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Do children with supraventricular tachycardia treated with ablation therapy have similar quality of life as healthy children?

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ABSTRACT

Introduction. There are a few available studies evaluating quality of life (QoL) in pediatric patients with supraventricular tachycardia (SVT) treated with ablation but they are based on small groups of patients. The aim of the paper was to compare the QoL in children with SVT treated with successful ablation with the group of healthy children.

Materials and Methods. The study included 122 SVT children who underwent a successful ablation therapy and 83 healthy children. The Qol was assessed, using the WHOQOL-BREF and the Pediatric Arrhythmia Related Score (PARS) - a specific questionnaire developed by the authors, related to patients' own feelings and observations concerning arrhythmia.

Results. On the basis of WHOQOL-BREF no significant differences were found in all the measured domains. On the basis of PARS in SVT-group the patients still reported significantly increased symptoms within physical domain in comparison with the healthy group (1.8 ± 0.5 vs 1.6 ± 0.3; $p = 0.0195$) as well as increased negative feelings within psychological domain (2.3 ± 0.7 vs 2.1 ± 0.6; $p = 0.0172$).

Conclusions. On the basis of the general questionnaire all scores in SVT group are comparable with healthy children. When analyzing PARS questionnaire six months after the ablation procedure the physical and psychological functioning of SVT children was still worse than in the group of healthy children. On the basis of the performed analysis we believe that PARS questionnaire is a more useful and sensitive tool than WHOQOL-BREF when evaluating ablation influence on patients' QoL.

Keywords: arrhythmia, pediatric, quality of life.

Introduction

Supraventricular tachycardia (SVT), which is the most common symptomatic arrhythmia in children, may result in a multitude of negative feelings and consequently impede the comfort of life [1–3]. The most common mechanisms of SVT in children are the following: atrioventricular reentrant tachycardia (AVRT), atrioventricular nodal reentrant tachycardia (AVNRT) or atrial ectopic tachycardia (AET) [1, 2] . Palpitation, syncope, chest pain, dyspnea, dizziness, lower exercise tolerance are the most typical symptoms in children with SVT [1]. Psychological dysfunction such as anxiety or depressive symptoms are also common in patients with arrhythmia [4, 5]. The symptoms of SVT and the related limitations, such as

missing school, admissions to the emergency room, regular check-ups, avoidance of physical exercises, necessary medications and their possible side effects may all affect the quality of life (QoL) and psychosocial functioning of SVT patients [3].

There are a lot of studies which show that arrhythmia significantly affects the QoL both in the adults and children with arrhythmia [3, 6–11]. Currently, radiofrequency ablation (RFA) or cryoablation is a standard care, recommended as the method of choice in patients with SVT [12–14]. The previous studies indicate that ablation is a safe and effective method to manage children with SVT. However, the majority of these studies focus on the effectiveness of ablation solely as the method to eliminate arrhythmia substrate. Regression of arrhythmia and thus the objective improvement of the health condition as a result of the provided treatment do not always imply the improvement of the QoL and a subjective perception of the health and therefore the evaluation of the applied treatment on the QoL appears to be important. There are a lot of studies that prove positive influence of ablation therapy on QoL of adult patients [15–17]. The available analyses of pediatric patients with arrhythmia confirm the positive effects of ablation on the QoL but they are scarce [3, 18, 19]. The number of studies comparing QoL of pediatric patients treated successfully with ablation with normal population is not sufficient [3, 19]. The Constitution of the World Health Organization (WHO) defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" [20]. The aim of the paper was to compare the QoL in children with SVT treated with successful ablation with the group of healthy children. Are SVT children who underwent a successful ablation treatment healthy, according to WHO definition?

Materials and Methods

Patients

In this study we enrolled a group of SVT children aged 7–18 with a diagnosed SVT treated with ablation therapy at the Department of Pediatric Cardiology, Poznan University of Medical Sciences, Poland in 2010–2014. Patients with organic heart disease or other chronic condition that could impede the QoL were excluded from the study. Also, we enrolled a group of healthy children, aged 7–18, selected by pediatricians during the routine check-ups in 2014–2015. On entering the study all patients underwent a detailed interview and a physical examination. SVT children completed the WHOQOL-BREF questionnaire and the PARS questionnaire six months after the ablation treatment. The healthy children completed the WHOQOL-BREF questionnaire and the abbreviated PARS questionnaire during pediatrician check-ups. All patients and their parents provided a written consent to participate in the study.

The parameters of QoL were assessed in SVT children who underwent a successful ablation treatment and the collected results were compared with the group of healthy children.

The study protocol was approved by the Bioethics Committee of the University of Medical Sciences, Poznan, Poland.

WHOQOL-BREF

The WHOQOL-BREF instrument comprises 26 items which measure the following broad domains: physical health, psychological, social relationships, and environment [21]. The WHOQOL-BREF is a shorter version of the original instrument that may be more convenient to use in large research studies or clinical trials [21]. Each domain is assessed on a 0–100 point scale; the higher the score obtained in one domain the higher QoL. There are also two questions of WHOQOL-BREF questionnaire which are analyzed separately: question No. 1, concerning individual general perception of QoL and question No. 2, concerning individual general perception of one's own health. Considering the patients' age the question regarding sexual activity, social domain part, was removed from the questionnaire.

Pediatric Arrhythmia Related Score (PARS)

The questionnaire regarding patients' own feelings and observations connected with arrhythmia (Pediatric Arrhythmia Related Score- PARS), which was developed by pediatric cardiologists in collaboration with a clinical psychologist and adjusted to the group of arrhythmia children was the second instrument used in the study. This questionnaire was already used in our study evaluating QoL in children with SVT [10].

Questions in this questionnaire are grouped into 3 domains: physical, regarding the symptoms perceived as specific or likely to accompany SVT; medical satisfaction, concerning cooperation with medical care

professionals; and psychological domain- referring to emotional condition of the studied individuals. Each domain is assessed on a 1–5 point scale and numeric results of individual areas are 'negatively directed', i.e. the lower numeric value the higher the QoL. Specific details regarding PARS questionnaire are available in our previous study [10]. Only the questions regarding physical and psychological aspects were used in the current study, assuming that the questions referring to medical satisfaction are inappropriate to be analyzed in the group of healthy children.

Statistical analysis

Statistical calculations were performed using the statistica data analysis software system (STATISTICA 10). Data were considered significant at $p < 0.05$. Both groups were statistically compared with regard to age, gender, a place of living, and education. Due to the fact that there was no correlation with normal distribution, the comparison of patients' age was performed using the nonparametric Mann-Whitney U test. The same test was used to compare education. Gender and a place of living were compared using the $\chi 2$ with Yates correction test. The age was determined by a mean value, standard deviation, a median and IQR. The Gender, a place of living and education were presented as proper numbers in categories and relevant percentage values. In the study we compared the scores obtained in 4 domains of WHOQOL-BREF questionnaire and 2 domains of PARS questionnaire of SVT children and healthy children. Moreover, two questions from WHOQOL-BREF and all questions from PARS were analyzed separately. The nonparametric Mann-Whitney U test was used to perform comparisons of the above QoL parameters between the both groups of patients.

Results

The study included 122 SVT children who underwent a successful ablation treatment. On the basis of the electrophysiological study the following forms of SVT were diagnosed: AVRT– 59.8%, AVNRT- 35.3%, AET- 4.9%. All the children in SVT group presented clinical symptoms before ablation. The mean ± SD age of the first SVT episode was 10.1 ± 4.6 years (median/IQR: 11.5/8.0). In the SVT group antiarrhythmic drugs were taken by 89 (72.9%) of the patients, while the remaining children were not treated pharmacologically.

Patient demographics are shown in **Table 1**.

WHOQOL-BREF

SVT group demonstrated no differences in comparison with healthy children in all the analyzed domains of WHOQOL-BREF questionnaire (the mean ± SD value on a 0–100 scale was: physical 79.4 ± 14.8 vs 82.0 ± 12.1; psychological 77.8 ± 16.0 vs 81.6 ± 13.9; social relationships 80.7 ± 17.3 vs 80.5 ± 16.6; environment 77.4 ± 14.0 vs 79.2 ± 15.6 **(Figure 1).**

On the basis of the analyzed responses on a five-point Likert scale, the general satisfaction with the QoL and general satisfaction with the health condition was also comparable in both groups of patients. Only one child (1.2%) of the healthy group was dissatisfied with their QoL (mean 4.3; median 4.0; IQR 1.0), whereas none of the children in SVT group were dis-

Table 1. Patient demographics

	SVT children group	Healthy children group	*p* value
Patient No.	122	83	
Age [mean ± SD (median/IQR)]	13.9 ± 2.8 (14.5/4.0)	12.9 ± 3.5 (13.0/6.0)	0.1107
Gender [n (%)]			
Boys	55 (45.1)	38 (45.8)	0.9731
Girls	67 (54.9)	45 (54.2)	
Place of living [n (%)]			
village	40 (32.8)	23 (27.7)	0.4522
town	82 (67.2)	60 (72.3)	
Education [n (%)]			
1. Primary School	35 (28.7)	35 (42.2)	0.2366
2. Secondary School	47 (38.5)	22 (26.5)	
3. Basic Vocational School	1 (0.8)	1 (1.2)	
4. Technical College	10 (8.2)	6 (7.2)	
5. High School	29 (23.8)	19 (22.9)	

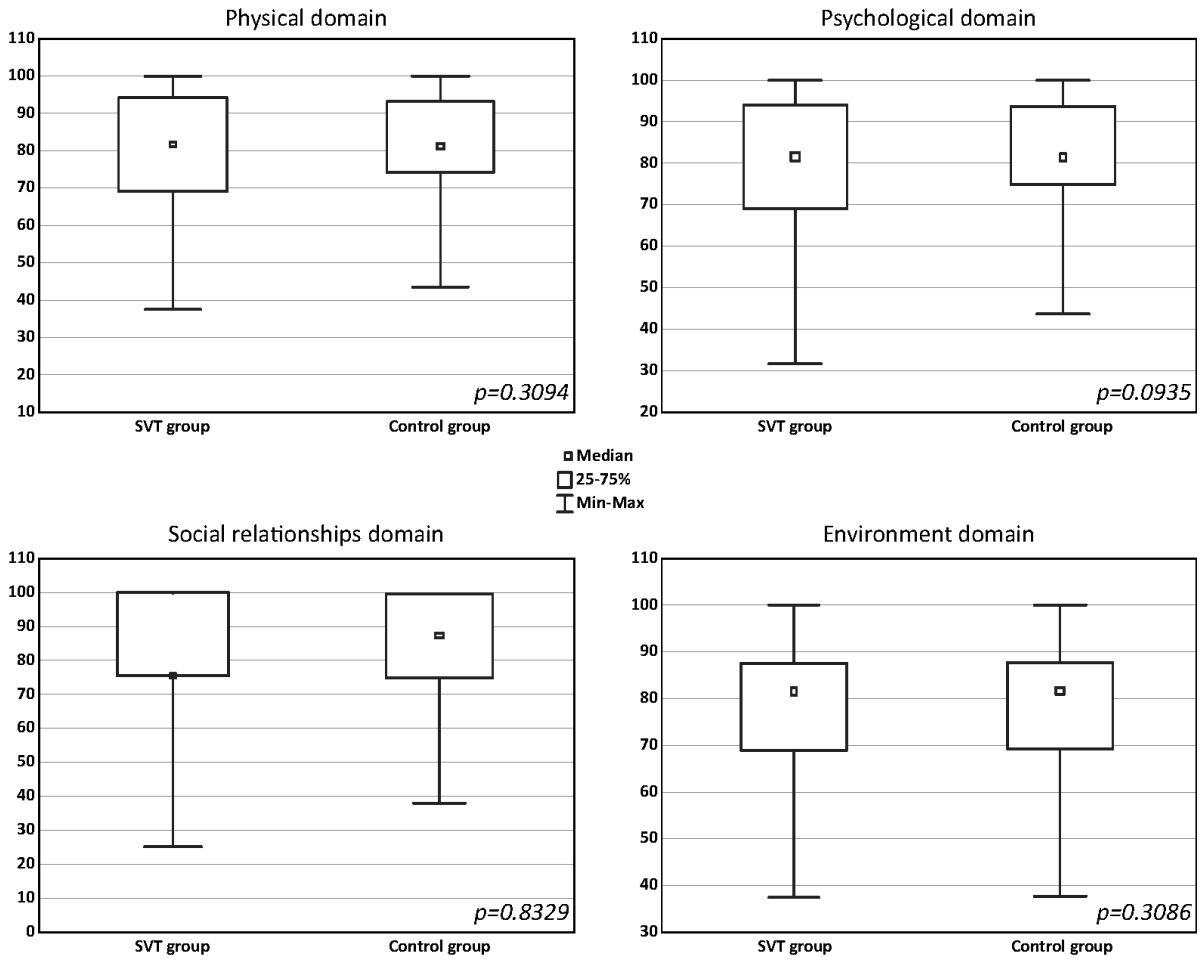

Figure 1. WHOQOL-BREF scores. Comparison of SVT children after ablation and healthy children. Values are presented as median; 25–75 percentile and minimum-maximum

satisfied (mean 4.3; median 4.0; IQR 1.0); similarly, only one child (0.82%) in arrhythmia children group was dissatisfied with their general health condition (mean 4.2; median 4.0; IQR 1.0) whereas nobody in the group of healthy children expressed their dissatisfaction (mean 4.2; median 4.0; IQR 1.0) **(Figure 2).**

PARS (authors' own questionnaire)

The PARS questionnaire still showed significant differences between the study groups in the both compared domains (the mean ± SD value on a 1–5 was: physical 1.8 ± 0.5 vs 1.6 ± 0.3; psychological 2.3 ± 0.7 vs 2.1 ± 0.6) **(Figure 3).**

Physical domain showed significantly higher intensity of negative feelings in SVT group after ablation in 6 out of 13 questions related to the discussed domain **(Table 2)**. Psychological domain showed differences in only 1 out of 7 related questions. SVT patients after ablation were still more nervous when compared with the healthy children **(Table 2)**.

Discussion

In the present study we found that the QoL of SVT patients is similar to control group when analyzing the general questionnaire, but the QoL of SVT patients is still lower in the specific questionnaire in comparison with the healthy children. Healthy children reported similar general satisfaction with the QoL and general satisfaction with the health condition as SVT children.

As mentioned above, there are few available studies evaluating and comparing with a normative population the QoL of pediatric patients with SVT who underwent ablation. Additionally, these studies are based on a significantly lower number of patients in comparison with our study group. Strieper et al. evaluated the QoL in 27 children with SVT [3]. This study demonstrated that six months following a successful ablation the total mean scores were comparable with healthy children [3]. Abo-Haded examined a group of 38 pediatric patients with SVT who underwent

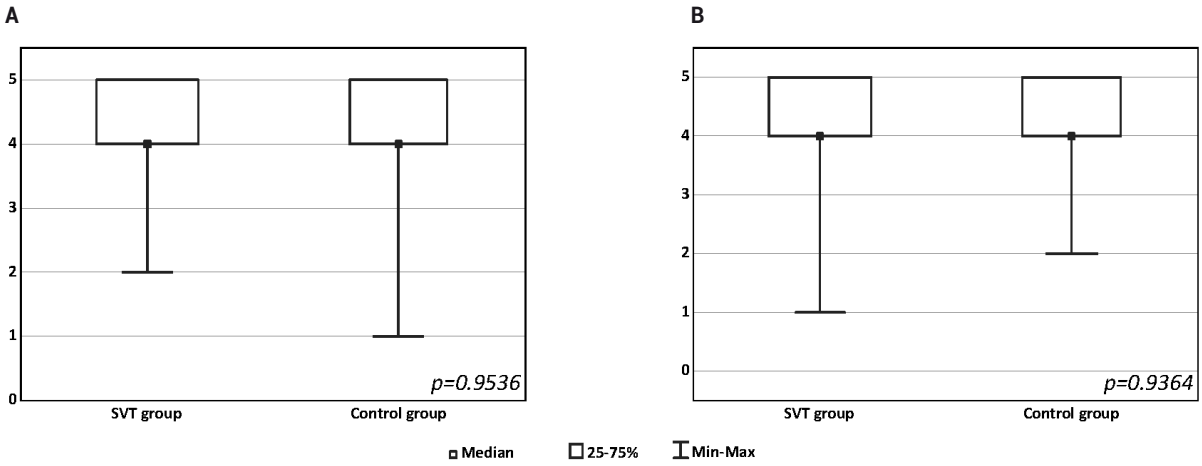

Figure 2. General satisfaction with the quality of life (A) and with the health condition (B). Comparison of SVT children after ablation and healthy children. Values are presented as median; 25–75 percentile and minimum-maximum

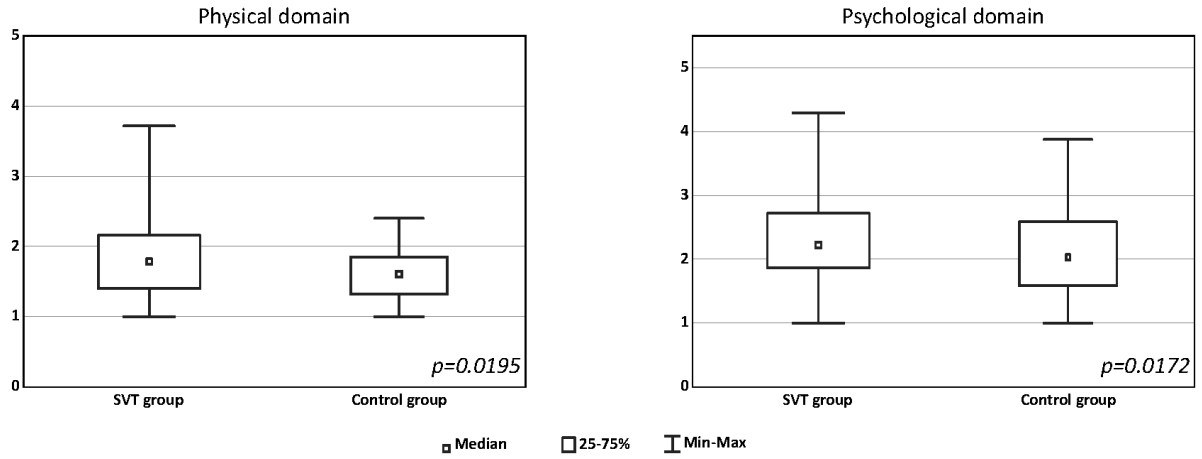

Figure 3. PARS scores. Comparison of SVT children after ablation and healthy children.Values are presented as median; 25–75 percentile and minimum-maximum

a successful ablation; his study showed that the data after ablation are similar to the general pediatric population scores [19]. The authors of these studies used PedsQL Cardiac Module, which was validated by Uzark et al. for pediatric patients with heart conditions; however, it is not available in a Polish language version [22, 23]. In our study we used the PARS questionnaire which evaluates patient's individual feelings and observations and it is adjusted to the arrhythmia group. PARS has been already used in a previously published study assessing QoL in pediatric population with SVT [10]. In this study [10] we compared 180 SVT children with the control group of 83 healthy children and we proved a significant impairment of QoL in SVT children in comparison with the healthy group. In the current study we also used a group of healthy patients as a benchmark to analyze the scores obtained in SVT group after ablation treatment. To our knowledge it is currently the most numerous pediatric SVT group treated with ablation, described in the available literature, comparing QoL with healthy children.

In the current study, on the basis of WHO-QOL-BREF questionnaire there were no differences found between study groups, unlike in PARS instrument which showed differences in the both analyzed domains. In the previous study [10] physical domain of PARS showed significantly increased symptoms in SVT group in 11 out of 13 questions, whereas in the current study there were still significantly increased negative feelings in 6 questions. In the previous study psychological domain of PARS showed differences in 3 out of 7 related questions: SVT patients were more likely to cry, experience sadness and nervousness when compared with the healthy children [10], whereas the current study showed only one difference, i.e. SVT patients after successful

Table 2. PARS questions and scores. Comparison of SVT children after ablation and healthy children; data presented as mean and median

Questions (the answers are provided using 1–5 point scale where '1' means 'absolutely not' and '5' means 'absolutely yes')	SVT children group		healthy children group		P value
	Mean	Median	Mean	Median	
Physical domain					
1. Do you have dyspnea?	1.6	1.0	1.3	1.0	.0012
2. Do you have palpitations?	1.8	1.5	1.3	1.0	<.0001
3. Do you have pain behind your breastbone?	1.7	1.0	1.3	1.0	.0003
4. Do you ever faint?	1.2	1.0	1.2	1.0	.9637
5. Do you seem to pass urine more frequently than usual?	1.5	1.0	1.4	1.0	.3418
6. Do you ever have a blurred vision? (e.g. scotoma)	1.8	1.5	1.8	2.0	.7433
7. Do you think you are more pale than your friends or do you happen to become pale suddenly?	1.7	1.0	1.5	1.0	.0803
8. Do you experience situations in which you sweat more than your friends?	1.9	1.0	1.5	1.0	.0235
9. Do you ever feel nauseous?	1.7	1.0	1.7	1.0	.9439
10. Do you have headaches?	2.4	2.0	2.6	3.0	.1635
11. Do you have stomach aches?	1.9	2.0	2.4	3.0	.0011
12. Do you sometimes feel suddenly cold without a reason?	1.8	1.5	1.5	1.0	.0429
13. Do you think you are weaker than your peers?	2.5	2.5	1.6	1.0	< .0001
Psychological domain					
1. Do you often cry?	2.1	2.0	1.9	2.0	.4398
2. Is it easy to make you cry?	2.5	2.0	2.2	2.0	.1409
3. Do you think you are more nervous than your peers?	2.6	2.0	2.0	2.0	.0018
4. Do you think you are sadder than your peers?	1.9	2.0	1.6	1.0	.0648
5. Do you think you are happier than your peers?	2.7	3.0	2.7	3.0	.9456
6. Do you think you are more lonely than your peers?	1.7	1.0	1.6	1.0	.3487
7. Can you count on your friends?	4.0	4.0	4.3	5.0	.0651

ablation still felt more nervous than the healthy peers. In the previous study we assumed that "General questionnaires provide more time-stable results and may not identify small but significant changes in the QoL" [10]. On the basis of the performed analysis we believe that PARS questionnaire is a more useful and sensitive tool than WHOQOL-BREF when evaluating ablation influence on patients' QoL.

Nowadays QoL evaluation is a very important element to determine the clinical benefit of the performed treatment. There are many studies assessing the QoL of patients with various cardiac arrhythmias confirming the significant improvement in investigated fields after ablation [3, 6–11]. However, cardiology patients who are seriously concerned about their heart condition may still report worse QoL than healthy population despite successful therapy, which was proved in the current study.

Study limitations

Only the children under 7 years of age were included in the study and therefore the study does not cover the whole range of the patients' age who undergo ablation treatment. It was assumed, that children below 7 years of age might have problems with understanding all the questions contained in questionnaires and thus, they could have difficulties providing autonomous (or with a little help from adults) answers to all the questions.

Perspectives

- Further studies concerning QoL in children with arrhythmia, also after ablation treatment with a longer follow-up period.
- Further improvement of QoL evaluation tools in arrhythmia children.
- Determination of the factors affecting QoL deterioration in SVT children as well as optimization of arrhythmia treatment in children, considering the effects of these factors on QoL.
- Expansion of examinations to include parent proxy-report instrument in relation to their child's disease. It may be essential in cases when, due to the young age, cognitive impairment or severity of illness, children are unable to complete QoL instrument. Apart from this, parent proxy-report reflects parents' impression of their child QoL that may affect the healthcare.

Conclusions

Six months after the ablation procedure the general satisfaction with health condition and general satisfaction with the QoL of SVT children is comparable to the healthy children. On the basis of the general questionnaire all scores are comparable with the healthy children.

When analyzing PARS questionnaire six months after the ablation procedure the physical and psychological functioning of SVT children is still worse in comparison with the healthy children.

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Conflict of interest statement
The authors declare no conflict of interest.

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