

RES MEDICA

Journal of the Royal Medical Society



ORIGINAL ARTICLE

Supraventricular Tachycardia and Catheter Ablation: Anxiety Levels and Patient Perceptions

Ahmed Yasser Mohamed El-Medany¹, Neil Robert Grubb²

¹ Foundation Doctor, Acute Medicine, Royal Infirmary of Edinburgh, UK.

² Consultant Cardiologist, Department of Cardiology, Royal Infirmary of Edinburgh, UK

Correspondence email: amedany@doctors.net.uk

ABSTRACT

Aim: To investigate anxiety levels and patient perception associated with supraventricular tachycardia (SVT); investigate anxiety levels and patient perception pre- and post- radiofrequency catheter ablation (RFCA); and explore any association between anxiety and patient perception with patient age and gender.

Design: Follow-up quantitative and qualitative cohort study. 141 patients in a tertiary centre in Scotland who underwent an electrophysiological study and RFCA for atrioventricular nodal re-entrant tachycardia, atrioventricular re-entrant tachycardia or atrial tachycardia between 2009 and 2012 were enrolled. 59 (41.8%) were male; mean age at follow-up was 50 years.

Interventions: Follow-up by structured phone questionnaire; mean follow-up period was 14 months.

Main outcome measures: Anxiety level and patient perception during index episode, and anxiety level before and after RFCA.

Results: During index episode, median patient anxiety, on a scale of 0–10, was 8. Anxiety was not associated with gender ($p = 0.07$). Patients in the lowest and highest anxiety groups tended to be older (mean 54.5 and 44.4 years respectively) compared with those in the middle 2 groups (mean 34.1 and 35.6 years). There was an association between anxiety and age ($p = 0.039$). 45 (32.0%) participants thought they were having a heart attack or dying. Before RFCA, median anxiety level was 7. 55 (39.0%) patients were afraid of complications, 21 (14.9%) patients feared being awake during RFCA. After RFCA, median anxiety was 2.5.

Conclusions: Anxiety is a common accompaniment to SVT that may lead to greater pre-procedural anxiety. Exploring this link may allow reduction of anxiety via better psychopharmacological intervention, education, and preprocedural counselling.

Copyright Royal Medical Society. All rights reserved. The copyright is retained by the author and the Royal Medical Society, except where explicitly otherwise stated. Scans have been produced by the Digital Imaging Unit at Edinburgh University Library. Res Medica is supported by the University of Edinburgh's Journal Hosting Service: <http://journals.ed.ac.uk>

ISSN: 2051-7580 (Online) ISBN: 0482-3206 (Print)

Res Medica is published by the Royal Medical Society, 5/5 Bristo Square, Edinburgh, EH8 9AL

Res Medica, 2014, 22(1):2-14.

doi:10.2218/resmedica.v22i1.817

Supraventricular Tachycardia and Catheter Ablation: Anxiety Levels and Patient Perceptions

Introduction

Supraventricular tachycardia (SVT) encompasses a group of common paroxysmal tachyarrhythmias. SVT occurs in all age groups, and its mechanism varies depending on patient demographics.¹ Prevalence is around 2.25 per 1000 in the general population.²

Atrioventricular nodal re-entrant tachycardia (AVNRT) is the commonest cause of paroxysmal SVT, accounting for 50–60% of diagnoses.^{3,4} It is more prevalent in young females.⁵ The AV node usually has a single conducting pathway whereby impulses travel to reach the bundle of His and cause contraction of the ventricles of the heart. Dual conduction pathways may coexist in some individuals and premature atrial impulses travelling along the secondary pathway may trigger episodes of AVNRT. Other mechanisms of SVT include atrioventricular re-entrant tachycardia, which includes Wolff–Parkinson–White syndrome and atrial tachycardia; a rare mechanism occurring in individuals with complex or structural heart disease particularly due to iatrogenesis or digoxin toxicity.⁶⁻⁸

Presentation of SVT can range from an asymptomatic presentation and anxiety to shortness of breath, syncope, and chest pain. Palpitations are present in 96% of presentations.^{9,10} Although SVT is not usually life threatening, many patients suffer recurrent symptoms that have a significant impact on their quality of life. Many have symptoms for a prolonged period of time before diagnosis. Episodes are commonly misdiagnosed as panic attacks.¹¹⁻¹³

Radiofrequency catheter ablation (RFCA) is the first-line therapy for many SVTs, usually performed as a day-case procedure using conscious sedation. The efficacy of RFCA exceeds that of medical therapy, with success rates of around 95%.¹⁴ The procedure involves insertion of an ablation catheter, usually via the femoral vein, allowing for focal ablation of a critical component of the arrhythmic mechanism – such as an accessory pathway – using heat generated from high frequency alternating current.

Hypothesis

We hypothesize that 1) patients with SVT experience high levels of anxiety during their index episode and many believe they are experiencing a cardiac event; 2) anxiety levels are greater in female patients; 3) anxiety levels are greater in older patients;

and 4) RFCA considerably reduces anxiety levels in patients with SVT.

The uncertain and sporadic nature of paroxysmal SVT can cause considerable anxiety. This paper primarily aims to 1) explore anxiety levels and patient perceptions at index episode (the first episode at which patients experience symptoms); 2) investigate any association between age or gender and anxiety; 3) explore anxiety and patient perceptions prior to RFCA; and 4) determine the impact of RFCA on patient anxiety. The secondary aim is to investigate an association between symptoms experienced during the index episode and anxiety. This is the first paper to assess anxiety during the index episode and explore patients' thoughts. The relationship between cardiovascular disease and psychopathology has been explored in previous literature.¹⁵⁻¹⁷ Therefore, the purpose of this study is to identify a hypothetically presumed anxiety symptomatology, allowing for adequate indication for psychopharmacological intervention and thus a potential reduction in morbidity in patients with SVT.

Methods

Study population

180 patients who had undergone an electrophysiological study (EPS) and RFCA for AVNRT, atrioventricular re-entrant

tachycardia, or atrial tachycardia at the Royal Infirmary of Edinburgh, a tertiary hospital with a cardiac centre in the UK, between 1 January 2009 and 1 January 2012 were approached to participate via an invitation letter. Simple random sampling was used to determine the sample size. Information regarding the mechanism of each patient's SVT was collected from their EPS report via the TOMCAT database, which includes information on patients that have undergone EPSs and RFCA. Exclusion criteria were active organic brain disease, such as dementia or cerebral vascular disease, and history of psychiatric illness. Of the 180 patients identified, telephone numbers were obtainable in 148 cases and 141 patients agreed to participate. 7 refused or did not respond. 59 male and 82 female patients took part, with an age range of 19–92 years (median 52 years).

Follow-up and data collection

The mean follow-up period was 14 months (range 3.2–39.1 months). Telephone interviews lasted an average of 5 minutes and consisted of a structured clinical interview (see Appendix for clinical questionnaire). Questions were designed to explore patient anxiety levels during their index episode, and before and after RFCA, using a subjective scale of 0–10 (where 0 indicates no anxiety and 10 indicates maximum anxiety). Patient perceptions of

their first episode of SVT and thoughts prior to RFCA were investigated using open-ended questions. Patients were encouraged to provide further comments about their perceptions and concerns about their index episode and RFCA procedure. Patients were also encouraged to provide comments about the symptoms experienced during their index episode such as chest pain, shortness of breath, or dizziness.

Statistical analysis

Statistical analysis was conducted using SPSS software. Anxiety level during the index episode was divided into 4 categories: (1) no anxiety (0); (2) mild anxiety (1–4); (3) moderate anxiety (5–7); and (4) severe anxiety (8–10). Any association between anxiety level during index episode and the gender or age was analysed using the Mann–Whitney test. Gender was divided into 2 groups: male and female. Age was divided arbitrarily into 2 groups: “older” and “younger”, separated by the median age of 52. Anxiety ratings were treated as ordinal data (values existing on an arbitrary scale) and ranked. The Mann–Whitney test was then used to assess the null hypothesis: that there would be no variation in anxiety between genders or age. The most common answers regarding perceptions during the index episode were grouped into 6 categories and less common answers were categorized under “other”.

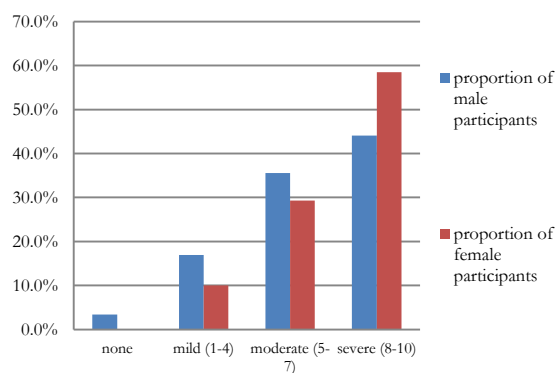
The ANOVA test was used to determine if there was any significance between age or anxiety level and patients’ perception of their index episode. Thoughts were divided into 2 categories: “dangerous” and “benign”, and compared with anxiety levels. The mean anxiety experienced was compared with patients’ thoughts prior to RFCA.

Results

Anxiety during index episode

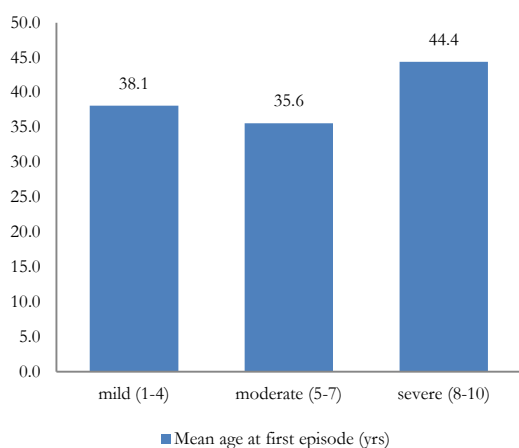
Out of 141 patients, median anxiety during index episode was 8. Anxiety was divided into 4 groups (Figure 1). Results showed 26 (44.1%) of males and 48 (58.5%) of females experienced severe anxiety (≥ 8) during their index episode. There was no significant association between anxiety and gender ($p = 0.07$) with a similar distribution of males and females amongst anxiety groups.

Figure 1. Proportion of male and female patients experiencing anxiety during their index episode of SVT. Participants were categorized into 4 groups depending on their anxiety level.



There was a significant association between age and anxiety during the first episode. Older patients showed greater anxiety ($p = 0.028$). Patients that showed no anxiety during the index episode were excluded from this statistical test as the sample size was too small. ($n = 2$) (Figures 1&2).

Figure 2. Mean age of participants during index episode of SVT, and their corresponding anxiety level. Participants have been categorized into 3 groups, depending on the level of anxiety experienced.



Patient perceptions during index episode

45 (32.0%) participants thought they were having a heart attack or dying (Figure 3). Of these patients, 43 (95.6%) had an anxiety rating in the severe category (8–10).

The mean anxiety level for patients who experienced chest pain during their index episode was 7.7, while patients who did not experience chest pain had a mean anxiety of 6.8. 15 out of 28 patients (53.6%) who experienced chest pain during their index

episode thought they were dying or having a heart attack.

There was a significant association between age at first episode and patient perception, with older patients tending to think they were having a heart attack or dying and younger patients regarding their index episode as benign palpitation or as a result of overexertion ($p = 0.004$) (Figure 4). The “other” category included indigestion, menopause, medication, overexcitement, pregnancy, and fatigue as perceived causes of the index episode. There was a significant association between anxiety level and patient perception of their index episode ($p < 0.001$). Patients showed a higher anxiety level if they thought they were having a heart attack or dying (Figure 4).

Figure 3. What patients thought was happening during their index episode. The 'other' category included indigestion, menopause, medication, over excitement, pregnancy and fatigue as perceived causes of index episode.

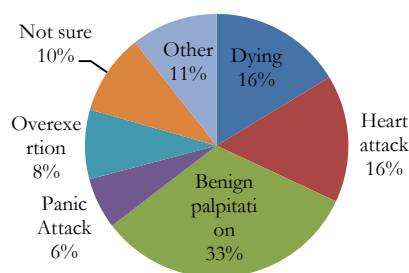
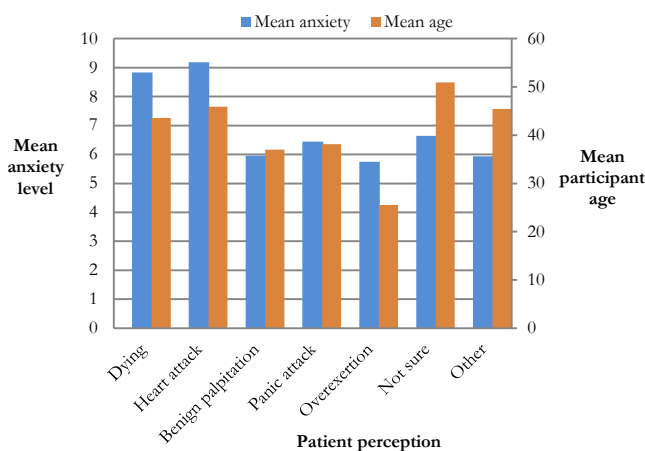
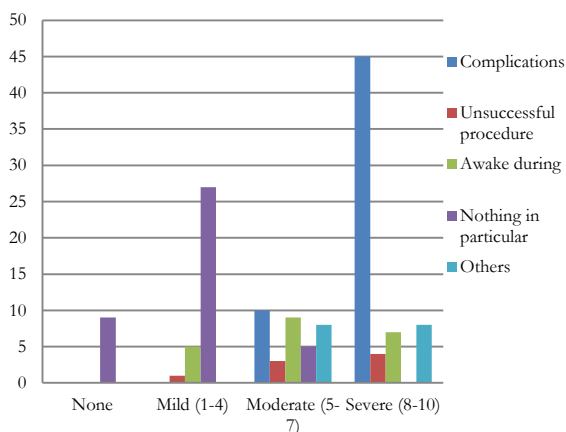


Figure 4. Mean patient age at index episode and the mean anxiety level associated with what patients thought was happening during their index episode.



Prior to RFCA, median patient anxiety was 7. The most common cause of concern and the greatest median subjective anxiety score prior to RFCA was due to fear of complications. 55 (39.0%) patients were afraid of complications, while 21 (14.9%) patients noted a fear of being awake during the procedure (Figure 5). The median anxiety level after RFCA was 2.5.

Figure 5. Number of participants with concerns about RFCA, categorized into 4 groups corresponding to the level of anxiety experienced.



The “other” category included fear of hospital, needle phobias, concern over the induction of palpitation, and waiting a long period prior to the procedure.

Discussion

Anxiety affects a large proportion of SVT patients. Of the 141 patients interviewed in this study, 74 (52.5%) experienced severe anxiety, with a reported anxiety level at index episode of 8 or above. Anxiety levels were not affected by gender ($p = 0.07$), which is surprising as there is a higher prevalence of anxiety disorders in females,¹² although none of the patients in this study had any known pre-existing psychiatric disorders. Moreover, female patients were more likely to attribute their palpitation to excitement, medication, or menopause, and this may be the reason why the mean anxiety level is similar between the genders as the palpitation was perceived to be a ‘natural’ event. Current literature states that males perceive cardiac disease more negatively and thus portray more anxiety and depressive symptoms.¹⁸

There was a significant association between anxiety during the index attack and patient age, as hypothesized ($p = 0.028$). Older patients reported higher anxiety levels whereas younger patients reported mild to moderate anxiety throughout their first attack. These variations may be due to individual symptom perception, or pre-

existing anxiety that may influence the formation of a threatening perception of SVT.¹⁹ This trend is further supported by the significant association between patients' perception of their palpitation and age ($p < 0.004$). Older patients are more likely to think they are having a heart attack or are dying, and are more likely to report symptoms and anxiety.²⁰ Younger patients were more likely to think they were having a heart attack if their palpitation came on during or after exercise. SVT potentially affects patients differently in terms of their physical symptoms, such as frequency and duration of episodes, and recurrence of symptoms after ablation. As a result, patients react differently to their symptoms and have dissimilar thoughts on the quality of their health and their prognoses. A prospective study, assessing anxiety levels and severity and duration of symptoms from index episode to ablation, would be useful in assessing such a relationship. Further studies could investigate the difference in prevalence of anxiety between SVT patients and the general population. One previous study did not find an increased prevalence of anxiety in patients with SVT.²¹

The median anxiety level prior to RFCA was highest in patients afraid of complications and of being awake during the procedure. Lack of information and fear of potential complications are known to cause high levels of anxiety.^{22,23} However, it could be

argued that this is the case for any invasive procedure and not RFCA in particular. There is a paucity of research regarding the difference in periprocedural anxiety among different invasive procedures. Many patients, however, mentioned previously undergoing invasive procedures where they had felt less anxious, and reported that the notion of being awake during a procedure which targeted a vital organ such as the heart caused them concern. Other patients were anxious due to the complexity of the procedure and the potential complications, which would be irreversible and require further interventions like pacemaker implantation. Anxiety levels prior to RFCA in this study were higher than anticipated, perhaps indicating a greater need for preprocedural explanation and reassurance. Previous research has suggested including discussions of previous patient experiences or reassurance from the clinician prior to RFCA to alleviate patient anxiety.²⁴ The idea of catheters entering the heart and ablating tissue will seem bizarre to patients, and the complexity of RFCA may require a more detailed explanation from the physician in order to alleviate patients' health concerns in comparison with other invasive procedures. The significant decrease in patient anxiety from a mean of 7 to 2.5 highlights the efficacy of RFCA. Anxiety levels after RFCA have previously been characterized, with a dramatic improvement in quality of

life and anxiety levels.²⁵ Invasive treatment of SVT may result in reduction of anxiety due to the placebo effect or due to ablation-induced changes in the arrhythmia. Studies looking at the placebo effect of other invasive cardiac procedures show that they significantly alter the perception of pre-existing symptoms and reduce anxiety²⁶ and this is probably true for ablation procedures for atrial fibrillation^{27,28} despite recurrences of symptoms. Further studies are needed to clarify this issue. Anxiety levels after ablation should be measured at a set time after the procedure, rather than immediately after or at arbitrary times, to allow for valid comparison between patients.

Implications for practice and policy

Anxiety is an important cause of morbidity and increased utilization of medical care. It is important for medical students to appreciate the impact that psychopathology can have on pre-existing disease and its prognostic contribution to cardiovascular disease.²⁹ Identifying a demographic pattern in patients who present with severe anxiety after SVT will allow for more efficient psychopharmacological intervention.

Limitations

Telephone interview was selected as the best method for collecting data compared with mailed questionnaires. The expected response rate was greater, therefore reducing

response bias. Communicating over the phone allowed the interviewer to clarify any misinterpretations of the participants, thus improving the reliability of the results.³⁰ There was risk of recall bias with over- or under-reporting of anxiety levels. Patients may not accurately remember how anxious they were during their index episode and thus may have given inaccurate reports of their anxiety. To reduce bias, the interviewer was trained and the same interviewer was used in each case.

The use of a subjective anxiety scale is a potential source of bias and is not the most reliable way of measuring anxiety, as it can vary depending on the individual and situation and, therefore, lead to unreliable results. Furthermore, results obtained from a subjective scale can be difficult to interpret because of the ordinal nature of the collected data. The use of a subjective scale, however, meant that a larger sample size was recruited. Furthermore, the high participation rate – 141 out of 148 (95.3%) – supports the use of a subjective scale due to its simplicity. Nonetheless, this study could be repeated using official psychiatric questionnaires such as the Generalized Anxiety Disorder assessment (GAD 7) and Social Anxiety Questionnaire for Adults (SAQ-A30) to allow for more valid results. This study provides a basis for further study. The ANOVA test was used in this study to determine associations between patient

anxiety and patient perceptions during their index episode. For this to be possible, perceptions had to be divided into 2 categories. The division of patients' thoughts into binary values – “dangerous” and “benign” – is potentially problematic. This could be avoided in further studies by simplifying the question regarding perceptions and asking patients if they felt that they needed to go to the hospital or not, then determining an association with anxiety between the 2 groups using the Mann–Whitney test.

Conclusion

The psychological health of patients is an important factor to take into account as anxiety and individual disease perception

can have an impact on the severity of symptoms.³¹ Anxiety is a common accompaniment to SVT and is more prevalent in older patients, hence supporting this study's hypothesis. However, there seems to be no association between gender and anxiety. Many patients believe that they are having a heart attack or dying during their index episode. The perceived complexity of RFCA commonly elicits periprocedural anxiety in patients, suggesting that this is a factor which could be targeted by better counselling and education of patients at the time of referral and review and prior to their procedure. RFCA can significantly reduce patient anxiety.

Learning Points

What is already known?

- SVT is a common tachyarrhythmia that causes anxiety in many patients.
- Misinterpretation of episodes is common and many SVTs are misdiagnosed as panic attacks.
- Catheter ablation is the first-line treatment for SVTs and significantly reduces anxiety levels in patients.

What does this study add?

- This study explores patients' anxiety during their index episode of SVT and provides details of patients' perceptions of their first attacks.
- As anxiety is a common problem associated with SVT, exploring this aspect will hopefully lead to cardiologists providing more counselling and improving patient education during the time of referral and review and prior to the catheter ablation procedure.
- Reducing anxiety in SVT patients will drastically lessen the severity of physical symptoms and improve quality of life.

APPENDIX

PATIENT INFORMATION SHEET

SUPRAVENTRICULAR MECHANISMS AND THEIR AGE AND GENDER DISTRIBUTION

You are being invited to take part in a research study. Before you decide, it is important for you to understand why this research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish.

What is the purpose of this study and why have I been chosen?

You have been chosen out of a group of 180 patients because you have been seen in the cardiology clinic with an arrhythmia and have undergone ablation treatment. We are interested in hearing about your experience with your condition, both before and after your treatment.

This study is designed to assess how patients' lives are affected, both physically and psychosocially, by their condition.

Do I have to take part?

It is completely your choice whether or not to take part. If you do decide to join our study, you are still free to withdraw at any time and without giving a reason. **A decision not to take part will not affect the standard of care you receive.**

What will happen to me if I take part and what are the potential risks?

There is no risk involved in this study. **Over the next few weeks, you will receive a phone call from us. We require around 10 minutes of your time**, during which we will ask you to complete a short questionnaire over the phone. This questionnaire will assess your first experience of arrhythmia symptoms, how you felt at the time and your past medical history. It will also ask questions about your health, mood and experiences with your ablation treatment; both during and after the procedure. **If you receive a call from us and feel that you do not have the time to answer questions at that moment, we would be happy to reschedule an interview.**

Will my taking part in the study be kept confidential?

All information which is collected about you will be kept strictly confidential. Any information which leaves the hospital/surgery will have your name and address removed so that you cannot be recognised from it.

What will happen to the results of the study?

The results will form part of a research project which will be submitted to the University of Edinburgh Medical Faculty. It is hoped that the results will be submitted for publication to a medical journal. As stated above, all information will be kept anonymous.

The results of the study will be made available to you should you require further information

Thank you for your consideration of this study

Dr. xxx is a consultant Cardiologist who is available to advise you about the study and participation if you require more information, and is contactable through the Royal Infirmary of Edinburgh switchboard: (0131 242 1000)

(2) Structured Clinical Interview

How old were you when you had your first episode?		
What was the first thing you thought when palpitation started?		
How anxious did you feel during your first attack? (score of 0-10; 0 being not anxious at all and 10 being the most anxious you could be)		
How often do episodes occur? (With specification)	<input type="checkbox"/> Daily	
	<input type="checkbox"/> Once/twice per week	
	<input type="checkbox"/> Once per fortnight	
	<input type="checkbox"/> Once per month	
	<input type="checkbox"/> Less than once per month	
How long do episodes last?	<input type="checkbox"/> Minutes	
	<input type="checkbox"/> Hours	
	<input type="checkbox"/> Days	
What do you feel during palpitation?	<input type="checkbox"/> Anxiety	
	<input type="checkbox"/> Dizziness/light-headedness	
	<input type="checkbox"/> Blackouts	
	<input type="checkbox"/> Chest pain	
	<input type="checkbox"/> Breathlessness	
	<input type="checkbox"/> Other	
Have you ever indentified a trigger for your palpitation? (Y/N)	<input type="checkbox"/> Stress	
	<input type="checkbox"/> Alcohol	
	<input type="checkbox"/> Caffeine	
	<input type="checkbox"/> Tiredness	
	<input type="checkbox"/> Exercise	
	<input type="checkbox"/> Other	
Do you ever get palpitation when you are doing nothing/ no obvious trigger? (Y/N)		
Are you able to stop your palpitation yourself? (Y/N)	<input type="checkbox"/> Breath-holding	
	<input type="checkbox"/> Neck massage	
	<input type="checkbox"/> Bending	
	<input type="checkbox"/> Lying down	
	<input type="checkbox"/> Other	
Did you take any medications before your RFCAs?	<input type="checkbox"/> Beta-blocker	
	<input type="checkbox"/> Calcium channel blocker	
	<input type="checkbox"/> Digoxin	
	<input type="checkbox"/> Amiodarone	
	<input type="checkbox"/> Flecainide	
	<input type="checkbox"/> Aspirin	

	<input type="checkbox"/> Warfarin
	<input type="checkbox"/> Other
Do you have any of the following health problems?	<input type="checkbox"/> Depression/anxiety
	<input type="checkbox"/> Thyroid disease
	<input type="checkbox"/> IHD
	<input type="checkbox"/> Diabetes

How anxious were you before your ablation? (0-10)		
What were you worried about?		
How anxious were you after the procedure? (0-10)		
Did you experience any pain at any point during the procedure? (Y/N)	When?	
	Pain (0-10)	
Did you feel breathless at all during the procedure? (Y/N)		
Did you feel dizzy at all? (Y/N)		
Any palpitation since your ablation? (Y/N)		

References

1. Baine WB, Yu W, Weis KA. Trends and outcomes in the hospitalization of older Americans for cardiac conduction disorders or arrhythmias, 1991–1998. *J Am Geriatr Soc.* 2001 Jun;49(6):763-70. DOI: 10.1046/j.1532-5415.2001.49153.x.
2. Orejarena LA, Vidaillet H, DeStefano F, Nordstrom DL, Vierkant RA, Smith PN, *et al.* Paroxysmal supraventricular tachycardia in the general population. *J Am Coll Cardiol.* 1998 Jan;31(1):150-7. DOI: 10.1016/S0735-1097(97)00422-1.
3. Akhtar M, Jazayeri MR, Sra J, Blanck Z, Deshpande S, Dhala A. Atrioventricular nodal reentry: clinical, electrophysiological, and therapeutic considerations. *Circulation.* Jul 1993 Jul;88(1):282-95. DOI: 10.1161/01.CIR.88.1.282.
4. Josephson ME, Kastor JA. Supraventricular tachycardia: mechanisms and management. *Ann Intern Med.* 1977 Sep 1;87(3):346-58. DOI: 10.7326/0003-4819-87-3-346.
5. Jazayeri MR, Hempe SL, Sra JS, Dhala AA, Blanck Z, Deshpande SS, *et al.* Selective transcatheter ablation of the fast and slow pathways using radiofrequency energy in patients with atrioventricular nodal reentrant tachycardia. *Circulation.* 1992 Apr;85(4):1318-28. DOI: 10.1161/01.CIR.85.4.1318.
6. Brugada P, Wellens HJ. The role of triggered activity in clinical ventricular arrhythmias. *Pacing Clin Electrophysiol.* 1984 Mar;7(2):260-71.
7. Lesh MD, Van Hare GF, Epstein LM, Fitzpatrick AP, Scheinman MM, Lee RJ, *et al.* Radiofrequency catheter ablation of atrial arrhythmias. results and mechanisms. *Circulation.* 1994 Mar;89(3):1074-89. DOI: 10.1161/01.CIR.89.3.1074.
8. Ma G, Brady WJ, Pollack M, Chan TC. Electrocardiographic manifestations: digitalis toxicity. *J Emerg Med.* 2001 Feb;20(2):145-52. DOI: 10.1016/S0736-4679(00)00312-7.
9. Al-Khatib SM, Pritchett EL. Clinical features of Wolff-Parkinson-White syndrome. *Am Heart J.* 1999 Sep;138(3 Pt 1):403-13.
10. Wood KA, Drew BJ, Scheinman MM. Frequency of disabling symptoms in supraventricular tachycardia. *Am J Cardiol.* 1997 Jan 15;79(2):145-9. DOI: 10.1016/S0002-9149(96)00701-1.
11. Lessmeier TJ, Gamperling D, Johnson-Liddon V, Fromm BS, Steinman RT, Meissner MD, *et al.* Unrecognized paroxysmal supraventricular tachycardia: potential for misdiagnosis as panic disorder. *Arch Intern Med.* 1997 Mar 10;157(5):537. DOI: 10.1001/archinte.1997.00440260085013.
12. McCrank E, Schurmans K, Lefcoe D. Paroxysmal supraventricular tachycardia misdiagnosed as panic disorder. *Arch Intern Med.* 1998 Feb 9;158(3):297.
13. Laederach-Hofmann K, Glauser R. Paroxysmal tachycardia in a patient without panic disorder. *Arch Intern Med.* 1998 Apr 27;158(8):929.
14. Calkins H, Ajit Kumar VK, Johnson F. Radiofrequency catheter ablation of supraventricular tachycardia. *Indian Pacing Electrophysiol J.* 2002 Apr;2(2):45.
15. Andreassi JL. The psychophysiology of cardiovascular reactivity. *Int J Psychophysiol.* 1997 Jan;25(1):7-11. DOI: 10.1016/S0167-8760(96)00732-5.
16. Fichera LV, Andreassi JL. Cardiovascular reactivity during public speaking as a function of personality variables. *Int J Psychophysiol.* 2000 Sep;37(3):267-73. DOI: 10.1016/S0167-8760(00)00106-9.
17. Fichera LV, Andreassi JL. Stress and personality as factors in women's cardiovascular reactivity. *Int J Psychophysiol.* 1998 Mar;28(2):143-55. DOI: 10.1016/S0167-8760(97)00092-5.
18. Frommeyer G, Eckardt L, Breithardt G. Panic attacks and supraventricular tachycardias: the chicken or the egg? *Neth Heart J.* 2013 Feb;21(2):74-7. DOI: 10.1007/s12471-012-0350-2.
19. Vos T, Flaxman AD, Naghavi M, Lozano R, Michaud C, Ezzati M, *et al.* Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet.* 2012 Dec 15;380(9859):2163-96. DOI: 10.1016/S0140-6736(12)61729-2.
20. Barsky AJ. Palpitations, arrhythmias, and awareness of cardiac activity. *Ann Intern Med.* 2001 May 1;134(9 Part 2):832-7.
21. Kitzlerová E, Anders M, Kautzner J, Dohnalová AI. Evaluation of psychopathology in patients with paroxysmal supraventricular tachycardia. *Exp Clin Cardiol.* 2007 Spring;12(1):42-5.

22. Parvan K, Zamanzadeh V, Dizaji SL, Shabestari MM, Safaie N. Patient's perception of stressors associated with coronary artery bypass surgery. *J Cardiovasc Thorac Res.* 2013;5(3):113-7. DOI: 10.5681/jcvtr.2013.024.
23. Cupples SA, Paige-Dobson B, Armstrong III D. Psychophysiological manifestations of anxiety in patients undergoing electrophysiology studies. *Heart Lung.* 1998 Nov-Dec;27(6):374-86. DOI: 10.1016/S0147-9563(98)90085-1.
24. Qiu YG, Zhang FR, Chen JZ, Zhu JH, Tao QM, Zheng LR, *et al.* Psychological status and its influencing factors on patients undergoing electrophysiology studies and radiofrequency catheter ablation [Article in Chinese]. *Zhonghua Liu xing bing xue za zhi.* 2003;24(10):928-31.
25. Wood KA, Stewart AL, Drew BJ, Scheinman MM, Froelicher ES. Changes in patient perceptions and quality of life following ablation in patients with supraventricular tachycardia. *Heart Lung.* 2010;39(1):12-20. DOI: 10.1016/j.hrtlng.2009.04.001.
26. Saririan M, Eisenberg MJ. Myocardial laser revascularization for the treatment of end-stage coronary artery disease. *J Am Coll Cardiol.* 2003 Jan 15;41(2):173-83. DOI: 10.1016/S0735-1097(02)02712-2.
27. Gerstenfeld EP, Guerra P, Sparks PB, Hattori K, Lesh MD. Clinical outcome after radiofrequency catheter ablation of focal atrial fibrillation triggers. *J Cardiovasc Electrophysiol.* 2001 Aug;12(8):900-8.
28. Berkowitsch A, Neumann T, Kurzidim K, Reiner C, Kuniss M, Siemon G, *et al.* Comparison of generic health survey SF-36 and arrhythmia related symptom severity check list in relation to post-ablation recurrence. *Europace.* 2003 Oct;5(4):351-5. DOI: 10.1016/S1099-5129(03)00089-8
29. Hindricks G, Piorkowski C, Tanner H, Kobza R, Gerds-Li JH, Carbucicchio C, *et al.* Perception of atrial fibrillation before and after radiofrequency catheter ablation relevance of asymptomatic arrhythmia recurrence. *Circulation.* 2005 Jul 19;112(3):307-13. DOI: 10.1161/CIRCULATIONAHA.104.518837
30. Akbayrak B. A comparison of two data collection methods: interviews and questionnaires. *Hacet Ünit Eğit Fak.* 2000;18:1-10.
31. Blomström-Lundqvist C, Scheinman MM, Aliot EM, Alpert JS, Calkins H, Camm AJ, *et al.* ACC/AHA/ESC Guidelines for the management of patients with supraventricular arrhythmias – executive summary. *Circulation.* 2003;108:1871. DOI: 10.1016/j.jacc.2003.08.013.