

Anxiety Levels of Children During Electrophysiological Study

Elektrofizyolojik alıřma Sırasında ocuklarda Anksiyete Düzeyleri

Özgün Arařtırma
Research Article

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ABSTRACT

Ama: Elektrofizyolojik alıřma (EF) tařikardi tanı ve tedavisinde kullanılmaktadır. Bu alıřmanın amacı EF öncesi ocuklardaki anksiyete seviyesini tespit etmektir.

Yöntem: Bu kesitsel alıřmaya Mart ve Eylül 2019 tarihleri arasında EF için hastaneye yatırılan 45 olgu alındı. 8-18 yař arası ocuklardan oluřan hasta grubu yař ve cinsiyet uyumlu kontrollerle karřılařtırıldı (n=46). ocuklarda anksiyete bozukluklarını tarama öleđi (Screen for Child Anxiety Related Emotional Disorders (SCARED) kullanılarak ocuklardaki anksiyete řiddeti deđerlendirildi.

Bulgular: alıřma grubundaki hastaların yař ortalaması 13,91±2,84 yıl, 23 kız ve 22 erkek idi. Aritmi nedeniyle iřleme alınan olguların tanıları %44,4 atriyoventriküler reentran tařikardi, %31 AV nodal reentran tařikardi, %22,2 ventriküler tařikardi, %8,8 sinüs tařikardisi ve %4,4 atriyal flutter idi. Elektrofizyolojik alıřma iřlemi için hastaneye yatırılan ocuklarda anksiyete düzeyleri kontrol grubuna göre daha yüksek olarak bulundu (p<0,001).

Sonuç: Bildiđimiz kadarıyla, alıřmamız Türkiye'de tařikardi nedeniyle EF yapılan ocuklarda anksiyete düzeyini ölen ilk alıřmadır. Elektrofizyolojik alıřma iřlemi ocuklarda anksiyeteyi artırmaktadır. Anksiyeteyi azaltan yöntemlerin alıřıldıđı ileri alıřmalara ihtiya vardır.

Anahtar kelimeler: Anksiyete, elektrofizyolojik alıřma, aritmi

ÖZ

Objective: Electrophysiological study (EPS) has been widely used in the diagnosis and treatment of tachycardia. The objective of this study was to determine the anxiety levels in children before EPS procedure.

Method: Patients (n=45) who were hospitalized for EPS between March and September of 2019 were included in this cross-sectional study. The patient group consisting of children aged 8-18 years old was compared with age- and sex- matched controls (n=46). We evaluated the severity of anxiety at the time of assessment using the Screen for Child Anxiety Related Emotional Disorders (SCARED) scale. The forms were filled out by both children and their parents.

Results: The mean age of the patients in the study group consisting of 23 girls and 22 boys was 13.91±2.84 years. Diagnoses of cases treated due to arrhythmia were as follows: atrioventricular reentrant tachycardia (44.4%), atrioventricular nodal reentrant tachycardia (31%), ventricular tachycardia (11.2%), sinus tachycardia (8.8%), and atrial flutter (4.4%). Anxiety levels were higher in children who were hospitalized for EPS procedure compared to the control group (p<0.001).

Conclusion: As far as we know, our study is the first in Turkey to measure the level of anxiety in children undergoing cardiac EPS due to tachycardia. Electrophysiological study procedure increases anxiety in children. Further studies in which methods to reduce anxiety are needed are studied.

Keywords: Anxiety, electrophysiological study, arrhythmia

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INTRODUCTION

Palpitations and arrhythmia are frequent reasons for admission to pediatric outpatient clinics and emergency services⁽¹⁾. Supraventricular tachycardia is the most common tachyarrhythmia in children^(2,3). It accounts for more than 90% of childhood arrhythmias⁽²⁾. While 80% of infants are affected by atrioventricular reentrant tachycardia (AVRT), atrioventricular nodal reentrant tachycardia (AVNRT) is more common in the later years^(2,4). The most common form of AVRT is Wolf-Parkinson-White syndrome (WPW). Wolff-Parkinson-White syndrome is characterized by short PR intervals, delta waves and wide QRS complexes detected on the surface electrocardiograms^(5,6). Electrophysiological study has been increasingly used for the diagnosis and treatment of arrhythmias in children (e.g. radiofrequency ablation and cryoablation) in recent years. After the electrophysiological study, the patient's palpitations can be eradicated completely⁽⁴⁾. In adult patients, the procedure can be performed using sedoanalgesia. The use of general anesthesia to allow pediatric patients to undergo a comfortable electrophysiology study is becoming the standard of care⁽⁷⁾. Optimal anesthetic agent for pediatric electrophysiological study, should have minimal effect on cardiac conduction system. These anesthetic agents should adequately suppress the sympathetic responses to induction and stimulation to allow predictable progression of procedure⁽⁷⁾. Preoperative anxiety is important in these patients. Preoperative anxiety may delay the onset of activity of stress hormones and induction of anesthesia and also prevent postoperative recovery.⁽⁸⁾

Previous studies have indicated that emotional and behavioral problems are more common in children with chronic diseases^(9,10). These problems are more likely to exhibit internalizing symptoms, such as anxiety, depression, and social functioning difficulties, rather than externalizing symptoms such as conduct disorder or physical aggression⁽¹⁰⁾. These

internalizing problems may worsen with physical problems and physical problems may also increase the severity of chronic symptoms⁽⁹⁾. Heart rhythm disorders are classified as chronic diseases, and like other chronic diseases they can cause anxiety and stress, leading to symptoms such as an increase in palpitations, which may cause higher levels of anxiety⁽¹¹⁾. Here, we wanted to detect the level of anxiety in children who were hospitalized for electrophysiological study.

MATERIAL and METHOD

This study included 45 children aged between 8–18 years who were hospitalized in Pediatric Cardiology Clinic of Tepecik Training and Research Hospital for electrophysiological study between September and March of 2019. All patients underwent pre-ablation screening tests including 12-lead electrocardiography, a transthoracic echocardiography and pre-anesthetic evaluation. Patients with any psychiatric disorder and chronic disease (diabetes mellitus, hypertension, rheumatic and immunological diseases, epilepsy, genetic diseases and also non-native Turkish speakers were excluded. Parents of children undergoing electrophysiological study (none of whom had any previous history of psychiatric illnesses) were included in the study. The control group included age and-sex matched children without any structural heart disease who had been referred to the pediatric cardiology outpatient clinic for cardiac evaluation with echocardiographic examination for innocent murmurs. The study protocol was approved by the local ethics committee (2019/14-18).

When a child hospitalized for the electrophysiological study, a pediatric cardiologist explained the study and obtained the parent and child's consent. The survey consisted of two parts. The first part contained questions about socio-demographic status of the participants, and the second part consisted of responses to the Screen for Child Anxiety Related Emotional Disorders (SCARED) scale questions⁽¹²⁾.

The questionnaires were given to both child and parents approximately 24 hours before child's catheterization. The individuals who were responsible for the care of the child e.g. mother, father or another person filled out the forms. Sociodemographic data inquired were related to child's age, gender, education level of parents, marital status (single, married, domestic partnership, or divorced), number of children in family ranked by age, age of the mother, perceived socioeconomic status, parents' profession, and history of presence of medical and psychiatric disease in a family member.

The Screen for Child Anxiety Related Emotional Disorders (SCARED):

The SCARED is a 41-item scale that aims to indicate how children have felt over the previous three months. We used the scale for parents and children to determine the anxiety levels in children. The form comprises 41 questions that evaluate the child's anxiety. Response given to each question is being scored as 0, 1, or 2 points, depending on the severity of the symptom. The total score is calculated, and a cut-off point of 25 is suggested to indicate the presence of an anxiety disorder. The Screen for Child Anxiety Related Emotional Disorders form was developed in 1997, and a Turkish validity and reliability study was carried out by Çakmakçı et al. in 2003⁽¹³⁾.

After the parents were informed, electrophysiological study was applied to the intubated patient under general anesthesia. Antiarrhythmic medications were discontinued for at least five half-lives in all patients before the electrophysiological study was conducted. Three-dimensional (3D) right atrial geometry was reconstituted without fluoroscopy. A minimum dose of anesthetic agent was used for general anesthesia, because high dose anesthetic agent may make it difficult to detect the foci of arrhythmia.

Statistical analyses

Statistical analysis was performed using SPSS 24.0 (SPSS, Inc., Chicago, IL, USA) program. Homogenous

distribution of data was evaluated with Kolmogorov-Smirnov test. Parametres with homogenous distribution in diseased and control children were compared using Student T test. Chi-square test was used for the comparison of group scores. Differences in terms of the mothers' age, family income status, history of medical and psychiatric diseases between the patient and control groups were checked by Pearson chi-square test. Any *p* value detected under 0.05 was considered to be significant.

RESULTS

Patients with rhythm disorder (n=45) and control subjects (n=46) were included in study. The mean age of the patients was 13.91±2.84 years and there were no differences between the study and the control groups in terms of age and gender (Table 1). Among 45 patients who underwent electrophysio-

Table 1. Age, gender, cardiac diagnoses, parent-child closeness, marital status, and number of siblings: EPS group and Control group.

	EPS group (mean±SDS)	Control group (mean±SDS)	p value
Age (year)	13.91±2.84	13.23±2.96	0.273
Gender			
Girl (n,%)	23	23	0.916
Boy (n, %)	22	23	
Diagnoses (n,%)			
AVRT (WPW)	20 (44.4)	-	-
AVNRT	14 (31.0)	-	-
VT	5 (11.10)	-	-
SinusTachycardia	4 (8.80)	-	-
AT	2 (4.40)	-	-
Treatment			
RFA	14 (31.11)	-	-
Cryoablation	25 (56.81)	-	-
Diagnostic EPS	6 (13.33)	-	-
Parents			
Mother	35 (79.50)	42 (91.30)	0.231
Father	8 (18.18)	4 (8.60)	
Other	1 (2.20)	0	
Parent marital status			
Married	39 (88.60)	39 (88.60)	1
Divorced	5 (11.40)	5 (11.40)	
Number of siblings			
Non	6 (13.60)	4 (9.00)	0.376
1	23 (52.27)	28 (63.63)	
2	6 (13.63)	2 (4.54)	
3 or more	8 (18.18)	10 (22.70)	

AVRT: Atrioventricular reciprocating tachycardia; AVNRT: Atrioventricular nodal reentrant tachycardia; AT: atrial tachycardia; WPW: Wolf Parkinson White; VT: ventricular tachycardia; RFA: radiofrequency ablation; EPS: electrophysiological study.

logical study, the rhythm disorders detected in respective number of patients were as follows: atrioventricular reentrant tachycardia (n:20; 44.4%), atrioventricular nodal reentrant tachycardia (n:14; 31%), ventricular tachycardia (n:5; 11.2%), sinus tachycardia (n:4; 8.8%), and atrial flutter (n:2; 4.4%). The SCARED scale scores for both groups are presented in Table 2.

Table 2. Comparison of the SCARED scores in EPS and control groups.

	EPS group (mean±SDS)	Control group (mean±SDS)	p value
SCARED P	20.72 ± 13.38	4.41 ± 2.29	<0.001
SCARED C	21.09 ± 13.25	4.97 ± 2.77	<0.001

EPS: electrophysiological study; SCARED C: Child Screen for Anxiety Related Emotional Disorders Child version; SCARED P: Screen for Child Anxiety Related Emotional Disorders Parent version.

There was no difference between the groups with regard to parent-child closeness, marital status, and number of siblings ($p=0.23$, $p=1$, $p=0.37$). Parents' educational status and their sociodemographic data are presented in Table 3. No difference was determined between the case and the control groups in terms of the number of children born, maternal age, family income status, parents' profession, and family history of medical and psychiatric disease(s) ($p=1$, $p=0.157$, $p=0.794$, $p=0.371$, $p=0.884$). Families of the children included in the study were classified as nuclear family (79.5%), wide family (6.81%), and parents were divorced in 9.5% of the families without any difference between the patient and control groups with respect to these parameters.

Table 3. Parent's educational status, patient and control groups.

Parent education	Mothers		Fathers	
	EPS group n (%)	Control group n (%)	EPS group n (%)	Control group n (%)
Illiterate	2 (4.54)	3 (6.66)	1 (2.27)	1 (2.38)
Primary school	25 (56.80)	28 (62.22)	17 (38.63)	19 (45.23)
Secondary school	3 (6.81)	1 (2.22)	8 (18.18)	8 (19.00)
High school	8 (18.18)	7 (15.55)	11 (25.00)	8 (19.00)
College or university	6 (13.63)	6 (13.33)	7 (15.90)	6 (14.20)
Total	44 (100)	45 (100)	44 (100)	42 (100)

EPS: electrophysiological study.

DISCUSSION

In our study, we found a higher level of anxiety in children who were hospitalized for electrophysiological study than the control group. Hospitalization for children is often associated with facing the fear of medical examinations, pain, loss of control, all of which increase anxiety⁽¹⁴⁾. Hospitalization for catheterization causes stress on the child and family. Previous studies have focused on measuring anxiety levels in the families of children with heart disease rather than diseased children. Kobayashi et al.⁽¹⁵⁾ reported that anxiety levels were significantly higher among parents before cardiac catheterization, although the trait anxiety level of the parents was otherwise normal. In addition, they found that families of infants, adolescents, and children who had no history of angiography experienced higher anxiety levels. In our study, most patients were adolescents; similarly, anxiety levels were at a higher level.

Goldberger et al.⁽¹⁶⁾ evaluated the factors effective on patient anxiety using a detailed informed consent protocol before electrophysiological study. Patients were divided into two groups as those receiving form A, which did not explain the specific risks, and B that did explain the specific risks. They found that situational anxiety was higher in Group B, and these patients needed more often anxiolytic therapy during the procedure. Conversely a study showed that children undergoing cardiac catheterization coped with stress more easily when the procedure was explained with videos⁽¹⁷⁾. Music therapy, educational videos, nurse training, and therapeutic massages have been shown to be effective in reducing anxiety in adult patients⁽¹⁸⁾. The identifying non-pharmacological strategies to reduce anxiety in patients undergoing cardiac catheterization is very important to improve nursing care and to prevent the negative effects of anxiety on patients' clinical outcomes, such as tachycardia and chest pain⁽¹⁸⁾. Children feel safer and their anxiety is reduced when they maintain a daily routine, which facilitates coping with the

procedure of electrophysiological study.

Distress and hopelessness are usually at a higher level in parents who have children with congenital heart disease⁽¹⁹⁾. Üzgeret al.⁽²⁰⁾ found, higher anxiety levels in children of families with cyanotic heart disease and anxiety levels were found to be compatible with the severity of the disease. More than 30% of adult patients with congenital heart disease, suffer from post-traumatic stress disorder and 25%-50% of them experience a major depressive disorder⁽²¹⁾. It was also found that emotional functioning is frequently adversely affected in these patients. Uzarket al.⁽²²⁾ detected lower emotional functioning scores in children with heart disease compared with healthy children. Successful treatment of cardiac arrhythmias by ablation results in a significant improvement in the quality of self-reported emotional functioning scores in young patients⁽²³⁾. Therefore, it is clearly important to undertake a psychosocial evaluation in addition to any physical evaluation.

CONCLUSION

In our study the anxiety of children hospitalized for electrophysiological study was found to be significantly higher than those in the control group. Electrophysiological study significantly increases anxiety in children, which affects the amount of anesthesia required for the procedure. The use of anesthesia at high doses makes it difficult to trigger arrhythmia. Therefore, trying to reduce anxiety and stress before the procedure can contribute to the success of the operation. We conclude that it is important to evaluate the psychosocial status of children who have chronic arrhythmia problems, especially before completing an electrophysiological study.

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Conflict of Interest: None.

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REFERENCES

1. Bobbo M, Amoroso S, Tamaro G, et al. Retrospective study showed that palpitations with tachycardia on admission to a paediatric emergency department were related to cardiac arrhythmias. *Acta Paediatr Oslo Nor.* 2018;108(2):328-32. [\[CrossRef\]](#)
2. Hafez M, Abu-Elkheir M, Shokier M, et al. Radiofrequency catheterablation in children with supraventricular tachycardias: intermediate term followup results. *Clin Med Insights Cardiol.* 2012;6:7-16. [\[CrossRef\]](#)
3. Gillette PC, Garson A. *Pediatric Arrhythmias: Electrophysiology and Pacing.* Philadelphia, PA: WB Saunders Co; 1990.
4. Blaufox AD. Catheter ablation of tachyarrhythmias in small children. *Indian Pacing and Electrophysiology Journal.* 2005;5(1):51-62.
5. Perry JC, Garson A Jr. Supraventricular tachycardia due to Wolff-Parkinson-White syndrome in children: Early disappearance and late recurrence. *J Am Coll Cardiol.* 1999;16:1221-3.
6. Calkins H, Sousa J, Rosenheck S et al. Diagnosis and cure of the Wolff-Parkinson-White syndrome or paroxysmal supraventricular tachycardias during a single electrophysiological test. *N Engl J Med.* 1991;324:1612-1618. [\[CrossRef\]](#)
7. Gupta M, Shivapour J, Lawrence A et al. Does Anesthesia Induction during Electrophysiological Studies Induce Tachycardia in Pediatric Patients. *Cardiovasc Dis Diagn.* 2016;4:4. [\[CrossRef\]](#)
8. Caldwell R M, Ray R. Utilization of iPad technology to decrease pediatric preoperative anxiety. *Journal of Pediatric Surgical Nursing.* 2017;6(4):103-12. [\[CrossRef\]](#)
9. Cadman D, Boyle M, Szatmari P, Offord DR. Chronic illness, disability, and mental and social well-being: Findings of Ontario Child Health Study. *Pediatrics.* 1987;9:805-3.
10. Dougall MJ, DeWit DJ, Wright FV. Social anxiety symptoms among youth with chronic health conditions: trajectories and related factors. *Disability and Rehabilitation.* 2020;42(23):3293-3305. [\[CrossRef\]](#)
11. Celano CM, Daunis DJ, Lokko HN, Campbell KA, Huffman JC. Anxiety disorders and cardiovascular disease. *Curr Psychiatr Rep.* 2016;18(11):838-44. [\[CrossRef\]](#)
12. Birmaher B, Khetarpal S, Brent D, et al. The screen for child anxiety related emotional disorders (SCARED): scale construction and psychometric characteristics. *J Am Acad Child*

- Adolesc Psychiatry. 1997;36(4):545-53. [\[CrossRef\]](#)
13. akmakçı FK. ocuklarda Anksiyete Bozukluklarını Tarama Öleđi Geerlik ve Güvenirlik alıřması, ocuk ve Genlik Ruh Sađlıđı Dergisi. 2004;11:2.
 14. Delvecchio E, Salcuni S, Lis A, Germani A, DiRiso D. Hospitalized Children: Anxiety, Coping Strategies, and Pretend Play. *Front. Public Health*. 2019;7:250. [\[CrossRef\]](#)
 15. Kobayashi D, Turner DR, Forbes TJ, Aggarwal S. Parental anxiety among children undergoing cardiac catheterisation. *Cardiology in the Young*. 2018;28:315-21. [\[CrossRef\]](#)
 16. Goldberger JJ, Kruse J, Parker MA, Kadish AH. Effect of informed consent on anxiety in patients undergoing diagnostic electrophysiology studies. *American Heart Journal*, 1997;134(1):119-26. [\[CrossRef\]](#)
 17. Uzark K, Klos D, Davis W, Rosenthal A. Use of videotape in the preparation of children for cardiac catheterization. *Pediatr Cardiol*. 1982;3:287-91. [\[CrossRef\]](#)
 18. Ferreira C, Ramalho Eda S, LopesJde L. Non-pharmacological strategies to decrease anxiety in cardiac catheterization: integrative review. *Rev Bras Enferm*. 2015;68:1093-1102. [\[CrossRef\]](#)
 19. Lawoko S, Soares JJ. Distress and hopelessness among parents of children with congenital heart disease, parents of children with other diseases, and parents of healthy children. *J Psychosom Res*. 2002;52:193-208. [\[CrossRef\]](#)
 20. zger A, Bařpınar O, Blbl F, Yavuz S, Kılın M. Evaluation of depression and anxiety in parents of children undergoing cardiac catheterization. *TurkKardiyol Dern Ars*. 2015;43:536-41. [\[CrossRef\]](#)
 21. Deng LX, Khan AM, Drajpuch D, et al. Prevalence and correlates of post-traumatic stress disorder in adults with congenital heart disease. *Am J Cardiol*. 2016;117(5):853-7. [\[CrossRef\]](#)
 22. Uzark K, Jones K, Slusher J, Limbers CA, et al. Quality of life in children with heart disease as perceived by children and parents. *Pediatrics*. 2008;121:1060-7. [\[CrossRef\]](#)
 23. Corcia MCG, Peters L, Sluysmans T, et al. Quality of life assessment in children before and after a successful ablation for supraventricular tachycardia. *Cardiology in the Young*. 2020;30(3):413-7. [\[CrossRef\]](#)