–5 months after the procedure. Subjects found the first month to be the most difficult, but the first three months included many more symptoms than expected and a difficulty returning to "normal" as fast as expected. A minority (n=3) of subjects experienced no change or a worsening in their symptoms after ablation. These subjects had increased health care utilization in an effort to manage the recurrent AF or other atrial arrhythmias, including electrical cardioversions, multiple office visits, as well as numerous additional medication changes.

Although fatigue is commonly reported as a symptom in other types of cardiac patients and with AF unrelated to ablation,[18–23] the severity and duration of fatigue reported by the post AF-ablation patients in this study has not previously been reported. In 40% of the sample, fatigue prevented return to even part time work at three weeks after ablation, which differs greatly from ablation recovery for other types of arrhythmias where patients return to full time work in two to four days.[6, 7, 24, 25] Restricted activity day data showed that these subjects reported their activity continued to be quite limited at one month after the ablation, having to miss work or normal activities for almost half of the month. The increased severity and duration of fatigue post AF ablation is frustrating for patients, and may lead to other distressing symptoms, such as anxiety and depression. Other investigators have reported the prevalence of fatigue in AF patients not undergoing ablation to range widely from 31% to 89%.[19–23]

In the present study, POMS-F scores were moderately high pre-ablation, but continued to be higher than normal through the one and three month periods. At six months, the POMS-F scores were improved to levels only slightly above normal. These fatigue scores support the patient perceptions reported in the interviews, namely a slow improvement in fatigue with only mild improvement noted before three months, but great improvement between 3–6 months.

Anxiety scores at baseline in this sample are worse than those found with normative samples of adult women receiving outpatient psychiatric treatment or those reported with patients having 50% chance of death within one year.[14–16] Anxiety after AF ablation may be related to a patient's feeling that their recovery is "abnormal". Thus, a more thorough discussion by health care providers about expected post-ablation symptoms (bruising, headache, elevated heart rates, and fatigue) might alleviate some of these feelings and improve the patient's recovery. This information is important to discuss and reinforce in future educational preparation of patients prior to the ablation, at discharge after ablation, and at each follow-up interaction. Depression was common in subjects pre-ablation, but rare at six month follow-up. This is in contrast to previous reports of high rates of depression and anxiety in patients with AF on medical therapy alone, which did not improve over time.[26]

Our findings of patient reported motivation to stop anticoagulation as a primary reason to undergo the ablation were similar to those found by Badin and colleagues,[27] who reported 43% of patients and 44% of referring physicians surveyed (internal medicine, family medicine, neurology, and cardiology) believed that an AF ablation would eliminate the need for anticoagulation. Misunderstanding of ablation outcomes by both patients and providers, where both perceived ablation to improve survival and decrease rates of stroke, were also reported.[27] It is unclear why these unjustified expectations continue, however, similar unjustified expectations are found in other patient groups such as cardiac patients undergoing percutaneous coronary interventions[28] and patients treated for osteoporosis or hypertension.[29] It is up to EP healthcare professionals to more clearly explain to patients and referring colleagues what outcomes of AF ablation are realistic and evidence based.

There are several important limitations to be considered, including the small sample size, lack of diversity in the sample (90% Caucasian), potential for selection bias due to the convenience sampling, and lack of a control group; therefore, our findings may not be reflective of all AF patients' experience recovering from an AF ablation. As we drew our sample mostly from an AF patient website without meeting the subjects face to face or viewing their clinical records, this could have introduced further selection bias that would limit the generalizability of our findings. However, the authors (XX, XX) have many years of clinical experience with arrhythmia patients from centers in different regions of the country and prior AF patient anecdotal comments about their unexpected prolonged recovery after an AF ablation is what triggered the idea to pursue this question. The lack of diversity in the sample also limits generalizability; however, the literature discusses racial differences in prevalence of AF such that non-Caucasian patients have significantly less AF compared to Caucasians, despite even higher prevalence of risk factors. So it is reasonable to assume that there would be fewer African Americans, Hispanics, and Asians meeting inclusion criteria for this study.[30–32] Future larger studies including a diverse sample of

patients are needed before generalizing these findings to AF ablation patients from all centers.

CONCLUSIONS

These preliminary findings provide a representation of the trajectory of patient experiences during the first six months after an AF ablation that will hopefully advance our knowledge leading to future research and influence clinical practice. Patients described the experience as a “struggle” including numerous symptom concerns and prolonged fatigue worse than previously appreciated.

FUTURE DIRECTIONS AND IMPLICATIONS FOR PRACTICE

These findings identify and define important variables from the patients’ perspectives for inclusion in future research. It is hoped that these data will provide clinicians information to heighten their sensitivity to a more realistic assessment of what patients actually experience after an AF ablation. A clearer understanding of the post-ablation patient experience may encourage better use of anticipatory guidance during patient teaching by clinicians and aid in the development and testing of interventions to help patients manage the challenges this recovery period presents. Future studies should include specific fatigue measures, as well as covariates of fatigue such as sleep quality, behavioral and physical activity measures, and physiological variables (ie, inflammatory biomarkers and hemoglobin).

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Abbreviations List

AF	atrial fibrillation
EP	electrophysiology
IRB	Investigational Review Board
NYHA	New York Heart Association Class
CCS-SAF	Canadian Cardiovascular Society’s Severity of Atrial Fibrillation Scale
PPAQ	Patient Perspective of Arrhythmia Scale
PHQ-9	Patient Health Questionnaire (9-item)
POMS	Profile of Mood States questionnaire
SD	standard deviation

ANOVA	analysis of variance
POMS-A	Profile of Mood States Anxiety Subscale
POMS-F	Profile of Mood States Fatigue Subscale

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Table 1

Baseline Clinical and Demographic Characteristics of the Sample.

	N/(%)
Age (years, mean ± SD)	65 (± 7)
Range (years)	54–77
Gender	
Male	9 (45%)
Female	11 (55%)
Race	
Caucasian	18 (90%)
Asian	2 (10%)
Marital Status	
Married	16 (80%)
Divorced	3 (15%)
Single	1 (5%)
Education	
At least some college	9 (45%)
Graduate degree	6 (30%)
Four year degree	4 (20%)
High school	1 (5%)
History of Hypertension	11 (55%)
History of heart failure (NYHA ≤ II)	2 (10%)
History of Stroke or TIA	1 (5%)
History of Pacemaker	1 (5%)
History of COPD	1 (5%)
History of Depression	3 (15%)
Type of AF	
Paroxysmal AF	7 (35%)
Persistent AF	13 (65%)
Type of AF Ablation	
PVI alone	18 (90%)
PVI + atrial flutter ablation	2 (10%)
Type of Energy Used in Ablation	
Radiofrequency energy	16 (80%)
Cryothermal energy	4 (20%)

	N/(%)
Antiarrhythmic Drugs	
Flecainide	9 (45%)
Propafenone	2 (10%)
Dronederone	2 (10%)
Amiodarone	1 (5%)
Dofetilide	1 (5%)
Rate Control Drugs	
Metoprolol	10 (50%)
Diltiazem	3 (15%)
Atenolol	2 (10%)
Sotalol	1 (5%)
Propranolol	1 (5%)
Oral anticoagulation	
Apixiban	6 (30%)
Rivaroxaban	6 (30%)
Dabigatran	3 (15%)
Warfarin	3 (15%)
Aspirin	2 (10%)

NYHA-New York Heart Association Classification; TIA-transient ischemic attack; COPD – chronic obstructive pulmonary disease; AF – atrial fibrillation; PVI – pulmonary vein isolation (AF ablation procedure).

Table 2

Atrial Fibrillation Severity, Number of Symptoms, and Symptom Subscale Scores over Time.

Scale or Subscale Score	Baseline pre-Ablation	1 month after ablation	3 months after ablation	6 months after ablation	Estimate of difference (Baseline-6 months) (95% Confidence Interval)
CCS-SAF Class * (median) (range)	3 (1–4)	2 (1–4)	1 (1–3)	0 (0–4)	2 (1, 2.5)
PPAQ Number of Symptoms (range)	7 ± 5 0–14	6 ± 4 0–14	5 ± 5 0–16	4 ± 5 0–14	3.4 (1.3, 5.5)
PPAQ Impact of Arrhythmia Subscale	44 ± 6	21 ± 5	16 ± 5	12 ± 4	32 (18, 47)
PHQ-9 Depressive Symptoms Score	6 ± 5	6 ± 5	4 ± 4	4 ± 3	3 (1, 4)
POMS-Anxiety Subscale Score	10 ± 6	9 ± 5	7 ± 5	6 ± 4	4 (2, 6)
POMS-Fatigue Subscale Score	12 ± 9	8 ± 6	7 ± 7	6 ± 6	6 (3, 10)

Scores presented are mean values for the sample ± standard deviation (SD) unless otherwise noted. CCS-SAF: Canadian Cardiovascular Society's Severity of Atrial Fibrillation Scale; PPAQ: Patient Perspective of Arrhythmia Questionnaire; PHQ-9: Patient Health Questionnaire-9 item Depression Screening Scale; POMS: Profile of Mood States Questionnaire.

* Six month ablation scores were compared to baseline using ANOVA, except for CCS-SAF Class where a non-parametric Wilcoxon signed rank test was used.