PATENT DUCTUS ARTERIOSUS DEVICE CLOSURE VERSUS SURGICAL LIGATION IN INFANTS

By

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ABSTRACT

Background: *Patent ductus arteriosus (PDA) is a congenital heart abnormality constituting nearly 10% of all congenital heart disease, and it is the third most common congenital heart defect. Transcatheter closure of patent ductus arteriosus now represents the established, standard approach for the correction of a PDA throughout the entire world. This study was a prospective observational study. The aim of this study was to compare the feasibility, short-term clinical outcomes, and safety of transcatheter closure of moderate to large patent ductus arteriosus in small infants versus surgical ligation and to follow the sequences after both methods of ductal closure by transthoracic echocardiography.*

Methods: *All patients were subjected to full clinical examination, chest X-ray, electrocardiography, echocardiography, and laboratory evaluation before they were transferred to the catheterization laboratory for undergoing an attempt of PDA closure or surgical duct ligation. Within 24 hours after successful PDA closure, all patient underwent echocardiographic examination to evaluate for presence of residual shunt and protrusion of devices into surrounding structures. Follow up visits have been scheduled at 1 and 6 months after the procedures for clinical and echocardiographic evaluation.*

Results: *This study was conducted on 40 patients, 20 cases in catheter group and 20 cases in surgery group: 12 (30%) were males and 28 (70%) were females. The mean age was 6.5 ± 1.9 months in catheter group and 4.7 ± 1.8 months in Surgery group, while mean weight was 5.6 ± 0.5 Kg and 4.6 ± 0.8 Kg in Catheter and Surgery groups respectively. All patients had successful transcatheter and surgical PDA closure with no mortality in both study groups.*

PDA closure was done using ADO- I in 45% of cases (n=9/20). The sizes of the device were; ADO- I size 8/6 in 35% (n=7/20) represented the majority of patients, followed by ADO- I size 6/4 in 10% (n=2/20). Double PDA ligation and trans-fixation was the most common technique used in surgery group (95%). Our intervention was without Procedure-related complications in 80% of cases of catheter group and 85% of surgery cases. Time to discharge from hospital was shorter in catheter group with

median time to hospital discharge 1 day versus 4 days in surgery group. Both methods of PDA closure showed similar results as regard residual shunts and regression of left side dilatation.

Conclusion: *Transcatheter closure of moderate to large PDA in infants ≤6 kg using recent devices is a feasible and effective modality of treatment with excellent results, and thus it should be the treatment of choice in infants and children.*

Key words: *Amplatzer Duct Occluder, Congenital heart disease, Patent ductus arteriosus, Transcatheter closure, surgical ligation.*

INTRODUCTION

Isolated patent ductus arteriosus (PDA) accounts for about 10% of all congenital heart anomalies[1]. Its incidence is higher in premature babies and twice more frequent in females than in males[2]. In infancy, failure to thrive and congestive heart failure are indications for closure of the PDA. If medical therapy is ineffective, urgent intervention to close the ductus should be undertaken regardless of age and size[3]. Treatment of PDA has traditionally been surgical, with ligation or division of the ductus arteriosus through a thoracotomy incision or through video assisted thoracoscopic clipping which is less invasive than standard thoracotomy[4]. However, in recent years, new devices have come onto the market, percutaneous techniques have improved and interventionists have become more experienced, which have all led to percutaneous PDA closure gets more common in infants[5]. Transcatheter PDA closure is the standard of care in most cases and PDA closure is indicated in any patient with signs of left ventricular volume overload due to a ductus[6]. Numerous studies have documented the feasibility of catheter-based closure of PDA in older children and adults; however, there is a paucity of data regarding the outcomes of percutaneous closure of PDA in small infants in comparison with surgical ligation. Therefore, the selection of treatment modality for patients with PDA who could undergo either technique remains controversial[7].

Ethical considerations:

1. Approval of Ethical committee from pediatrics department, faculty of medicine and university was obtained before the study.
2. Written consent from parents or caregiver of the patient was obtained before the study.

3. The parents had the right to refuse to share in the study.
4. All the data of the study are confidential and the patients had the right to keep them.
5. The authors received no financial support regarding the study or publication.
6. The authors claimed that, no conflict of interest regarding the study or publication.

PATIENTS AND METHODS

Population: The current study was a prospective and observational study with short term follow up for six months. It included 40 infants with moderate to large PDA attended the out-patient pediatric cardiology clinics at Al Azhar university hospitals & Abo El-Resh university hospitals Cairo, Egypt, 20 patients underwent transcatheter PDA occlusion, at the cardiac catheterization laboratory of Specialized Children hospital, faculty of medicine, Cairo University **(group I)**. The other 20 patients underwent surgical ligation at Bahtim Insurance Hospital **(group II)**, The study started in August 2018 and ended in December 2020.

We included in our study Infants less than 12 months of age with body weight less than or equal 6 kilograms at time of intervention who had echocardiographic findings of moderate to large hemodynamically significant PDA.

We excluded infants with body weight more than 6 kg and age more than 12 months, irreversible pulmonary vascular disease with Rt. to Lt. shunt, tiny PDA (pulmonary end < 1.5mm), and infants with PDA as a part of Complex congenital heart disease requiring surgery or PDA dependent lesions.

Methodology: The patients of both groups were subjected to:

1. Thorough history taking,
2. Complete clinical examination,
3. Plain Chest X-ray,
4. Two-dimensional and Doppler Echocardiography.

Postprocedural outcomes of interest included: vascular complications of catheter or surgery (thrombosis, arterial or venous occlusion, access site hematoma, loss of peripheral pulsations), residual shunt, device embolization, hemolysis, obstruction of the left pulmonary artery or Aorta, blood transfusion within first 48 h. and length of hospital stay.

Follow up: Transthoracic echo (TTE) was conducted at 24 hours

after successful PDA closure to evaluate the shape and position of the device. Color- Doppler ultrasound was used to detect and quantify any residual shunt.

The following were arbitrarily defined: The severity of leakage as assessed by color- Doppler was defined as follows: trivial, <1 mm diameter; mild, 1-2 mm diameter; moderate, >2mm. Doppler ultrasound were used to determine flow and velocity patterns in the descending aorta and pulmonary artery to rule out obstruction (maximum Doppler velocity <2-2.5 m/s)[8].

Follow-up with detailed TTE was conducted at 1 month, and 6 months after surgical or device closure using reference values for M mode echocardiography according to Park, MK[9].

Statistics:

All analyses were performed using SPSS version 23 for Windows. Measured data were expressed as mean ± standard deviation or median. Procedural outcomes for each age group were compared using a chi-square test or Fisher exact test. A P value of <0.05 is defined as statistically significant.

RESULTS

A total of 40 infants, 20 infants underwent percutaneous transcatheter PDA closure at the catheterization laboratory in Specialized Children's hospital; Cairo University, (Group I) and the other 20 infants underwent surgical PDA ligation at Bahtim insurance hospital (Group II).

Table (1): Demographic characteristics of both study groups

Variable	Catheter group (n=20)	Surgery group (n=20)	Mean Difference	95% CI		P-value†
				Lower	**Upper**	
	Mean ±SD	**Mean ±SD**				
Age (months)	6.5 ± 1.9	4.7 ± 1.8	1.8	0.6	3.0	**0.005**
Sex (F/M) ratio	15/5	13/7				0.731‡
Weight (kg)	5.6 ± 0.5	4.6 ± 0.8	1.0	0.6	1.4	**<0.001**
Length (cm)	62.6 ± 4.2	57.0 ± 2.8	5.6	3.3	7.8	**<0.001**
BSA (m^2)	0.30 ± 0.02	0.27 ± 0.03	0.04	0.02	0.05	**<0.001**
Parent consanguinity	4 (20%)	4 (20%)	-	-	-	1.000‡
Down's syndrome	1 (5.0%)	3 (15.0%)	-	-	-	0.605‡

BSA; body surface area, †. Unpaired t-test unless otherwise indicated, ‡. Fisher's exact test. CI; confidence interval, Data are mean ± SD or ratio.

This table shows that, there are significant differences between the two studied groups regarding age, weight, length and body surface area (BSA).

Table (2): Primary presenting symptoms and clinical signs in both study groups

	Catheter group (n=20)		**Surgery group (n=20)**		
Variable	**N**	**%**	**N**	**%**	**P-value†**
Primary presenting Symptoms					0.810
Feeding difficulty	9	45.0%	6	30.0%	
FTT	3	15.0%	3	15.0%	
Difficult breathing	7	35.0%	9	45.0%	
Recurrent chest infections	1	5.0%	2	10.0%	
Clinical signs and Antifailure treatment					
Bounding pulse	20	100.0%	20	100.0%	NA
Hypoperfusion	0	0.0%	2	10.0%	0.487
Hepatomegaly	2	10.0%	6	30.0%	0.235
Antifailure treatment	20	100.0%	15	75.0%	0.047

FTT; failure to thrive,
†. Fisher's exact test.

Regarding clinical manifestations, there is no significant difference between catheter and surgery groups, while patients on Anti failure treatment were less in surgery group with significant difference between both groups.

Table (3): Echocardiographic measurements in both study groups pre-intervention

	Catheter group (n=20)	Surgery group (n=20)		95% CI		
Variable	**Mean±SD**	**Mean±SD**	**Mean Difference**	**Lower**	**Upper**	**P-value†**
PDA size (mm)	3.8 ± 1.0	4.9 ± 0.9	-1.1	-1.7	-0.5	**0.001**
PG (mmHg)	63 ± 18	48 ± 21	15.7	3.2	28.1	**0.015**
LA/Ao ratio	1.55 ± 0.25	1.67 ± 0.13	-0.12	-0.25	0.01	0.061
LVEDD (mm)	30.1 ± 3.5	29.7 ± 2.2	0.4	-1.5	2.3	0.667
LVEDD Z-score	3.47 ± 1.86	4.91 ± 1.15	-1.44	-2.44	-0.44	**0.006**
FS (%)	39 ± 4	40 ± 4	-1.1	-3.7	1.6	0.420
ESPAP (mmHg)	31 ± 9	48 ± 12	-17.1	-23.8	-10.4	**<0.001**
PA annulus (mm)	12.5 ± 1.3	12.2 ± 0.6	0.4	-0.3	1.0	0.241
LPA velocity (m/s)	1.09 ± 0.14	1.16 ± 0.11	-0.07	-0.15	0.01	0.080
Velocity in descending aorta (m/s)	1.04 ± 0.49	1.15 ± 0.16	-0.11	-0.35	0.12	0.338

PDA; patent ductus arteriosus, PG; pressure gradient, LA; left atrium, Ao; Aorta, LVEDD; left ventricular end diastolic diameter, FS; fractional shortening, ESPAP; estimated systolic pulmonary artery pressure, PA; pulmonary artery, LPA; left pulmonary artery
†. Unpaired t-test

This table shows that, there is significant increase in PDA size, LVEDD Z-score and ESPAP in surgery group than catheter group, while PG was significantly lower in surgery group than catheter group.

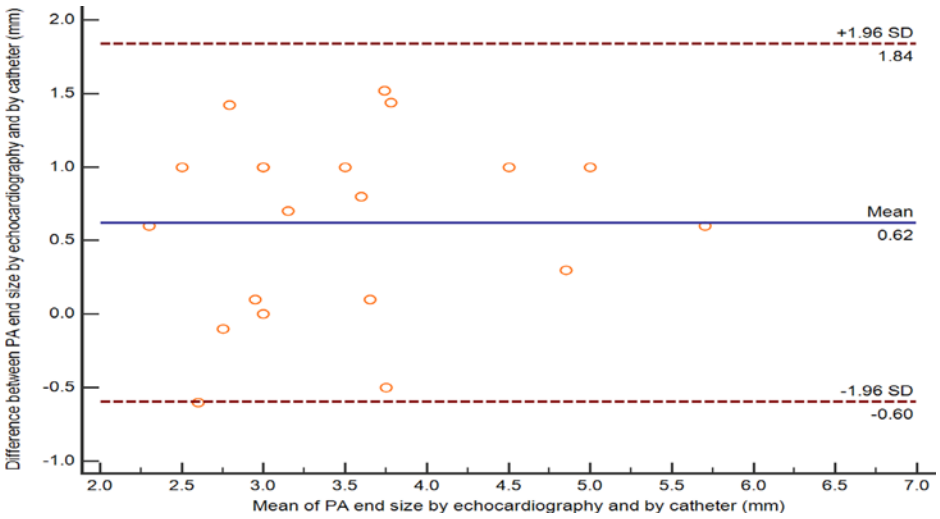

Figure (1): Agreement between catheterization and echocardiography as regards measurement of PA end size

This figure shows that, the lower limit of agreement between catheterization and echocardiography as regards measurement of PA end size = -0.60 mm, upper limit of agreement = 1.84 mm and mean difference (Bias) = 0.62 mm.

Table (4): Types of PDA (Krichenko classification) in both study groups

		Catheter group (n=20)		Surgery group (n=20)		
Variable		**N**	**%**	**N**	**%**	**P-value†**
Duct type	**Type A (Conical)**	17	85.0%	18	90.0%	0.605
	Type C (Tubular)	1	5.0%	2	10.0%	
	Type E (Elongated Conical)	2	10.0%	0	0.0%	

This table shows that; the Conical type was the most common morphology among both study groups (85%).

Table (5): Technical difficulties and complications in catheter group

Variable		N	%
Technical difficulties	**Nil**	17	**85.0%**
	Difficult arterial access	1	5.0%
	Bradycardia after device deployment	1	5.0%
	Difficult advancement of catheter (small diameter of abdominal aorta)	1	5.0%
Procedure-related Complications	**Nil**	16	**80.0%**
	Temporary loss of femoral pulsation (Minor)	1	5.0%
	Access site hematoma (Minor)	2	10.0%
	Dissection of abdominal aorta (Major)	1	5.0%

This table shows that; our intervention was without technical difficulties in 85% of cases and with no complications in 80% of cases in catheter group.

Table (6): Procedure time and Hospital stay duration in both study groups

	Catheter group (n=20)	**Surgery group (n=20)**		**95% CI**		
Variable	**Mean±SD**	**Mean±SD**	**Mean Difference**	**Lower**	**Upper**	**P-value†**
Procedure time (min)	79.9 ± 23.2	55.3 ± 7.4	24.6	13.3	35.9	**<0.001**
Hospital stay (days)	1.6 ± 0.9	4.5 ± 0.6	-2.9	-3.4	-2.4	**<0.001**

†. Unpaired t-test.

As regard the Procedure time, it was longer in catheter group than in surgery group, with significant difference, while the hospital stay was shorter in catheter group than in surgical group with statistical significant difference between both groups.

Table (7): Early postoperative outcomes in both study groups

	Catheter group (n=20)		Surgery group (n=20)		
Variable	**n**	**%**	**n**	**%**	**P-value†**
Immediate occlusion	19	95%	19	95%	1.000
Residual shunt at end of procedure	1	5.0%	1	5.0%	1.000
Need for blood transfusion	0	0.0%	3	15.0%	0.231

†. Fisher's exact test.

This table shows that; Immediate occlusion was achieved in 95% of cases in both study groups and the need for blood transfusion was 15% in surgery group cases with no significant difference between both groups.

Table (8): Echocardiographic abnormalities at 1 month post intervention in both study groups

	Catheterization (n=20)		Surgery (n=20)		
Variable	**N**	**%**	**N**	**%**	**P-value†**
Residual shunt	0	0.0%	1	5.0%	1.000
Turbulent flow in LPA	0	0.0%	0	0.0%	NA
Turbulent flow in aorta	0	0.0%	0	0.0%	NA
LPA stenosis	0	0.0%	0	0.0%	NA
Ao stenosis	0	0.0%	0	0.0%	NA

†. Fisher's exact test.
NA = test not applicable.

This table shows that; persistence of residual shunt in one case in surgery group at 1-month follow up.

DISCUSSION

Patent ductus arteriosus (PDA) is considered a significant precursor to short- and longer-term morbidity[10]. In view of the increasing number of catheter based closures among infants[11]. A total of 40 infants, 20 infants underwent percutaneous transcatheter PDA closure at the catheterization laboratory in Specialized Children's hospital; Cairo University, (Group I) and the other 20 infants underwent

surgical PDA ligation at Bahtim insurance hospital (Group II).

The infants in the surgical ligation group had lower weight, BSA and age than those in the percutaneous group (P <0.05) as they were relatively younger in age so that their weight was lower. The mean age was 6.5 ± 1.9 months in catheter group and 4.7 ± 1.8 months in Surgery group, while mean weight was 5.6 ± 0.5 Kg and 4.6 ± 0.8 Kg in Catheter and Surgery groups respectively **(Table 1)**. In our contemporary experience, surgical ligation was performed on smaller and sicker infants. These infants were younger at the time of the procedure which was similar to the results of the study done by **Kim, H. S., et al.,**[12].

The study included 28 females (70%) and 12 males (30%) with female to male ratio was 3:1 in catheter group and about 2:1 in surgery group. The female-to-male ratio is ≈2:1 in most reports[13].

The Primary presenting symptom in catheter group was the feeding difficulty (45%) while in surgical group was difficult breathing (45%), while bounding pulse was the main clinical sign (100%) in each group, with no statistical significant difference. As regard the Antifailure measures pre-intervention of the studied cases, the surgical group had significantly less percent of cases (n=15/20) 75% vs. (n=20/20) 100% in catheter group. In most cases, anti-failure drugs had been stopped one month after successful PDA closure **(Table 2)**.

As regard the estimated systolic pulmonary artery pressure (ESPAP), no cases of severe pulmonary hypertension, 25% of cases with mild to moderate pulmonary arterial hypertension in catheter group vs. 65% of cases in surgery group. The cut-off value for mild pulmonary artery hypertension has been assumed as PA systolic pressure of 36 to 40 mmHg by Doppler method [14].

PDA size by echocardiography was significantly larger in surgery group, the mean ductal size was 3.8 ± 1.0 mm for catheter group and 4.9 ± 0.9 mm for surgical group (P ≤o.oo1), while PG was significantly higher in catheter group, denoting that larger PDA size usually associated with higher systolic PA pressure, as in the surgical group with larger PDA diameter, the ESPAP was significantly higher, p- value <0.001 which can be explained by the larger size of PDA. This was in agreement with **Lloyd TR. et al.,**[15].

On reviewing the TTE data of all cases, there was evidence of left atria, and left ventricular dilatation. Increased LA/AO ratio was evident in 80% of patients (n= 32/40) with a mean of 1.55±0.25 in catheter group and 1.67±0.13 in surgery group with no significant statistical difference. Mean LVEDD was 30.1 ± 3.5 mm and 29.7 ± 2.2 mm for catheter and surgery groups, respectively **(Table 3)**.

In our study, the minimum and maximum diameters of the arterial duct, measured angiographically, were 3.20 ±0.92 mm and 8.56 ± 2.09 mm respectively for catheter group. The morphologies of the PDA were classified angiographically based on the categories first described by **Krichenko et al.,**[16]. Type A (conical) ductus in 85% of cases (n= 17/20). Type C (tubular) ductus in 5% of cases (n= 1/20). Type E (elongated conical) ductus in 10% of cases (n=2/20) (Table 4). **Masura et al.,**[8], and **Lin et al.,**[17] reported similar findings: type A in 53/66 patients (80%), followed by type E in 9/66 patients (13.6%). **Roushdy et al.,**[18] reported that 24/42 patients (57%) had type A, followed by type E in 13/42 patients (30%). On the other hand, **Ammar and Hegazy**[19], reported a higher percentages of type A in 44/47 patients (94%). Device implantation was successful in all 20 patients (100%) in our study.

In the present study, successful percutaneous vascular access using femoral vessels was obtained in all catheter group patients. ADO I was deployed in 9/20 patients (45%) representing the majority of patients. ADO II size 5/4 mm was used in 1 case (5%). Hyperion PDAO cone shape was deployed in 5 cases (25%). All devices achieved excellent occlusion rates with low complication rates, regardless of PDA type.

Despite the advancement in transcatheter PDA closure, there are many problems during performance of the procedure in infants under 6 kg: relatively large sheath size for small vessels, stiffness of the delivery system with resultant hemodynamic instability during device deployment, risk of protrusion of the device into the aorta or pulmonary artery, poor anchoring or stability within the PDA, and difficult retrievability as well as the size and morphology of the PDA itself[20].

In the current study, all patients were below one year of age (mean=6.5±1.9 months) and mean weight 5.6±0.5 Kg, we reported no technical problems during device

deployment in majority of cases (85%), while we had technical difficulties in 3 cases (15%) in the form of difficult arterial access in one case (5%), bradycardia after device deployment in one case (5%) and difficult catheter advancement in abdominal aorta in one case (5%) aged 5 months with body weight of 6 Kg due to small diameter of abdominal aorta (=5 mm) and with follow-up, it resolved spontaneously with no need for further intervention **(Table 5)**.

Minor complications occurred in 3/20 patients (15%) in catheter group, in the form of peripheral vascular complications such as loin hematoma (10%) and temporary loss of femoral pulsations (5%) necessitating anticoagulation with heparin which were managed successfully and resolved after 5 days of treatment with no long-term sequelae.

In surgery group, no major complications occurred in our study, minor complications occurred in 3/20 patients (15%) in the form of need for blood transfusion which were managed successfully.

In the current study, Catheter group procedure time ranged from 50 minutes to 125 minutes (mean =79.9 ± 32.2 min). The fluoroscopy time ranged from 3.03 minutes to 18.5 minutes (mean =10.68± 5.26 min). **Lin et al.,[17]** reported that the mean procedure time in a similar study was 98 ±19 minutes and the mean fluoroscopy time and 8.9 ± 1.8 minutes. While, **Parra-Bravo et al.,[21]** reported that the procedure time ranged between 40-134 min (mean= 66.2 ± 24 min) and fluoroscopy time ranged between 4- 32 minutes (mean= 13.3 ± 6.6 min).

The mean procedure time was longer in catheter group, 79.9 ± 23.2 minutes while it was 55.3 ± 7.4 minutes in surgery groups, with significant difference between them **(Table 6)**. our results were in agreement to **Kim, H. S., et al.,[12]** who reported that, the median PDA device closure time (41.5 min) was longer than the surgical ligation time (35.0 min, $P < 0.01$). In keeping with our findings no cases of device protrusion or embolization, **Baspinar et al.,** and **Agnoletti et al.,** also reported the same results[22, 23].

In catheter group, immediate occlusion, confirmed by angiography, was achieved in 19/20 patients (95%); 1/20 patients (5%) showed trivial postprocedural leak that disappeared at 1-month follow-up,

while in surgery group there was a residual shunt in one case (5%) 1.5mm at day 1 postoperative decreased to 1mm at 1 month follow-up and complete occlusion at 6 months follow-up **(Tables 7&8)**, single ligation technique was used in this case.

An occlusion rate of 96% was obtained at 3-month follow-up after transcatheter device PDA closure in many studies[24]. Our overall residual shunt rates of 5.0% on post procedure angiogram, 5.0% at 24 hrs., and 0.0% at 6- month follow-up in catheterization group **(Tables 7&8)**, are similar to those found in other large patient series[8, 25, 26]. Moreover, we found that regardless of PDA type, all devices achieved high occlusion rates at 6-month follow-up 100%.

In surgery group, no major complications occurred in our study, minor complications occurred in 3/20 patients (15%) in the form of need for blood transfusion **(Table 7)** which were managed successfully, our results are similar to a study by **Zulqarnain, A., et al.,**[27] who reported higher rate of blood transfusion in surgery group.

Follow up period was extended to 6 months for comparison of echocardiographic data and cardiac dimensions between both groups that was recorded before the procedure, at one month, and at six months after PDA occlusion, and to detect any complication of the procedure.

Follow-up studies following ADO deployment have confirmed occlusion rates of >99% within 6 months of device deployment, with minimal complication rates[28, 29]. The majority of occlusions can be confirmed within 24 hours, prior to discharge from hospital.

In our study, at 1- and 6-month follow-up after closure in both groups, weight gain, control of respiratory infections, and regression of LV dilatation with normalization of the systolic function were observed.

The mean estimated systolic pulmonary artery pressure measured preintervension dropped from 31.9±9 to 28±7 mmHg at one month, and further drop to 24±5 mmHg at 6 months after ductal closure. In the current study, in all cases pulmonary artery pressure dropped to normal value six month after PDA closure, with similar drop in surgery group but with significant difference between both groups ($P<0.05$) due to higher ESPAP values in the surgery group pre-intervention.

The mean left ventricular end diastolic diameter (LVEDD)

decreased from 30.1±3.5 pre-intervention, to 26±2 at one month and to 25±2 at 6- month follow up. This is similar to the findings of another studies by **Galal MO, et al.,** and **Ahmed R. Afifi et al.,**[30, 31].

In our experience, percutaneous PDA closure in infants weighing ≤6 kg was found to be as effective as surgical ligation.

CONCLUSION

Transcatheter closure of PDA is a successful and effective treatment option for a majority of early infants with significant clinical symptoms with a safety profile comparable to surgical ligation.

Recommendations

1. Transcatheter closure of moderate to large PDA should be the treatment of choice in small infants.
2. Research should continue for better PDA occlusion devices for smaller infants with hemodynamically significant PDAs.

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غلق القناه الشريانيه بالقسطره القلبيه مقارنة بربطها جراحيا في الاطفال الرضع

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تعتبر القناة الشريانية المفتوحة من اشهر أمراض القلب الخلقية شيوعا و تمثل تقريبا 10% من نسبة حدوثها، وهى ثالث أكثر عيوب القلب الخلقية شيوعاً. ويمثل إغلاقها عن طريق القسطرة القلبيه التداخليه الآن النهج المعياري الراسخ في جميع أنحاء العالم. وكانت هذه الدراسة دراسة رصدية مستقبلية. وكان الهدف من هذه الدراسة هو مقارنة الجدوى، والنتائج السريرية قصيرة الأجل، و تقييم مدى الفاعلية و الأمان و النتيجة لهذا الأسلوب الجديد من العلاج باستخدام جهاز غلق القناة الشريانية و كذلك متابعة التغيرات القلبية المصاحبة بعد غلقها ومقارنتها بنتائج الغلق الجراحى المعتاد.

قبل عمل التدخل العلاجى لهؤلاء المرضى تم أخذ التاريخ المرضى لهم و توقيع الفحص السريرى الكامل عليهم و عمل التحاليل اللازمة لهم و عمل تصوير للصدر بالأشعة السينية و عمل موجات فوق الصوتية على القلب. و بعد 24 ساعة من النجاح فى غلق الوصلة الشريانية –سواء عن طريق القسطرة القلبيه او الربط الجراحى- تم عمل تصوير للصدر

بالأشعة السينية و عمل موجات فوق الصوتية على القلب للتحقق من درجة غلقها, ثم تم متابعة هؤلاء المرضى بالموجات فوق الصوتية على القلب بعد شهر و ستة أشهر من غلق الوصلة الشريانية.

ولقد أجريت هذه الدراسة على 40 مريضا, من بين المرضى الذين تم غلق القناة الشريانية لهم بنجاح كان منهم 12 من الذكور (30%) و 28 مريضا من الإناث (70%). و كان متوسط أعمارهم 6 شهور فى مجموعة القسطرة القلبيه و4 شهور ونصف فى مجموعة الربط الجراحى و متوسط الوزن=5.6 كجم فى مجموعة القسطرة و 4.6 كجم فى مجموعة الجراحة.

ولقد استخدم جهاز الأمبلاتزر لغلق القناة الشريانية بنجاح فى 9 اطفال (45%), و كانت مقاسات الأجهزة المستخدمة كالتالى: 6/8 فى 7 حالات (35%), و 4/6 فى حالتين (10%).

وكان ربط القناة الشريانية المفتوحة المزدوج والتثبيت العابر التقنية الأكثر شيوعا المستخدمة في مجموعة الغلق الجراحي (95%).

تم غلق القناة الشريانية بنجاح فى جميع الحالات دون تسجيل حالات وفاه فى المجموعتين. وكان التدخل العلاجى غير مصحوب بأى مضاعفات فى 80% من حالات القسطرة القلبيه و 85% من حالات الغلق الجراحى.

وكان وقت الخروج من المستشفى بعد التدخل العلاجى أقصر في مجموعة القسطرة مع وقت متوسط 1 يوم مقابل 4 أيام في مجموعة الجراحة مما يعني استهلاك أقل للموارد. هذه الإقامة القصيرة في المستشفى هي واحدة من مزايا إغلاق الوصلة الشريانية المفتوحة عن طريق القسطرة القلبيه عن الطريقة التقليدية بالربط الجراحي.

اظهرت كلتا الطريقتين نتائج مشابهة فيما يخص عودة الجزء الايسر من القلب لحجمه الطبيعى بعد غلق الوصلة الشريانيه المفتوحة.

الاستنتاج: غلق الوصلة الشريانيه المفتوحة – المتوسطه الى كبيرة الحجم - فى الرضع ذوى الاوزان الصغيره (اقل من 6 كجم) باستخدام الاجهزة الحديثة عن طريق القسطرة القلبيه هى طريقة فعاله ومجديه ونتائجها ممتازه ولذا يجب ان تكون الخيار الاول فى العلاج فى الأطفال الرضع.