

Deep Sedation In Patients Undergoing Atrioventricular Nodal Reentry Tachycardia Ablation

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Background: General anesthesia and deep sedation can be used during cardiac EPS to relief pain and provide comfort and immobility, but many electrophysiologists avoid sedation for better arrhythmia induction.

Objective: To determine anesthesia effects in ablation procedures in adults, we used intravenous anesthetic agents in patients who underwent slow pathway ablation.

Patients and Methods: One hundred patients who were to undergo radiofrequency catheter ablation were randomly assigned to with and without intravenous anesthesia groups. All patients had palpitation with a documented electrocardiography (ECG) compatible with atrio-ventricular nodal reentrant tachycardia (AVNRT). We used propofol, fentanyl and midazolam for intravenous sedation. Electrophysiological parameters were checked for the two groups and compared before and after the ablation.

Results: Electrophysiological parameters were not significantly different in the two groups. In the anesthetic group, patients were more satisfied with the procedure (P value < 0.001).

Conclusions: Intravenous anesthesia could be done safely in patients who underwent electrophysiological procedures. It had no effect on arrhythmia induction or slow pathway ablation in patients with documented AVNRT.

Keywords: Atrio-Ventricular Nodal Reentrant Tachycardia; Deep Sedation; Ablation Techniques Introduction

1. Background

Electrophysiological testing (EPS) and ablation are effective invasive procedures in symptomatic arrhythmic patients. Atrio-ventricular node reentrant tachycardia (AVNRT) is the most frequent arrhythmia in these patients. General anesthesia and deep sedation can be used during cardiac EPS to relief pain and provide comfort and immobility, but many electrophysiologists avoid sedation for better arrhythmia induction. The effect of anesthetic drugs on the conduction system are controversial and some reports have revealed associations between anesthetic drugs and supraventricular arrhythmia termination while others have demonstrate no effect from propofol and/or isoflurane on atrial/ventricular tissue or atrioventricular node function (1, 2). However, successful management of anesthesia in patients undergoing radiofrequency catheter ablation (RFCA) requires that the pathologic tachycardia remains inducible.

2. Objective

In this study we tried to evaluate the effect of anesthesia on AVNRT management.

3. Patients and Methods

A total of 100 consecutive patients were included during January to December 2011. All patients underwent radiofrequency catheter ablation (RFCA) for symptomatic arrhythmia compatible with AVNRT and were informed about the details of the procedure and the anesthesia protocol, if they were included in the anesthetic group. Written informed consent was obtained from all patients. All antiarrhythmic drugs had been discontinued for at least five half-lives before the procedure. All patients were categorized randomly into two groups of with (Group A) and without (Group B) anesthesia. Patients with double arrhythmias or other types of arrhythmias were excluded from the study.

Implication for health policy/practice/research/medical education:

Sedation during AVNRT ablation can increase patient's satisfaction.

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3.1. Intravenous Anesthesia

An anesthesiologist was responsible for anesthesia induction and at least one anesthesia nurse was dedicated for vital signs monitoring (BP and pulse oximetry) and propofol administration. Anesthesia induction was performed with fentanyl (1 μ /kg), midazolam (0.03 mg/kg) and propofol (200 μ /kg/min). When the patient could no longer be aroused, the infusion rate was decreased and adjusted according to the patient's condition. An oral airway was used for airway protection. A nasal canola was used with an O₂ flow of 2 L/min. Cuff blood pressure monitoring and pulse oximetry were used for continuous vital signs monitoring. We did not use pre-medications such as atropin because of electrophysiological effects. All patients recovered within 30 minutes after anesthesia protocol termination.

3.2. Electrophysiological Study

In the anesthetic group (Group A) catheter placement was performed after anesthesia induction and there was no response to the painful stimulation. In the non-anesthetic group (Group B), catheter placement was done after local anesthesia. All patients received four mapping catheters in the right atrium, right ventricular apex, His bundle region and coronary sinus. Intracardiac electrogram was recorded and displayed on a computerized multichannel recording system (Bard EP). Electrophysiological tests including atrial, coronary sinus and ventricular pacing were performed for arrhythmia induction. If no arrhythmia was inducible, isoproterenol infusion was administered to increase baseline heart rate by more than 25% and electrophysiological tests were done again for arrhythmia induction. We could induce at least two echo beats in all patients with or without isoproterenol infusion before the ablation.

4. Results

There were 61 females and 33 males at the end of follow ups (mean age: 46 \pm 13; range 8 to 77). Table 1 shows the characteristics of patients in the two groups. No anesthesia complication, except transient oxygen desaturation, was seen during the procedure. Electrophysiological characteristics are summarized in Table 2. After successful slow pathway ablation or modification, no more than one echo beat was induced in the patients with and without isoproterenol infusion up to three extra-stimuli from right atrium and coronary sinus. We could not induce arrhythmias from the right ventricle for patients in whom tacharrhythmias were inducible from the right ventricular apex before ablation. Post ablation electrophysiological characteristics are summarized in Table 3. All patients

stayed in the hospital for rhythm and hemodynamic monitoring for 24 to 48 hours. The patients mean clinical follow up was 6 months (Table 3). Fifty patients enrolled in each group to compare the effect of anesthesia on AVNRT induction and ablation but only 49 patients in the anesthetic group and 45 patients in the control group completed the entire follow up period. Only one clinical recurrence of tachyarrhythmias was suspected in each group (P value = 0.327). Before discharge, we asked patients about their satisfaction of the procedure. We asked them to give a score from very low to high (low, average, good and very good). In the anesthetic group patient satisfaction was significantly better than the other group (P value < 0.0001) (Table 4).

5. Discussion

This study demonstrated that intravenous anesthesia is a safe and effective procedure for patients undergoing slow pathway ablation. No significant sinus pause, sinus bradycardia or Atrioventricular (AV) block was seen during anesthesia. Lai et al. showed that intravenous propofol has no brady-arrhythmic effects (3). Table 2 and 3 demonstrate that, our anesthesia protocol has no effect on electrophysiological parameters. A few reports revealed that anesthetic agents have no significant clinical effects on sinoatrial node or Atrioventricular nodal (AVN) conductions (1, 3, 4). There are some reports concerning the non-inducibility of AVNRT after intravenous sedation (5), but these findings are restricted to pediatrics. We could induce at least two echo beats in all patients with documented supra ventricular tachyarrhythmia (SVT) compatible with AVNRT with or without anesthesia. Although anesthetic patients need more isoproterenol infusion for arrhythmia induction, but there was no significant difference between the two groups (Table 2). To the best of our knowledge, patient's satisfaction after electrophysiological procedures was not checked in the previous articles (1-5). We suppose that the most important key is appropriate prematurity for arrhythmia induction. We used up to three extra-stimuli with minimum prematurity conducted from AV node with or without isoproterenol infusion in all patients for arrhythmia induction. All patients in the anesthetic group revealed their satisfaction after the procedure. On the basis of the current study, in adults, AVNRT induction is not related to anesthetic agents and it could be performed safely for all patients who undergo electrophysiological procedures for slow pathway ablation. Intravenous anesthesia increases patient's satisfaction without increasing complication rate or inducing disturbance in electrophysiological parameters.

Table 1. Patients' Characteristics with and without Anesthesia

	With Anesthesia (n = 49)	Without Anesthesia (n = 42)	P value
Gender, female	29 (59.2)	30 (71.4) ^b	0.223
Age, y	47.24 ± 14.33	46.12 ± 12.37 ^c	0.692
Weight	75.16 ± 14.56	75.48 ± 14.74	0.919
LVEF ^a	54.49 ± 3.98	52.74 ± 8.42	0.198
Known case of CAD	2 (4.2)	1 (2.4)	> 0.99
Known case of HTN	7 (14.3)	6 (14.3)	> 0.99
Known case of DM	6 (12.2)	3 (7.1)	0.498

^a Abbreviations: CAD, coronary artery disease; DM, diabetes; HTN, hypertension; LVEF, left ventricular ejection fraction

^b The data are shown with No. (%)

^c The data are shown with Mean ± SD

Table 2. Pre-ablation Electrophysiological Characteristics of Patients with and without Anesthesia

	With Anesthesia (n = 49)	Without Anesthesia (n = 42)	P value
SCL ^a	763.23 ± 137.33 ^b	730.12 ± 135.39	0.259
PR interval ^d	135.19 ± 31.26	135.33 ± 24.26	0.981
QRS duration	97.77 ± 50.79	91.17 ± 26.65	0.453
QT interval	396.09 ± 51.46	385.14 ± 45.26	0.292
Sinus AH interval	81.28 ± 20.87	86.00 ± 25.46	0.359
Sinus HV interval	50.33 ± 7.06	51.36 ± 11.05	0.620
AVWP	331.38 ± 56.86	315.00 ± 33.60	0.132
VAWP	323.07 ± 63.77	333.98 ± 72.29	0.462
AERP-FP	333.64 ± 76.56	299.19 ± 80.80	0.159
AERP-AVN	254.48 ± 64.80	253.64 ± 59.29	0.953
Arrhythmia CL	340.14 ± 54.70	346.97 ± 55.23	0.592
Arrhythmia VA (HRA)	67.53 ± 38.84	53.200 ± 20.80	0.054
Pre-ablation Antegrade Jump	22 (53.7) ^c	17 (37.8)	0.139
Pre-ablation Retrograde Jump	2 (5.1)	2 (4.4)	0.883
Pre-ablation Isoproterenol Usage	9(22.5)	7 (15.2)	0.387

^a Abbreviations: AERP-FP, antegrade effective refractory period of fast pathway; AERP-AVN, antegrade effective refractory period of AV node; AVWP, atrio-ventricular wenckebach point; SCL, sinus cycle length; VAWP, ventriculo-atrial wenckebach point

^b The data are shown with Mean ± SD

^c The data are shown with No. (%)

^d All times are in millisecond

Table 3. Post-ablation Electrophysiological Characteristics of Patients with and without Anesthesia

	With Anesthesia ^a (n = 49)	without Anesthesia (n = 42)	P value
SCL	693.28 ± 211.65	648.17 ± 123.56	0.310
AH interval	105.25 ± 127.25	77.24 ± 18.95	0.245
HV interval	52.05 ± 12.98	51.31 ± 10.25	0.803
AVWP	396.28 ± 43.93	315.70 ± 43.90	0.265
AERP-FP	304.44 ± 45.85	290.00 ± 28.86	0.480
AERP-AVN	274.75 ± 57.92	268.96 ± 43.37	0.655
Slow pathway ablation, No. (%)	25 (25.2)	25 (61.0)	0.399
Procedure time	26.43 ± 22.50	32.15 ± 51.34	0.504
Duration of Follow Up	6.17 ± 3.31	6.39 ± 3.62	0.777

^a All the data are shown with Mean ± SD

Procedure time is in minutes, Duration of follow up is in months and other times are in millisecond. We analyzed

slow pathway ablation vs. modification after AVNRT termination.

Table 4. Patient Satisfaction after AVNRT Ablation

	Very Low (n = 7)	Low (n = 28)	Intermediate (n = 7)	High (n = 37)	P value
Patients without anesthesia, No. (%)	7 (17.1)	27 (65.9)	6 (14.6)	1 (2.4)	0.0001
With Anesthesia, No. (%)	0 (0.0)	1 (2.1)	1 (2.1)	36 (76.6)	0.0001

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Authors' Contribution

Amir Farjam Fazelifar: conducted the manuscript, case section, clinical study; Ali Eskandari: reviewed the literature and clinical study, Mohammad Jafar Hashemi: clinical study and case selection; Mostafa Alavi: management and clinical study; Mohammadzia Totouchi: management and clinical study of the out-patient; Azam Forghanian: data collection; Mahboubeh Zeighami: data collection, Zahra Emkanjoo: clinical study; Majid Haghjoo, clinical study. We thank all the staff of the EP lab for assisting with the data collection and also cardiac electrophysiology support for assisting with this project.

Financial Disclosure

There is not any conflict of interest.

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