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Predictors and Prognostic Value of Arrhythmia Post Fallot Repair

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Abstract

Background: Tetralogy of Fallot is a congenital cardiac malformation that occurs in 3 of every 10,000 live births, and accounts for 7-10% of all congenital cardiac malformations. Arrhythmia contributes to both morbidity and mortality in patients with repaired TOF. Atrial tachyarrhythmias are prevalent and are associated with increased morbidity. Preventing sudden death remains one of the largest challenges in the care of patients with CHD. Although there has been progress in noninvasive and invasive risk stratification, there remains no widely accepted algorithm to identify patients who are at greatest risk of arrhythmia and warrant more aggressive treatment.

Aim of Study : To characterize patients with risk of arrhythmia (SVT or Junctional), identify its predictors and prognosis in selected TOF patients undergoing total repair at Ain Shams University, Cardiothoracic Department.

Patients and Methods: It is a prospective observational study on 65 pediatric patients who underwent total correction of TOF, conducted at Ain Shams University Hospitals, Cardiothoracic Department. Preoperative, intra operative, and post operative variables were assessed including patients' age at the time of surgery, gender, weight (Kg), preoperative ECHO, MSCT, the use of inotropic supports, 12-lead ECG, data of postoperative ECHO including (residual VSD, RV function (RVSP & TAPSE), associated valve disorders, pulmonary annulus size, RVOT gradient, pulmonary arteries sizes).

Results: Results of the current study indicated no direct relationships between the occurrence of JET and gender, weight, level of preoperative oxygen saturation, percentage of cyanotic spells, ECHO hemodynamic parameters (VSD size, RVOT gradient, associated valve disorders, pulmonary arteries sizes and McGoon index), CPB, CCT, cardioplegia type, approach, use of TAP, VSD closure technique, use of RVOT patch, previous shunt, intra-op temperature, and the type of inotropic support used. Nonetheless, there were a significant relationship between younger age of operation and lower pulmonary annulus size with the occurrence of JET.

Conclusion: Cardiac arrhythmias are a frequent problem in the early post operative course after cardiac surgery. Junctional ectopic tachycardia is a frequent complication after Tetralogy of Fallot repair. It has a benign course; however, it possesses a negative impact on ICU and hospital stay. In this study, we identified factors associated with the occurrence of arrhythmias in the postoperative period.

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Introduction

TETRALOGY of Fallot is a congenital cardiac malformation that consists of an interventricular communication, also known as a ventricular septal defect, obstruction of the right ventricular outflow tract, overriding of the ventricular septum by the aortic root, and right ventricular hypertrophy. This combination of lesions occurs in 3 of every 10,000 live births, and accounts for 7-10% of all congenital cardiac malformations **[1]**.

The development of tetralogy of Fallot is multifactorial; it has been associated with untreated maternal diabetes, maternal intake of retinoic acid, phenylketonuria, chromosomal anomalies (trisomies 21, 18, 13), microdeletions of chromosome 22q11.2, and Alagille syndrome with JAG1/NOTCH2 mutations **[2]**.

Clinical presentation varies based on the severity of the right ventricular outflow tract obstruction, more commonly presenting as neonates with a certain degree of cyanosis. In some patients, cyanosis presents months later in life, when the rate of obstructions worsens **[2]**.

Since the first surgical correction was performed in 1954, several epidemiologic studies evidenced the good prognosis of the patients operated on for total correction of tetralogy of Fallot (TOF), with a perioperative death less than 1%, and a survival rate 30 years after the surgery very close to 90% **[3]**.

After pediatric cardiac surgery, postoperative arrhythmia is potentially life-threatening, especially in the initial postoperative period due to the risk of hemodynamic impairment [4]. When the intervention is close to the atrioventricular node and bundle of Hiss, as in tetralogy of Fallot (TOF), the risk of arrhythmia is higher. Due to mechanical trauma or indirect stretch injury of the conduction system. Electrical instability results mainly from anatomical modifications following surgery or from mechanical events such as ventricular dilation and stretching. In particular, abnormal fibrous tissue was found at different sites in the right and left ventricles, as well as fibrous fatty substitution can be present around the surgical scar, and could represent an anatomical substrate for reentrant arrhythmias, as well evidenced by endocardial mapping [3].

Arrhythmia contributes to both morbidity and mortality in patients with repaired TOF. Atrial tachyarrhythmias are prevalent and are associated with increased morbidity. Preventing sudden death remains one of the largest challenges in the care of patients with CHD. Although there has been progress in noninvasive and invasive risk stratification, there remains no widely accepted algorithm to identify patients who are at greatest risk of arrhythmia and warrant more aggressive treatment [5].

Aim of the work:

Arrhythmia prevention is not feasible for all pediatric cardiac surgery patients. Thus, high-risk patients must be identified. Many predicted criteria have been offered; however, they lack accuracy. The aim of this work is to characterize patients with risk of arrhythmia (SVT or Junctional), identify its predictors and prognosis in selected TOF patients undergoing total repair at Ain Shams University, Cardiothoracic Department.

Patients and Methods

Study setting: Ain Shams University Hospitals, Cardiothoracic Department.

Study population: TOF patients undergoing total repair.

Methods:

It is a prospective observational study on 65 pediatric patients in 2022/2023 who underwent total correction of TOF at cardiothoracic department, Ain Shams university. The study was approved from the ethical committee of the department of Cardiothoracic Surgery, Faculty of Medicine, Ain Shams University. Strict confidentiality of patients' information was applied without any disclosure of identity as the data is presented by the patient's diagnosis,age and gender rather than the patient's name.

Study procedure:

This study was carried out on sixty-five pediatric patients with their age ranging from 0.4-19 years and weight from 5-45Kg. Patients who underwent elective corrective surgery for TOF were included. Those with co-existing congenital heart diseases, any genetic anomalies, patients suffering from preoperative arrhythmia, other TOF variants were excluded.

Preoperative variables were assessed on admission including patients' age at the time of surgery, gender, weight (Kg), preoperative ECHO, and MSCT. Preoperative heart rate and oxygen saturation were collected after sedating the patients.

Intraoperative variables included cardiopulmonary bypass (CPB) time (minutes), aortic cross clamp time (minutes), intra-operative temperature, cardioplegia type, VSD closure technique, and the approach used.

Collected post operative data included oxygen saturation (Post), the use of inotropic supports, 12-lead ECG, data of postoperative ECHO including (residual VSD, RV function (RVSP & TAPSE), associated valve disorders, pulmonary annulus size, RVOT gradient, pulmonary arteries sizes) and the outcome.

Statistical analysis:

Recorded data were analyzed using the statistical package for social sciences, version 23.0 (Released 2015. IBM SPSS Statistics for Windows, Armonk, New York: IBM Corporation). Quantitative data were expressed as mean ± standard deviation (SD). Qualitative data were expressed as frequency and percentage. The p-value was considered significant as the following: p-value >0.05 was considered non-significant (NS), p-value <0.05 was considered significant (S), p-value <0.01 was considered as highly significant (HS).

Results

This study was carried out on sixty-five pediatric patients with their age ranging from 0.4-19 years and weight from 5-45Kg.

The table shows that there was a statistically significant decrease in themedianof age of patients with arrhythmia 0.87 years than those without arrhythmia 2 years with *p*-value=0.016 while no statistically significant relation found between arrhythmia and gender distribution or weight of the studied patients with *p*-value=0.326 and 0.095; respectively.

The results shows that there was no statistically significant relation found between arrhythmia and level of preoperative oxygen saturation and percentage of cyanotic spells with *p*-value=0.659 and 0.344; respectively.

The previous table shows that there was no statistically significant relation found between arrhythmia and preoperative VSD size, RVOT gradient, associated valve disorders, pulmonary arteries sizes, and McGoon index except for statistically significant decrease in mean pulmonary annulus size in patients with arrhythmia (6.44±1.50) compared to those without arrhythmia (8.20±3.15) with *p*-value=0.027.

The data shows that there was no statistically significant relation found between arrhythmia and CPB, CCT, cardioplegia type, approach, use of TAP, VSD closure, use of RVOT patch, previous shunt, or intra-op temperature. This following table shows that there was no statistically significant relation found between arrhythmia and postoperative VSD status & mean RVOT gradient among the studied patients with *p*-value=0.374 and 0.437; respectively.

Furthermore, there was no statistically significant relation found between arrhythmia and postoperative oxygen saturation with *p*-value=0.391.

Table (1): Demographic data and weight of the studied patients.

Demographics	No.=65
Age (years):	
Median (IQR)	1.17 (0.75-3)
Range	0.42-19
Gender, No. (%):	
Female	28 (43.1%)
Male	37 (56.9%)
Weight (Kg):	
Median (IQR)	9 (7-11)
Range	5-45

Table (2): Postoperative oxygen saturation level among the studied patients.

Post operative oxygen saturation	No.=65
Mean ± SD	93.20±3.97
Range	85-99

Table (3): Relation of arrhythmia with demographic data and weight of the studied patients.

	Arrhythmia		Test value	*p*-value	Sig.
	No	Yes			
	No.=47	No.=18			
Age (Years):					
Median (IQR)	2 (0.83-3.5)	0.87 (0.75-1.17)	–2.411‡	0.016	S
Range	0.42-19	0.67-3			
Gender:					
Female	22 (46.8%)	6 (33.3%)	0.964*	0.326	NS
Male	25 (53.2%)	12 (66.7%)			
Weight (Kg):					
Median (IQR)	10 (7-11.4)	8.25 (7-9)	–1.668‡	0.095	NS
Range	5-45	5-13			

p-value >0.05: Non significant (NS).
p-value <0.05: Significant (S).
p-value <0.01: Highly significant (HS).
*: Chi-square test.
‡: Mann Whitney test.

Table (4): Relation of arrhythmia with the level of preoperative oxygen saturation and percentage of cyanotic spells.

	Arrhythmia		Test value	*p*-value	Sig.
	No	Yes			
	No.=47	No.=18			
Pre Oxygen saturation (%):					
Mean ± SD	80.91±9.71	79.67±11.33	0.443•	0.659	NS
Range	65-98	60-97			
Cyanotic spells:					
No	28 (59.6%)	13 (72.2%)	0.894*	0.344	NS
Yes	19 (40.4%)	5 (27.8%)			

p-value >0.05: Non significant (NS). *: Chi-square test.
p-value <0.05: Significant (S). •: Independent *t*-test.
p-value <0.01: Highly significant (HS).

Table (5): Relation of arrhythmia with preoperative echo parameters.

ECHO data	Arrhythmia		Test value	*p*-value	Sig.
	No	Yes			
	No.=47	No.=18			
VSD size (mm):					
Median (IQR)	13 (11-15)	10.5 (10-20)	–1.122‡	0.262	NS
Range	8-71	7-20			
RVOT gradient (mmHg):					
Mean ± SD	88.87±14.79	83.78±14.91	1.240•	0.220	NS
Range	65-124	69-124			
Pulmonary annulus size (mm):					
Mean ± SD	8.20±3.15	6.44±1.50	2.263•	0.027	S
Range	4-17	4-9			
Valve disorders:					
MR	2 (4.3%)	0 (0.0%)	3.845*	0.698	NS
TR	2 (4.3%)	0 (0.0%)			
Moderate TR, MR	2 (4.3%)	0 (0.0%)			
ASD	1 (2.1%)	1 (5.6%)			
TR + AR	1 (2.1%)	0 (0.0%)			
Trace of AR	1 (2.1%)	0 (0.0%)			
Pulmonary arteries abnormalities:					
Origin stenosis of LPA & RPA	6 (12.8%)	6 (33.3%)	6.868*	0.076	NS
Origin stenosis of LPA or RPA	6 (12.8%)	1 (5.6%)			
Attenuated MPA	1 (2.1%)	2 (11.1%)			
Mc Goon index:					
Mean ± SD	1.83±0.28	1.85±0.20	–0.218•	0.828	NS
Range	1-2.3	1.5-2.4			

p-value >0.05: Non significant (NS). *: Chi-square test.
p-value <0.05: Significant (S). •: Independent *t*-test.
p-value <0.01: Highly significant (HS). ‡: Mann Whitney test.

Table (6): Relation of arrhythmia with intra-operative parameters.

Intra operative parameters	Arrhythmia		Test value	*p*-value	Sig.
	No	Yes			
	No.=47	No.=18			
CPB (mm):					
Mean ± SD	121.62±39.77	136.56±40.79	–1.346•	0.183	NS
Range	65-218	55-197			
CCT (mm):					
Mean ± SD	77.45±30.06	86.17±20.49	–1.131•	0.262	NS
Range	22-130	29-106			
Cardioplegia type:					
Custodiol	3 (6.4%)	1 (5.6%)	0.015*	0.901	NS
Cold	44 (93.6%)	17 (94.4%)			
Approach:					
Transatrial	15 (31.9%)	7 (38.9%)	0.626*	0.890	NS
Transatrial + Transpulmonary	31 (65.9%)	11 (61.1%)			
Transventricular	1 (2.1%)	0 (0.0%)			
VSD closure:					
Gortex	34 (72.3%)	9 (50.0%)	5.804*	0.122	NS
Bovine	11 (23.4%)	9 (50.0%)			
Pericardium	2 (4.3%)	0 (0.0%)			
Intra-op Temperature (°C):					
Mean ± SD	28.15±2.13	27.78±2.62	0.589•	0.558	NS
Range	24-34	25-34			

p-value >0.05: Non significant (NS). *: Chi-square test.
p-value <0.05: Significant (S). •: Independent *t*-test.
p-value <0.01: Highly significant (HS).

Table (7): Relation of arrhythmia post-operative echo parameters.

ECHO parameters	Arrhythmia		Test value	*p*-value	Sig.
	No	Yes			
	No.=47	No.=18			
VSD:					
Residual flow	2 (4.3%)	0 (0.0%)	0.790*	0.374	NS
Well Seated	45 (95.7%)	18 (100.0%)			
RVOT gradient (mmHg):					
Mean ± SD	27.74±8.73	29.89±12.46	–0.783•	0.437	NS
Range	16-45	18-55			

p-value >0.05: Non significant (NS). *: Chi-square test.
p-value <0.05: Significant (S). •: Independent *t*-test.
p-value <0.01: Highly significant (HS).

Table (8): Relation arrhythmia of with postoperative oxygen saturation.

Post Oxygen Saturation	Arrhythmia		Test value	*p*-value	Sig.
	No	Yes			
	No.=47	No.=18			
Mean ± SD	92.94±4.22	93.89±3.23	–0.864•	0.391	NS
Range	85-99	88-98			

p-value >0.05: Non significant (NS). *: Chi-square test.
p-value <0.05: Significant (S). •: Independent *t*-test.
p-value <0.01: Highly significant (HS).

Discussion

Arrhythmias following pediatric cardiac surgery are a significant source of mortality and morbidity [9]. Despite advances in surgical procedures, perfusion technology, and perioperative management over the last decade or two, arrhythmias continue to be a serious consequence early following congenital cardiac surgery repairs. Thus, the prophylaxis of arrhythmia after pediatric cardiac surgery became the focus of many trials recently. According to several authors, the incidence of postoperative arrhythmias in children can reach up to 48%. The great variability in arrhythmia incidence could be attributed to the diagnostic criteria used and the wide variability in patients' characteristics [10].

After TOF repair, atrial arrhythmias such as atrial fibrillation, flutter, and focal or reentrant atrial tachycardia are relatively common, occurring at a rate of about 30%. Although there are no immediate effects, supraventricular tachyarrhythmias are a major cause of morbidity inpatients who have had TOF surgically repaired. These arrhythmias are linked to an increased risk of heart failure, reoperation, ventricular tachycardia, stroke, and death. The atriotomy scar also creates an anatomical barrier that, when combined with haemodynamic abnormalities, results in atrial arrhythmias, primarily classic atrial flutter or re-entrant tachycardia in the vicinity of the atriotomy scar. Dietl et al., compared the incidence of atrial and ventricular arrhythmias in patients who underwent transatrial or transventricular repair. Transatrial repair had a highly significant effect in reducing both atrial and ventricular arrhythmias [6]. Gatzoulis et al., found that 29 (3.5%) patients (mean age 8.2 years, mean postoperative follow-up 21.1 years) developed atrial flutter or fibrillation in their multicenter analysis of 793 patients. An increased right atrial pressure, hypertrophy, chronic right ventricular systolic pressure overload and elevated end-diastolic pressures were associated with a higher risk of sudden mortality and atrial arrhythmia [7].

Junctional ectopic tachycardia (JET) is a common arrhythmia following surgical repair of congenital heart defects and poses a severe threat in the initial postoperative period due to the possible subsequent hemodynamic impairment. Although the specific cause is uncertain, it is suspected that postoperative JET is caused by either a direct mechanical trauma or an indirect stretch injury to the conduction system, which causes the bundle of His to become automatic [8].

Discussion since early post-operative arrhythmias are associated with a higher rate of mortalities and morbidities, some researchers prefer to investigate arrhythmia and its risk factors early after total correction of TOF. In the present study, the prevalence of post operative arrhythmia was found to be 27%, which is consistent with the results of many recent studies. Nearly 40% of the patients showed one kind of permanent electrocardiographic abnormality in the form of RBB early after TOF total correction. We observed that JET was the most common arrhythmia detected post-operatively. In the current study, 17 patients (26%) developed JET.

Various risk factors for arrhythmia described in the literature include younger age at surgery, low body weight, prolonged CPB time, longer aortic cross clamp time, cyanosis, deep hypothermic circulatory arrest, and use of Milrinone. Results of the current study indicated no direct relationships between the occurrence of JET and gender, weight, level of preoperative oxygen saturation, percentage of cyanotic spells, ECHO hemodynamic parameters (VSD size, RVOT gradient, associated valve disorders, pulmonary arteries sizes and McGoon index), CPB, CCT, cardioplegia type, approach, use of TAP, VSD closure technique, use of RVOT patch, previous shunt, intra-op temperature, and the type of inotropic support used. Nonetheless, there were a significant relationship between younger age of operation and lower pulmonary annulus size with the occurrence of JET [11].

The younger age can be explained by the fact that complex surgical interventions if more frequent at an early age, cause the biggest impact in favor of arrhythmia as the sensitivity to electrolyte and acid base disorder is higher early in life. Furthermore, younger patients are generally sicker and smaller hearts are more prone to damage by surgical technique and retraction. The disruption to the proximal right bundle branch as in courses around the rim of VSD, either by VSD repair, or by delay or block in the peripheral right ventricular Purkinje fibers, is the etiology of RBBB following TOF repair.

Ismail et al. [12] isa retrospective cohort study performed on 322 patients at King Faisal Specialized Hospital and Research Centre in Jeddah, Saudi Arabia to characterize patients with JET, identify its predictors, and the outcomes in selected TOF patients. In their series the incidence of JET was 29.8%. In the study; younger age was significantly associated with increased risk of postoperative JET, which is consistent with results of our study. Preoperative B-blockers were associated with significant reduction of postoperative JET. JET had

a benign course and didn't increase hospital mortality.

In Kumar Sahu et al. **[13]** data were reviewed pertaining to incidence, diagnosis, potential risk factors, and management of postoperative arrhythmias in 369 consecutive patients under 18 years of age, undergoing elective open heart surgery. It revealed JET to be the commonest arrhythmia detected in this study population. The study attributed the type of surgery to be the most significant risk factor. Especially were VSD closure was done either in isolation or in combination with complete repair of other defects. Furthermore, the prevalence of arrhythmia was found to be low 6.7%. However, it included only those resulting in hemodynamic disturbance.

Edraki et al. **[14]** a retrospective study conducted on 118 pediatric patients with TOF who had consecutively underwent surgical totalcorrection. In this study, nearly 70% of the patients showed one kind of permanent electrocardiographic abnormality early after TOF total correction, mostly RBBB. 17% of patients developed JET. The results were different from our study indicating no direct relationship between the occurrence of JET and age. Furthermore, it revealed that there was a significant relationship between milrinone and the occurrence of JET.

In Zahidul Hoque et al. **[15]** a prospective study on a total of 100 pediatric patients who underwent cardiac surgery revealed that the overall incidence of arrhythmia to be 31 %. Junctional ectopic tahycardia (JET) and supraventricular tachycardia (SVT) were the most common especially in tetralogy of Fallot. Moreover, it showed that younger age, low body weight, cyanosis, CPB time all create statistically significant impact in producing early post operative arrhythmia.

In Paluszek et al. **[16]** retrospective study was done on 105 patients who underwent TOF repair. These patients were monitored to identify risk factors for the occurrence of JET and to evaluate the outcome. In this study group, JET was the most common tachyarrhythmia encountered in the early postoperative period with an incidence of 13.3%. Younger age at operation as well as longer ACC and CPB times were identified as relevant risk factors for JET. There were no permanent complete AV blocks with the need for pacemaker implantation in JET patients. Thus, JET does not cause increased susceptibility to subsequent arrhythmias or conduction disorders.

Conclusion:

Cardiac arrhythmias are a frequent problem in the early post operative course after cardiac surgery. Junctional ectopic tachycardia is a frequent complication after Tetralogy of Fallot repair. It has a benign course; however, it possesses a negative impact on ICU and hospital stay. In this study, we identified factors associated with the occurrence of arrhythmias in the postoperative period. The current study findings revealed younger age of operation and smaller pulmonary annulus diameter as the main risk factors after TOF surgical total for the development of JET. Proper and careful monitoring of these type of patients may reduce the episodes of post operative arrhythmia. Thus, medical prevention and early diagnosis as well as proper management may improve the operative outcome.

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التوقعات والنتائج من عدم انتظار ضربات القلب بعد اصلاح رباعى فالوت

تصيب أمراض القلب الخلقية ٠.٩٪ من المواليد الأحياء. ومع ذلك، بسبب التطورات الحديثة فى طب الأطفال، طب القلب والجراحة والإنعاش، سيعيش ٩٠٪ من المصابين حتى سن الرشد. بسبب نسبياً نسبة حدوث عالية (٧–١٠٪ من جميع أمراض القلب الخلقية) ولأنه من الممكن إجراء جراحة تصحيحية، رباعية فالوت (TOF) لها دور راجح بين أمراض الشرايين التاجية.

بعد جراحة قلب الأطفال، من المحتمل أن يكون عدم انتظام ضربات القلب بعد الجراحة مهدداً للحياة، خاصة فى فترة ما بعد الجراحة الأولية بسبب خطر ضعف الدورة الدموية.

عندما يكون التدخل قريباً من العقدة الأذينية البطينية وحزمة هيس، كما فى رباعية فالو (TOF) والإصلاح الكلى للقناة الأذينية البطينية (AVC)، يكون خطر عدم انتظام ضربات القلب أعلى. بسبب الميكانيكية رضح أو إصابة تمدد غير مباشرة فى نظام التوصيل.

يتم إبراز الحجم المحتمل لهذه المشكلة الحرجة بشكل أكبر من خلال الارتباطات بين عدم انتظام ضربات القلب فى الأفراد المصابون برباعية فالو وانفخاض جودة الحياة والمراضة والوفيات المرتبطة بالصحة.

الوقاية من عدم انتظام ضربات القلب غير مجدية لجميع مرضى جراحة القلب للأطفال. وبالتالى، فإن المرضى المعرضين لمخاطر عالية يجب تحديدها . تم تقديم العديد من المعايير المتوقعة، ومع ذلك، فإنها تفتقر إلى الدقة.

الدراسة الأهداف هى تحديد الأفراد المعرضين لخطر عدم انتظام ضربات القلب، بالإضافة إلى المتنبئين والنتائج المحتملة.

أهداف الدراسة هى لتوصيف المرضى المعرضين لخطر عدم انتظام ضربات القلب، حدد تنبئها والتشخيص فى مرضى TOF المختارين يخضع لإصلاح شامل.

نوع الدراسة : دراسة قائمة على الملاحظة.

- نوع العينة : عينة هادفة.
- مكان الدراسة : مستشفيات جامعة عين شمس، قسم جراحة القلب والصدر.
- فترة الدراسة : من تاريخ موافقة لجنة الأخلاقيات بكلية الطب جامعة عين شمس.
- الجامعة (الوقت المتو قع لاستكمال البيانات ٦ أشهر).

معايير الاستبعاد :

المرضى المصابون بأمراض القلب الخلقية المصاحبة.

- أى تشوهات وراثية.
- أى مريض خضع لعملية قلب مفتوح سابقة
- المرضى الذين يعانون من عدم انتظام ضربات القلب قبل الجراحة
- متغيرات رباعى فالوت بما فى ذلك رباعى فالوت مع رتق الرئة، رباعى فالوت مع غيات الصمام الرئوى، رباعى فالوت مع غياب فرع الشريان الرئوى.

حجم العينة :

٦٥ (مستوى الثقة : ٩٥٪).

- الاعتبارات الأخلاقية ستبدأ الدراسة من يوم موافقة لجنة الأخلاقيات.

-إجراءات الدراسة : سيتم جمع البيانات بما فى ذلك :

التركيبة السكانية (العمر والجنس والوزن)، ومدة CPB و CCT واستخدام دعم التقلص العضلى، مخطط كهربية القلب، التشبع بالأكسجين (قبل وبعد)، تصوير القلب بالرنين المغناطيسى، التحويلة السابقة، تقنية إغلاق VSD، الأولية الإصلاح، التصحيح عبر العين، النهج (عبر الأذينى مقابل عبر البطينى)، درجة الحرارة داخل البطين، صدمة DC أثناء الالتفافية، نوع شلل القلب، حالة إغلاق الصدر، وظيفة VSD المتبقية، وظيفة (TAPSE & RV ,RVSP)، اضطرابات الصمامات، قطر RA و LA، الحجم الانبساطى لطرف RV، الأبعاد الداخلية للضغط المنخفض. LVEF، الحلقة الرئوية، التدرج RVOT، حجم الشريان الرئوى، نتائج عمليات القلب الكهربائى (ECV) أو الموت.

النتيجة : يعد عدم انتظام ضربات القلب مشكلة متكررة فى الدورة التدريبية المبكرة التى تلى الجراحة بعد جراحة القلب. يعد تسرع القلب الوصلى خارج الرحم من المضاعفات المتكررة بعد إصلاح رباعية فالو. لديها دورة حميدة. ومع ذلك، فإن لها تأثيراً سلبياً على وحدة العناية المركزة والإقامة فى المستشفى. فى هذه الدراسة، حددنا العوامل المرتبطة بحدوث عدم انتظام ضربات القلب فى فترة ما بعد الجراحة.

كشفت نتائج الدراسة الحالية عن سن أصغر للعملية وقطر الحلقة الرئوية الأصغر كعوامل الخطر الرئيسية بعد إجمالى TOF الجراحى لتطوير JET. قد تقلل المراقبة المناسبة والدقيقة لهذا النوع من المرضى من نوبات عدم انتظام ضربات القلب بعد الجراحة. وبالتالى، فإن الوقاية الطبية والتشخيص المبكر بالإضافة إلى الإدارة المناسبة قد يحسن نتيجة الجراحة.