

Assessment of Post Radio Frequent Ablation Success Rate in patients with supra ventricular tachycardia due to accessory pathway in Ibn- Al Bitar Cardiac Center

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Abstract

Background: Radio frequent ablation has been considered the first line therapy in the management of patients with supra ventricular tachycardia due to accessory pathway.

Aim of the Study: To assess the success rate following radio frequent ablation in patient with accessory pathway in Ibn Al-Bitar Cardiac Center.**Patients and Methods:** This cross-sectional study was conducted in EP-study unit in Ibn Albitar center for cardiac surgery from January 2017 to January 2020. The study included records of computerized data base of 209 patients suggested for accessory pathway referred to the unit with a request of EP study. Radio frequent ablation was performed using deflectable electrode catheters positioned at the mitral or tricuspid annulus. The site of the accessory pathway was localized by the electrophysiological study and radio frequent energy was applied via the tip of the catheter.**Results:** The results of this cross sectional study showed that the mean age of 209 patients with SVT and accessory pathway was 32.81 ± 13.18 years, and 113(54.1%) of patients had wpw syndrome, 87 (41.6) had concealed accessory pathway(AVRT), 7 (3.35%) had Mahaim accessory pathway and 2 (1%) patients had Persistent Junctional Reciprocating Tachycardia (PJRT). The study showed that patients with immediate success rate of all patient with accessory pathway involved in this study were 183 (88%), while patients with failure rate were 26 patients (12%).**Conclusions:** The outcomes of this study confirmed the efficacy and safety of radio frequent ablation and suggested that it is a reasonable first-line therapy for the management of SVT with accessory pathway at any location.

Key words: Supraventricular Tachycardia, Post Radio Frequent Ablation, Accessory pathway

Introduction

Few studies in the middle east and especially in Iraq conducted the success rate of radio frequent ablation in the treatment of supra ventricular tachycardia with accessory pathway. This study showed that the experience of electrophysiological units in the cardiac centers is beneficial and promising.

Supraventricular tachycardia (SVT) is a dysrhythmia originating at or above the atrioventricular (AV) node and is defined by a narrow complex (QRS < 120 milliseconds) at a rate > 100 beats at rest [1]. The mechanism of which involves tissue from the His bundle or above. Traditionally, SVT has been used to describe all kinds of tachycardias apart from ventricular tachycardias (VTs) and AF [2].

SVT is caused by 1 of 3 mechanisms: reentry, increased automaticity, or triggered activity. The reentry mechanism involves repetitive impulse propagation around 2 pathways or limbs, separated by a zone of non-excitability for reentry to occur [3].

Acute successful ablation of the AP was defined as abolition of conduction over the AP and non-recurrence of conduction during a follow-up period of 20–30 minutes. Identification of accessory pathway and selection of ablation site first, perform EPS (1) to determine that the AP is part of the tachycardia reentrant circuit and (2) to locate the optimal site for ablation. APs may be located in the left or right free wall or septum of the heart. In approximately 5-10% of patients, multiple pathways are present [4].

Accessory pathways are fibers that connect the atrium or AV node to the ventricle outside the normal AV nodal–His–Purkinje conduction system. These pathways can conduct impulses in the forward (anterograde from the atrium to the ventricle) or reverse (retrograde from the ventricle to the atrium) direction and are potential substrates for reentrant tachycardia's (AV reciprocating tachycardia [2]).

Most APs insert along the mitral or tricuspid valve and are referred to as atrioventricular APs. Approximately 60% of APs insert along the mitral valve and are referred to as left free wall pathways. About one-fourth insert along the septal aspect of the tricuspid or mitral valve and are classified as septal pathways. The remaining 15% are right free wall pathways. Occasionally, one may encounter APs that do not insert along the AV valves. Examples include atriofascicular, nodoventricular, nodofascicular and atrionodal pathways [5].

This study involved different accessory pathway locations and different procedural approaches and the success rate and failure rate was studied and compared according to the age of the patients and their gender and success rate and failure rate compared to position of accessory pathway as well as usage of procedural approach.

Patients and methods

This cross-sectional study was conducted in EP-study unit in Ibn Albitar center for cardiac surgery during the period from January 2017 to January 2020). It included computerized data base records of patients suggested for accessory pathway and referred to the unit with a request of an EP study. The data included age, gender, position of accessory pathway, and the approach for radio frequent ablation was used whether it was right, trans septal or trans aortic approach in addition to the study of success associated with radio frequent ablation procedure. The EP studies were done through trans femoral puncture for all patients. Three right 6 French femoral sheaths were applied. All antiarrhythmic drugs were stopped five half-lives before the procedure. One to three multipolar electrode catheters (deflectable 6 French for coronary sinus (CS) record and quadri-polar electrode for right ventricular (RV) record were introduced through the right femoral veins. For procedures requiring ablation, an ablation catheter was also used. All patients underwent prior diagnostic EPS. During EPS, records of intra cavitory electro gram were taken and supraventricular and ventricular stimulations were performed. Localization of accessory pathway was done according to EGM record in the ablation catheter with choosing site with shortest Atrio Ventricular (AV) interval and looking for accessory potential if available. Fluoroscopy was performed in all cases to position the catheters within the cardiac cavities. The radio frequent energy output, length of application and temperature were individually titrated by an electro physiologist responsible for the procedure.

Regarding ablation, it was non irrigated and temperature was controlled. IV Un Fractionated Heparin 10000 I.U. was given during the procedure. This precaution aimed at preventing a thrombogenic state that may be triggered during catheter ablation. Follow up was conducted by the electrophysiology and outpatient clinic Unit. Acute successful ablation of the accessory pathway was defined as abolition of conduction over the accessory pathway and non-recurrence of conduction during a follow-up period of 20–30 minutes i.e. restore sinus rhythm. The data of EP study were taken from the records which included approach, accessories and position and the final outcome was divided into success or failure.

The research proposal was fully discussed and approved by the ethical and scientific committee in the Iraqi Board for Cardio Vascular Diseases. The agreement of health authority in Ibn Al-Bitar Cardiac Center was taken before starting data collection. The collected Data were treated confidentially and anonymously and were not used for any purpose other than research. The patients whom the records belong to were informed during time of admission that Ibn Albitar is a teaching Center and information of patients may be used in researches.

Statistical analysis

The SPSS V 26 statistical program was used to analyze the collected data Descriptive statistics were presented using tables (Mean +/- Standard Deviation, Frequency and Percentage) and graphs. Chi Square test was used to find out significance of statistical associations between related categorical variables. P value less than 0.05 was considered as a discrimination point for significance.

Results

The results showed that of the total 129 patients in the study, 113(54.1%) patients had wpw syndrome, 87(41.6%) had concealed accessory pathway (CAP), 7(3.35%) had Mahaim accessory pathway and 2(1%) had Persistent Junctional Reciprocating Tachycardia (PJRT).

According to approach for accessory pathway ablation used, the study showed that the trans septal approach was 92(44%) patients, the right side was 80(38.3%) patients, while trans aortic was 37(17.7%) patients. According to position of accessory pathway the study showed that 60 (28.7%) patients had left lateral accessory pathway, 51(24.4%) had infero septal accessory pathway, 41(19.6%) had left anterolateral accessory pathway, 23(11%) had right free wall accessory pathway, 18(8.6%) had left inferolateral accessory pathway and 16(7.7%) had anteroseptal accessory pathway as shown in table (1).

Table (1): Distribution of studied cases according to the type and position of accessory pathway and procedural approach

		No.	%
Accessory	CAP	87	41.6
	WPW	113	54.1
	Mahaim accessory	7	3.35
	PJRT	2	1
Approach	Right	80	38.3

	Aortic	37	17.7
	Septal	92	44
Position	Left inferolateral	18	8.6
	Left lateral	60	28.7
	Left anterolateral	41	19.6
	Anteroseptal	16	7.7
	Right free wall	23	11
	Inferoseptal	51	24.4

The study showed that immediate success rate of all patients with accessory pathway involved in this study occurred in 183(88%) patients while the failure rate occurred in 26 (12%) patients as illustrated in figure (1).

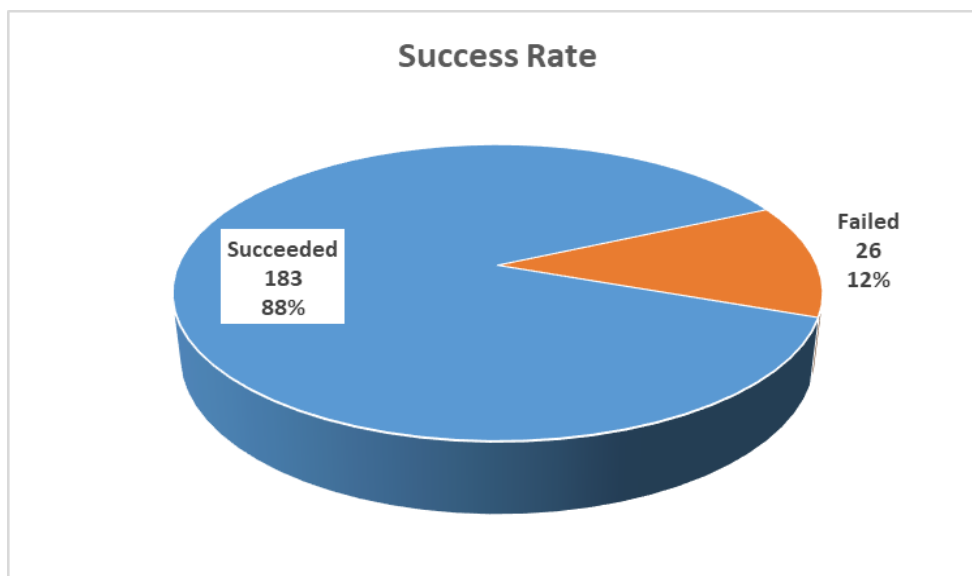


Figure (1): Distribution of patients according to success rate

The study showed that number of male patients with accessory pathway was 103 and the success rate in this group was 82.4% , the number of female patients was 80 patients and the success rate was 95.2% with a significant difference ($p=0.006$). The study showed that the acute success rate in patients with concealed AP was 90.8%, the wpw AP was 84.1%, the mahaim AP was 100% and the PJRT was 100% with a non-significant difference ($P= 0.336$). The study also demonstrated that the number of patients who underwent right approach for accessory pathway

ablation was 80 patients, of them 69 (86.3%) had successful AP ablation and 11(13.8%) had failed ablation. The number of patients who underwent trans aortic accessory pathway ablation was 37, of them 25 (67.6%) had success rate, while 12 (32.4%) of them had failure rate. The number of patients who underwent trans septal AP radio frequent ablation was 92, of them 89 (96.7%) had successful RF ablation and 3(3.3 %) had failed RF ablation with a highly significant difference ($P=0.001$). According to position of AP, the study revealed that 18 patients had left inferolateral AP, of them 14(77.8%) patients had successful RF ablation and 4(22.2%) had failed RF ablation. The number of patients with left lateral AP was 60, of them 54(90%) had successful ablation and 6(10%) had failed ablation. The number of patients with left anterolateral AP was 41, of them 36(87.8%) had successful RF ablation and 5(12.2%) had failed ablation. The number of patients with anteroseptal AP was 16, of them 14(87.5%) had successful RF ablation and 2(12.5%) had failed ablation. The number of patients with right free wall AP was 23, of them 20(87%) had successful RF ablation and 3(13%) had failed RF ablation. The number of patients with inferoseptal AP was 51, of them 45(88.2%) had successful RF ablation and 6(11.8%) had failed RF ablation, with non-significant differences ($p=0.857$) as shown in table (2).

Table (2): Association between success and studied variables

		Success				P value
		Succeeded		Failed		
		NO.	%	NO.	%	
Age	<20 year	37	84.1%	7	15.9%	0.436
	21-40 year	95	90.5%	10	9.5%	
	>40 year	51	85.0%	9	15.0%	
Gender	Male	103	82.4%	22	17.6%	0.006
	Female	80	95.2%	4	4.8%	
Accessory	CAP	79	90.8%	8	9.2%	0.336
	WPW	95	84.1%	18	15.9%	
	Mahaim accessory	7	100.0%	0	0.0%	
	PJRT	2	100.0%	0	0.0%	
Approach	Right	69	86.3%	11	13.8%	0.001
	Aortic	25	67.6%	12	32.4%	
	Septal	89	96.7%	3	3.3%	
Position	Left inferolateral	14	77.8%	4	22.2%	0.857

Left lateral	54	90.0%	6	10.0%
Left anterolateral	36	87.8%	5	12.2%
Anteroseptal	14	87.5%	2	12.5%
Right free wall	20	87.0%	3	13.0%
Inferoseptal	45	88.2%	6	11.8%

Discussion

This study was conducted to emphasize the success rate of radio frequent ablation in patients with SVT due to accessory pathway, although there was limited data particularly in the Middle East and especially in Iraq.

Our result agreed with a study in Egypt by (Mm.Hafez *et al*; 2012) who showed that the success rate of the RF catheter ablation was 93.3% for patients with SVT and accessory pathway [6].

The current study demonstrated that according to approach for accessory pathway ablation the success rate of RF ablation of patients with SVT due to accessory pathway using trans aortic approach was compared to a study done by (Demosthenes Katritsis *et al*; 2003) who conducted a prospective study on randomized comparison of transaortic and trans septal approaches during a single-catheter technique for the ablation of left-sided accessory pathways in patients with Wolff-Parkinson-White syndrome. They found that he success rate in trans aortic approach was 87% and in trans septal approach was 90 % [7]. This lower success rate for trans aortic approach may be due to poor equipment supply and especially it was associated with the initial experience of EP study program in Ibn Al Bitar Cardiac Center.

The findings in the current study agreed with a study performed in Italy by (Matteo Anselmino *et al*; 2018) in which (1017 patients were trans septal and 1013 patients were retrograde) selected from 28 observational studies, as the patients approached by trans septal puncture for accessory pathway ablation had success rate of (98%) with ($p=0.40$), while trans aortic approach was (94%) with ($p=0.040$) [8].

Regarding distribution of position of accessory pathway, our results were compatible with those done in VietNam by (Chu ,*et al.*, 2018) who showed that 78(29.2%) patients had left lateral accessory pathway, 69(30.8%) had inferoseptal accessory pathway,54(20%) had left anterolateral accessory pathway, 44(10%) had right free wall accessory pathway, 20(4.3%) had left inferolateral accessory pathway and 10(5.7%) had anteroseptal accessory pathway [9].

Also our results were compatible with another study in Iran by (Behjati *et al.*, 2020) who showed that among 178 patients with WPW syndrome, the most frequent location of the accessory pathway was left lateral (39.3%) [10].

The current study showed that the number of patients with immediate success rate with accessory pathway involved in this study was 183(88%) patients, while the number of patients with failure rate was 26(12%). This result agreed with a study done in Iran by (Behjati ardakani ,Faezeh Dehghani *et al.* Among the 178 patients with WPW syndrome, the most frequent location of accessory pathway was left lateral (39.3%), which had high ablation success rate (97%) and low recurrence rate (1%). Ablation success rate was 89.7% and was statistically related to accessory pathway location [10]. It also agreed with (Bernard Belhassen *et al*) who revealed in their cohort study comprised of 508 consecutive patients who underwent radio frequent ablation procedures for ablating accessory pathways [11].

The APs were manifest, concealed or intermittent in 46.8%, 44.4% and 8.8% of cases, respectively. AP distribution was as follows: left free wall (56.6%), posteroseptal (23%), right anteroseptal (7.9%), right free wall (6.2%), midseptal (3.4%) and right atriofascicular (3.0%). The acute successful rate for a first ablation was 93.1%, and acute success and failure rates were the highest for midseptal (100%) and right atriofascicular (12.5%) APs respectively.

The rate of complications associated with radio frequent ablation procedures was (2.39%) with a total number of 5 cases that included 2 cases of wpw syndrome, one of them developed transient heart block and the other developed pericardial effusion that needs aspiration and 3 patients of concealed accessory pathway developed complications, two of them developed pericardial effusion that needs aspiration and one of them developed deep venous thrombosis that was treated according to guidelines.

The main cause of decreasing the acute success rate in this study is those procedures that were done through trans aortic approach and it is mainly attributed to poor equipment supply and initial experience program.

All these studies in spite of their different aims and methodology agreed that radio frequent ablation is effective first line therapy for patients with SVT and different accessory pathway locations.

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