PERCUTANEOUS PDA CLOSURE IN PRETERMS USING AMPLATZER DUCT OCCLUDER II ADDITIONAL SIZE: AN INITIAL EXPERIENCE

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Background
Patent ductus arteriosus (PDA), is a frequent problem in the neonatal intensive care unit and complicates the hospital course of pre-term newborns. Treating PDA in premature infants is still controversial. Options includes medical treatment and/or surgical intervention with ligation or clipping. Surgery has been shown to be safe but, involving a thoracotomy, carries attendant morbidity and mortality. The risk rises considerably in those neonates with additional comorbidities. Catheter closure can potentially overcomes several of these limitations.

Transcatheter procedure in small newborns is technically challenging with most currently available hardware. Amplatzer Duct Occluder additional size II (ADO II AS), with its new miniaturized shape, is very suitable in this extreme situations.

To our knowledge the series we are presenting is the first describing the use of ADO II AS in newborns with body weight < 3Kg.

Materials and method:
From March 2012 to April 2013, 5 preterms, 4 females and 1 males, all weighting below 3 Kg, presenting with relevant patent ductus arteriosus, undergone successfully percutaneous DA closure. All were preterms with mean gestational age of 30 weeks (from 25 to 37 weeks). The mean age at procedure was 2,3 months (1 month-5 months) and the mean weight at procedure was 2,6 Kg (from 2,2Kg to 3,2 kg).

All these newborns were affected by relevant comorbidities: 2 of them due to prematurity (severe broncodyplasia) and 3 because of other congenital malformations: Aneurysm of Galen vein, Congenital Rubella and Diaphragmatic hernia.

In 4 of them medical therapy was attempted and one had serious complication due to medical therapy (retinal hemorrhage ).

Results
The DA mean measurements at the aortogram were 2,32 mm (from 1,2 mm to 3,8 mm). We used an ADO AS II 4/2 in 2 patients, one ADO AS II 5/4, one ADO AS II 4/4 and a ADO AS II 5/6 in the last one.

Mean fluoroscopy time was 35 minutes and mean contrast volume delivered was 21 ml. The procedure was successful in all the patients and no complications occurred.

No residual shunt at the echo ultrasound performed the day after was found. Mean hospital stay was 30 days due to other comorbidities.

Conclusions: Thanks to materials improvement percutaneous occlusion of patent ductus arteriosus in preterms with the ADO II AS is already a serious alternative to the surgical gold standard in severely ill patients.
THE EDWARDS VALEO LIFESTENTS: AN ADULT-SIZE EXPANDABLE STENT TO TREAT PULMONARY ARTERY STENOSIS IN INFANTS AND SMALL CHILDREN

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Background: Intravascular stenting is the procedure of choice in the treatment of vascular stenoses. However, in infants and small children large sheaths are needed and adult-size stents cannot be implanted. The Valeo Biliary Lifestent (Edwards Lifesciences Irvine, CA) is a stainless steel triple helical stent with open cell design premounted on a high pressure balloon. They are low profile, in fact the required sheath size is 6 Fr for stents mounted on 6-8 mm balloons and 7 Fr for stents mounted on 9-10 mm balloon. The stent can be easily post-dilated up to 18 mm.

Aim: To report on preliminary data about our experience in the use of Valeo Lifestent in the treatment of severe pulmonary stenoses in infants with complex congenital heart disease s/p surgical repair.

Methods: Nine subjects were treated in our experience. Mean age and weight were 39±35 months (range 5-132) and 12.4 ± 6.7 kg (range 6-30), respectively. All subjects underwent transcatheter treatment of severe pulmonary artery stenoses after surgical repair for complex congenital heart disease (complex TOF=3 pts; TGA s/p switch=1 pt; Truncus arteriosus=1 pt; Pulmonary atresia and VSD=3 pts; Pulmonary atresia and intact ventricular septum=1 pt). The systolic pressure ratio RV/AO before intravascular stenting was 1 ± 0.2 (range 0.8-1.5).

RESULTS: Transcatheter approach was successful in all patients. Femoral veins access was used in 8 pts. In one patient the procedure was performed using femoral veins thrombosis. The following sheath sizes were used: 6Fr in 4 pts; 7 Fr in 4 pts and 8 Fr in 1 pt. In five patients bilateral stenting was performed. The following stents diameter were used: 6 mm in 3 cases, 8 mm in 6 cases, 10 mm in 5 cases. Fluoroscopy time was 32 ± 11 min. No intra-operative death or hospital mortality was recorded. Post-dilatation of stenting were performed in n=5 patients. The incidence of complication was 22% (2/9) (1 pt presented transient hypotension and bradycardia which required inotrope treatment, 1 pts presented mild lung bleeding). There was a significant improvement of angiographic appearance and RV pressure (RV/AO systolic pressure ratio before 1±0.2 (range 0.8-1.5) versus after procedure 0.6±0.2 (range 0.4-0.8)) p<0.001.

At a median follow-up of 3 months (range 1-6 months) results remained stable, no complications occurred.

CONCLUSIONS: A premounted stent requiring small sheaths and that can be re-dilated up to an adult size are ideal in small kids. In our small series, Valeo Lifestent has been effective and with low incidence of major complication. Large series and longer follow-up are necessary to show safety and efficacy of this procedure.
ANGIOPLASTY OF A RIGID AND STIFF TUNNEL IN PATIENTS WITH PFO AND PREVIOUS STROKE. A NEW OPTION TO PREPARE THE “LANDING” ZONE FOR AN OCCLUDING DEVICE

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Background
PFO morphology may be quite variable. Sometimes a long and stiff tunnel may be associated. This morphological variant can complicate PFO implantation.

Patients and Methods
Between January 2012 and April 2013, 120 patients were submitted to PFO closure in our institution due to previous history of ischemic stroke. Two devices were used: Amplatzer PFO occluder in 70 subjects and Gore Septal Occluder in 50 patients. Morphological variants associated to PFO included: Atrial septal aneurysm in 65 subjects, Redundant Eustachian valve in 10 subjects, long (>15 mm) but compliant tunnel in 48 subjects, long and stiff tunnel in 5 subjects. Procedures were performed under general anesthesia and with fluoroscopic and transesophageal echocardiographic guidance. All subjects gave their informed and signed consent to the procedure.

Results
Five subjects (median age 35 years; range 30-58 yrs; 3 females) showed a long (median 22 mm; range 15-32 mm) and rigid tunnel (median opening 4 mm; range 2-6). In two subjects the attempt of implanting a Gore septal occluder resulted in a malpositioned device.

Angioplasty of the tunnel was performed using peripheral angioplasty balloons (Fox Balloons) with a length of 4 cm and a diameter ranging from 8 to 12 mm. After angioplasty the tunnel appeared less long (12 mm; range 8-16 mm) and less rigid (median opening 8 mm; range 7-12 mm). The following devices were implanted: 25 mm Amplatzer PFO occluder in 1 pt; 25 mm Gore septal occluder in 4 subjects. Median fluoroscopy time was 8 minutes (range 6-10 minutes). Non complications occurred. At a median follow-up of 6 months (range 2-16 months) no problems occurred and all subjects showed a complete closure.

Conclusions
Angioplasty of a rigid and stiff tunnel is a feasible and safe option. A trans-septal approach is another possible option.
TRANSCATHETER ANGIOPLASTY FOR RECURRENT AORTIC COARCTATION: MID-LONG TERM FOLLOW-UP RESULTS IN A SERIES OF PEDIATRIC PATIENTS

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Objectives: to evaluate mid-long term follow-up (FU) results, and their relationship with the immediate ones, in infants treated with balloon angioplasty (BA) for recurrent AoCo after surgery (re-AoCo).

Methods: the procedural and FU results of 36 patients who underwent BA for re-CoAo in our Institution in the first year of life (median age 5 months, median weight 6.3 kg) between 1993 and 2011 were reviewed. The following data were noted: haemodynamics, repeated BA (re-BA) and/or reintervention for residual/recurrent AoCo, late complications, clinical/instrumental signs of AoCo. FU results were related to the immediate ones (procedural success: pressure gradient (PG) < 20 mmHg; partial success: PG reduced more than or equal to 50% from baseline but still more than or equal to 20 mmHg; failure: PG reduced < 50% and more than or equal to 20 mmHg)

Results: BA was successful in 23 cases (64%), partially successful in 10 (28%) and failed in 3 (8%). One case was complicated by a small aortic aneurysm, which was conservatively managed. Of the failures, 1 was reoperated and two improved afterwards and were managed conservatively. After partial success, 4 patients needed surgery, 3 underwent re-BA (twice in 1 case) and one of them was then send to surgery; the remaining 3 improved. No patient required a second procedure after a successful BA. The overall rate of reoperation was 14%. Excluding surgical cases, the median FU duration was 5 (1 - 18) years. At last FU visit, 23/31 pts (74%) were free from recurrence, and 8/31 (26%) had signs of mild AoCo.

Conclusions: in our experience, BA for re-AoCo showed a low rate of late complications (0% major, 2.7% minor). An immediate success of the procedure was maintained in the mid-long term follow-up, but an unsatisfactory immediate result was not always predictive of a bad outcome. Moreover, some patients with residual AoCo after BA were successfully treated with redilatation, avoiding reoperation. Patients with a moderate residual AoCo can be followed until they reach an adequate size for stent angioplasty.
INTRODUCTION: Transcatheter closure of atrial septal defects (ASDs) is currently a reliable alternative to surgery, even though challenging in the case of complex septal anatomy. The aim of this study was to evaluate the feasibility and mid-term results of percutaneous closure of ASDs in a single tertiary referral centre.

METHODS: From April 2000 to March 2013, 735 patients with atrial septal defect and volume overload of right ventricle were submitted to percutaneous closure. Their mean age and mean weight were 20 ± 18 years (range 2-72) and 48 ± 23 Kg (range 5.6-105 Kg) respectively. The mean QP/QS was 1.6 ± 0.5 (range 1-2.6). The mean diameters of atrial septal defect measured by dynamic technique (Boston Scientific Corporation sizing balloon catheters) was 17.8 ± 6.5 mm (range 4-39 mm). Two hundred forty-two/709 patients (34%) showed complex defect (large ASDs with a deficient rim or a cribriform/aneurysmal septum) and were treated using different devices tailored to the atrial septal anatomy. The mean follow-up was 5.9 years ± 3.3 years.

RESULTS: The transcatheter procedure was successful in 709/735 patients (96.5%), using a single device in 665 patients, two devices in 42 patients and three devices in 2 patients. Overall, 696 Amplatzer Septal Occluder (ASO) devices, 28 Cribriform ASO devices, 8 PFO ASO devices, 12 Gore Septal Occluder devices, 9 Figulla Occlutech device, and 2 NMT Starflex devices were used. Procedural times and fluoroscopy were 83.6 ± 45 min (range 30-100 min) and 10 ± 8 min (range 3-21), respectively. Major procedure related complication were recorded in 5/709 patients (0.7%). Major complications were observed in 5/709 pts (0.7%) N=3 device embolization with cardiac surgery necessity, N=1 anterior mitral leaflet perforation, N=1 right common iliac dissection. Early minor complications were observed in 20/709 pts (2.8%) N=16 arrhythmias, N=3 ECG sign for transient ischemia, N=1 nerve compression by femoral pseudoaneurysms. Immediate ASD occlusion was recorded in 89.7% of patients, reaching 95.9% at the last follow-up control. At long term follow up no aortic erosion or AV valve disfunction were reported. No major arrhythmias were recorded. One patient developed pulmonary hypertension over long-term follow-up.

CONCLUSIONS: Percutaneous closure of ASD may be considered technically feasible, relatively safe and highly effective, although the procedure is still significantly more complex in patient with complex ASDs.
Il dispositivo Gore Septal Occluder (GSO) è di recente a disposizione dell’emodinamista per la chiusura dei difetti del setto interatriale (DIA). Tale protesi permette la chiusura del DIA con un meccanismo a copertura, disponendo di due dischi su cui è montato una membrana di PTFE, uniti da un perno centrale con sistema di rilascio a scatto. Essendo tali protesi non autocentranti, l’utilizzo è principalmente rivolto alla chiusura percutanea dei forami ovali pervi. In questo lavoro riportiamo la nostra esperienza di chiusura dei DIA in età pediatrica con protesi GSO.

Da Dicembre 2011 a Marzo 2013, tra i pazienti afferenti al nostro Laboratorio di Emodinamica, sono stati selezionati 14 pazienti con caratteristiche idonee alla chiusura percutanea del DIA con protesi GSO: sono stati pertanto esclusi pazienti aventi difetti superiori ai 16 mm di diametro e con rim antero-superiore (aortico) assente. L’età media dei pazienti era 9±4 anni (range 5-18 anni, mediana 8). In tutti casi è stato praticato l’approccio venoso femorale utilizzando un introduttore Cook 12 Fr, il diametro stretched medio è risultato essere 13±2 mm (range 6-16 mm, mediana 14 mm). La procedura è stata completata con successo in 13 casi su 14, utilizzando un dispositivo GSO 15 mm in un caso, un dispositivo 20 mm in 2 casi, un dispositivo 25 mm in 4 casi ed in 7 casi un GSO 30 mm. Sono stati utilizzati dispositivi di diametro pari a 1,8-2,2 volte il diametro “stretched” del DIA. In uno degli 14 pazienti non è stato possibile chiedere il DIA (diametro: 12 mm) con una protesi GSO 25 mm a causa del margine aortico deficitario, che ne impediva il corretto posizionamento. La procedura è stata poi completata con un dispositivo Amplatzer 12 mm. In uno dei 13 casi completati utilizzando una protesi GSO era stato utilizzato un dispositivo 20 mm che, per la non perfetta conformazione del disco di destra durante le manovre di rilascio, è stato rimosso e sostituito con una protesi 25 mm. In un terzo caso una protesi GSO 25 mm non si è adeguatamente conformata durante la procedura di rilascio, per cui è stato necessario rimuoverla e sostituirla con una nuova protesi GSO 25 mm. Tutti i pazienti trattati con successo con protesi GSO non mostravano shunt residui al follow-up.

In conclusione il dispositivo GSO è un valido ausilio per la chiusura dei DIA di diametro <15-16 mm. La differente filosofia di chiusura ed la differente modalità di rilascio rispetto ai dispositivi Amplatzer richiedono un adeguato tempo di apprendimento anche per gli emodinamisti esperti, tuttavia i risultati preliminari sono da considerare incoraggianti per l’utilizzo di tali protesi nei DIA di piccolo e medio diametro. La mancanza del margine aortico può rendere difficoltoso il posizionamento della protesi, e può richiedere l’uso di appropriati artifizi tecnici.
PERCUTANEOUS CLOSURE OF PARAVALVULAR LEAK IN CHILDREN AFTER LEFT VENTRICULAR OUTFLOW ENLARGEMENT BY THE KONNO PROCEDURE WITH AORTIC VALVE PROSTHESIS

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Despite percutaneous treatment of paravalvular leak has been increasingly employed, since it is safer and more effective than surgery, the percutaneous closure of paravalvular leak in children after left ventricular outflow enlargement by the Konno procedure is not reported. We describe two cases of transcatheter closure of aortic paraprosthetic leak in two pediatric patients after left ventricular outflow enlargement by the Konno procedure with aortic valve prosthesis, which, to our knowledge, is not reported elsewhere.

CASE 1. An 8-year-old female patient with left isomerism, azygos continuation and subaortic stenosis underwent a Konno operation and received a 19 mm aortic bi-leaflet prosthesis. Over time she developed paravalvular moderate-to-severe regurgitation, due to two distinct periprosthetic leaks. The main leak was well visualized, close to the left coronary ostium. After a sizing-balloon on a retrograde guide-wire was inflated through the leak, an Amplatzer device was released in the appropriate position. The subsequent aortography showed a residual smaller paravalvular leak, located in the opposite coronary sinus. Then, a coil for patent ductus arteriosus closure was positioned through this leak with successful result. In the final aortography only a trivial intra-valvular regurgitation was noted.

CASE 2. A 15-year-old female patient with surgically corrected partial atrio-ventricular septal defect had developed fibromuscular subaortic stenosis with aortic regurgitation and underwent surgical resection of subaortic stenosis and aortic valve replacement. During follow-up, a moderate-to-severe paraprosthetic leak was detected. On angiography, the leak was located on the right anterior side of the prosthetic annulus. Then, a sizing balloon was inflated through the leak and an Amplatzer device was finally released. No significant paravalvular regurgitation was seen on aortography.

Conclusion. In our experience percutaneous closure of paravalvular leak using Amplatzer device is effective and safe in children after Konno operation and provides a valid option to surgery.
TRANSCATHETER TREATMENT OF FENESTRATED ANEURISMAL ATRIAL SEPTUM: SAFETY, FEASIBILITY AND MID-TERM FOLLOW-UP

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INTRODUCTION: Transcatheter closure of atrial septal defects (ASDs) is currently a reliable alternative to surgery. However, percutaneous approach to fenestrated aneurismal atrial septum is still challenging and not universally indicated. Aim of this study was to evaluate feasibility, safety and mid-term follow-up of transcatheter treatment of fenestrated aneurismal atrial septum in a third-level, high-volume paediatric and G.U.C.H. centre.

METHODS: Between April 2000 and March 2013, 123 (13.8%) of the 893 patients submitted to transcatheter atrial septal closure (ASD)/patent foramen ovale (PFO) showed fenestrated aneurismal septum with ASD (n= 88) or PFO (n= 32). Their mean age and weight were 30±20 years (range 5-72) and 59.5 ± 22.6 kg (range 18-105), respectively. Atrial shunt resulted in a QP/QS of 1.5± 0.5 (range1-2.6) due to multiple fenestrations in 43 patients (38%).

RESULTS: Transcatheter approach was successful in 97.6% of patients (120/123, using a single device in 105 patients, two devices in 14 patients and three devices in one patient. Overall, 109 Amplatzer Atrial Septal Occluder (ASO) devices, 12 Cribriform ASO devices, 2 Gore Septal Occluder devices, 9 Figulla Occlutech device, and 2 NMT Starflex devices were used. Procedural and fluoroscopy times were 98±48 min and 19±11 min, respectively (p= NS vs closure of simple atrial septal defect for both comparisons). Procedure-related complication rate was 0.9%, (p= NS vs closure of simple atrial septal defect). Immediate ASD occlusion was recorded in 59.7% of patients, reaching 95.9% at the last follow-up control (p=NS vs. simple ASD closure for both comparisons).

CONCLUSIONS: Percutaneous treatment of fenestrated aneurismal septum can be considered technically feasible, safe and effective in a high percentage of cases, although the procedure is still significantly more demanding than transcatheter closure of simple ASDs.
STENT IMPLANTATION FOR RIGHT VENTRICULAR OUTFLOW OBSTRUCTION IN SMALL-SIZED CHILDREN

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Aim To report our experience in stent implantation to relieve obstruction of the right ventricular outflow tract (RVOT) and pulmonary arteries (PA) in infants with complex congenital cardiopathy.

Methods Retrospective review of the databases of our Institutions identified 20 children less than 10 kg of weight treated with stent angioplasty in either the RVOT or the PA. Diagnosis, indications, hemodynamic data, complications and outcomes were noted.

Results The weight of the 20 children ranged from 2.7 to 9.7 Kg (median 5.6 kg) and the age from 11 days to 26 months (median 7.4 months). All but 3 patients had previously undergone surgical treatment. Indications for intervention were severe stenosis/hypoplasia of the RVOT or PA, conditioning low oxygen saturation and/or right ventricular hypertension/failure. Twenty-five procedures were performed, 3 of them were done on emergency setting for thrombotic occlusion of PA and BT shunt. Stents implanted were: 25 premounted Genesis, 8 balloon-expandable coronary stents, 1 Palmaz-Shatz and 1 Wall stent. In 18 cases the stents were placed in PA and in 2 in the RVOT. The approach was percutaneous in 16 cases (femoral or jugular vein, femoral or axillary artery) and hybrid in 6. Associated interventions were: 2 BT shunt stenting and 2 ballooning of BT and of PA. Median fluoroscopy time was 35 min. The diameter of the stented vessels and the systolic pressure gradient across the stenosis changed from 1.5 ± 1.75 to 6.6 ± 1 mm (p = 0.04) and from 48 ± 16 to 22 ± 14 mmHg (p = 0.009) respectively. Complications occurred in 2 implants (8%) and were treated conservatively with no sequelae. Two critically ill patients died few days after the procedure despite technical success; in all the others the clinical conditions improved and were discharged. During the follow-up period (FU) (median duration 1.5 years, range 1 month-15 years), 5 patients required repeated procedures: 4 additional stents were implanted and 5 stents redilated for occlusion/restenosis (2 associated with fractures); 1 stent was redilated to accommodate growth. Two children died during the FU for causes unrelated to the procedure (overall mortality 20%). Of the 16 children in FU, in 6 surgical treatment was performed afterwards: 6 stents were extracted and 4 were left in place; 10 patients have not received further surgery yet.

Conclusion In our experience stent implantation to relieve stenosis of RVOT and PA is a safe and effective option in selected high risk small-sized children. Although stents may not be a definitive solution, such treatment can temporarily improve hemodynamics and permit further growth to allow future surgical revision. However the mortality remains high in this complex group of patients.
TREATMENT OF PERSISTENT VERTICAL VEIN AFTER SURGICAL CORRECTION OF TOTAL PULMONARY ANOMALOUS VENOUS RETURN: THE ROLE OF BALLOON TEST OCCLUSION

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Background: an unligated vertical vein (VV) may persist after surgical correction of total anomalous pulmonary venous return (TAPVR) and cause significant left-to-right (L-R) shunt, mandating later closure.

Patients and methods: from June 2011 to March 2013, 6 consecutive patients (pts) (median age 3.83 years, range 1.53-7.87) underwent hemodynamic evaluation for persistent L-R shunt after surgical correction of TAPVR. The venous return was supracardiac in 4 pts and mixed (supracardiac and in the coronary sinus) in 2 pts. Surgery was performed in the neonatal age in 4 cases (1 with obstructed TAPVR), and later in the remaining 2 (at the age of 5 and 3 months, respectively) for late diagnosis. One patient had two reinterventions for obstruction between pulmonary veins (PVs) and the left atrium (LA); at the time of evaluation, he presented recurrent respiratory tract infections. The remaining pts were asymptomatic.

Results: the shunt was at the level of the VV in 5 pts; one case had an unusual type of supracardiac TAPVR with 2 communicating collectors, and the shunt was at the level of the one draining into the superior vena cava. The anastomosis between PVs and LA was widely patent in all pts but one, who presented a mild residual stenosis. The median pulmonary-to-systemic blood flow ratio was 1.8 (range 1.22 – 2.7). Test occlusion with a balloon catheter was performed: in 4 pts, it did not cause significant hemodynamic changes. In the remaining 2 pts, even a gradual closure caused a persistent and significant rise of left ventricular end-diastolic (LVEDP) and mean pulmonary artery (mPAP) pressures, so they were referred to surgical closure of the VV and creation of a calibrated atrial septal defect (ASD). In one of them, however, even if the abnormal hemodynamic response to ligation of the VV was confirmed, the surgeon decided not to open the atrial septum since the final LA pressure remained in a “safe zone” (10 mmHg, vs 27 mmHg in the cath lab). In both, the postoperative course was uneventful; at medium-term follow-up, they did well without signs of LA and pulmonary hypertension, and in the pt with the surgical ASD, the shunt was no more detectable. Of the 4 pts that tolerated acute closure, 1 was operated, because of the large dimensions of the VV; 1 is waiting for transcatheter occlusion; 2 were successfully treated with implantation of an Amplatzer Duct Occluder device in the same procedure. At short term follow-up, they did well and echocardiography confirmed the good result of the embolization.

Conclusions: treatment of late patency of an unligated VV in pts after TAPVR repair is not standardized. The interventional approach had been rarely reported but is a valuable option; however, in cases with a poor compliance of the left ventricle, closure without creation of a pop-off valve is contraindicated. Balloon test occlusion is crucial for the selection of patients; however, it may not always predict the intra- and post-operative adaptation of the left ventricle to the volume challenge.
TRATTAMENTO IBRIDO DEL CUORE SINISTRO IPOPLASICO: DESCRIZIONE DI 8 CASI

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INTRODUZIONE: L'intervento di Norwood nel periodo neonatale presenta, nonostante i progressi della cardiochirurgia, una mortalità elevata. Il trattamento ibrido con settostomia percutanea, stent duttale e bendaggio delle arterie polmonari è stato recentemente utilizzato come alternativa in pazienti con cuore sinistro ipoplasico.

METODI: abbiamo analizzato in modo retrospettivo tutti i pazienti afferiti al nostro centro e sottoposti a trattamento ibrido per cuore sinistro ipoplasico o cardiopatie complesse con atresia o ipoplasia aortica, da febbraio 2012 ad aprile 2013. Di questi, in particolare, abbianno considerato la presenza di diagnosi prenatale, le procedure, i giorni di ricovero, le complicanze cardiache e la mortalità.

RISULTATI: La casistica comprende 8 neonati, 5 maschi e 3 femmine, di cui 2 senza diagnosi prenatale e 6 con diagnosi prenatale, di cui 4 dopo le 23 settimane di gestazione.
La diagnosi era: 6 cuori sinistri ipoplasici, 1 stenosi aortica critica, 1 atresia aortica in ventricolo sinistro a doppio ingresso.
Sono nati con parto spontaneo la metà dei pazienti. L'età gestazionale alla nascita era compresa fra 37 e 39 settimane, il peso neonatale tra 2670 e 3710 g.
Sono stati effettuati 8 trattamenti ibridi, ad un'età compresa tra 1 e 11 giorni. Durante la procedura in 3 casi si è verificata migrazione dello stent, risolta senza problemi. In 2 casi è stato rifatto il bendaggio.
Complicanze nel follow up: difetto interatriale (DIA) restrittivo in 5 pazienti (4 risolti con trattamento percutaneo, 1 con trattamento percutaneo e successivamente chirurgico per grave restrizione del DIA con desaturazione), coartazione aortica da stenosi dello stent in 3 pazienti (con due recidive), trattati per via percutanea.
E' stato effettuato intervento di Norwood e Glenn in 4 casi, ma con take-down Glenn e confezionamento di shunt in un caso. Il numero di ricoveri pre-Norwood, indipendentemente dall'età, è stato tra 2 e 4. I giorni totali di ricovero pre-Norwood sono stati tra 16 e 75.
Tutti i pazienti sono stati sottoposti a cateterismo interventistico post procedura ibrida. C'è stato un solo decesso post-ibrido a 14 giorni di vita. Non ci sono stati decessi dopo l'intervento di Norwood.

CONCLUSIONI: Nella nostra casistica, seppur piccola, le complicanze maggiori sono state restrizione del DIA e coartazione aortica per stenosi dello stent, che hanno determinato diverse ospedalizzazioni per scompenso cardiaco e procedure interventistiche supplementari. Si è verificato un solo decesso pre-Norwood all'inizio della nostra esperienza. Abbiamo avuto un miglioramento dei risultati da quando l'inserzione dello stent è stata effettuata per via transpolmonare. Ulteriori studi, progressivo apprendimento della metodica e un follow-up più lungo sono necessari per dimostrare se il trattamento ibrido sia un'efficace alternativa alla Norwood in pazienti con cuore sinistro ipoplasico.
La chiusura percutanea del difetto interatriale (DIA) è una procedura sicura e con bassa incidenza di complicanze. Tale procedura viene solitamente eseguita in età scolare o ad un peso superiore ai 20 kg. Studi recenti hanno tuttavia dimostrato che l’utilizzo di dispositivi più piccoli, impiantati in età più precoce, potrebbe offrire dei vantaggi in termini di rimodellamento atriale e ventricolare al follow-up a lungo termine.

Scopo dello studio è di analizzare i risultati ed il follow-up a lungo termine dei pazienti affetti da DIA e corretti in età pre-scolare. Dal 2000 al 2012 sono state eseguite 32 procedure di chiusura percutanea di DIA in pazienti aventi età <6 anni (età media 4,1±1,1 anni, mediana 4 anni). Il peso medio dei pazienti era 17,2±4,5 kg (range 7-27 kg), di cui 13 di peso inferiore ai 16 kg. L’indicazione nei pazienti di età inferiore ai 5 anni e di peso inferiore ai 15 kg era correlata alla presenza di shunt paradosso e/o altri difetti congeniti correlati. È stato utilizzato un device Amplatzer Septal Occluder (ASO) in 29 pazienti, un device Amplatzer multi-fenestrato (25 mm) in 1 paziente ed un device Helex (20 e 30 mm) in 2 pazienti. Il diametro medio della protesi ASO utilizzata è stato 16,4 mm (range 9-30 mm) con un rapporto device/peso pari a 1,0±0,5 (range 0,4-2,7). La procedura è stata completata con successo in 31 pazienti, mentre in 1 paziente (età 5 anni, peso 18 kg, diametro del difetto 18 mm) si è verificata una fissurazione della giunzione cavo-atriale e conseguente tamponamento cardiaco durante le manovre di posizionamento del sistema di rilascio 8 Fr, e conseguente sospensione della procedura. Al follow-up (durata 5,0±3,5 anni) non si sono verificate complicanze a lungo termine.

In conclusione, la procedura di chiusura percutanea dei DIA si è dimostrata sicura ed efficace in un sottogruppo di pazienti corretti in età pre-scolare, in particolare quando il peso è superiore ai 15 kg. Il trattamento ad un peso <15 kg si è dimostrato comunque sicuro, sebbene l’indicazione resti circoscritta a casi particolari.
PERCUTANEOUS CLOSURE OF RESIDUAL SHUNTS AFTER INITIAL PERCUTANEOUS PATENT FORAMEN OVALE CLOSURE: SHOULD BE A SOLUTION?

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BACKGROUND: Percutaneous transcatheter closure of patent foramen ovale (PFO) is deemed as an alternative to long-term anticoagulation in patients with paradoxical embolism. Significant residual shunt after percutaneous PFO closure, reported in literature, is about 3%. The management in these cases has not been clearly established in clinical practice.

AIM OF THE STUDY: We reported preliminary data about our experience in the percutaneous closure of significant residual shunt after PFO closure with different approaches tailored to local anatomy and residual shunt feature.

METHODS: From December 2001 to March 2013 184 pts underwent PFO closure at our institution. Transcranial Doppler was performed after 12 months, resulting in significant (shower appearance) right to left shunt in 5 of them. According to features of PFO, different kinds of device were implanted at the primary procedure (n= 1 ASO PFO 30 mm, n=1 ASO PFO 35 mm, n=1 Occlutech 27/30 mm; n=1 ASO cribriform 30 mm, in one patients were implanted two devices ASO MF 30 mm and ASO MF 18 mm).

RESULTS: The patients were evaluated during procedure by transesophageal echocardiography. The residual shunt was intra-prothesic in 3 patients and peri-prothesic in 2 patients. Percutaneous closure was attempted, and successfully completed in all patients with different devices. Four pts needed a single device (Amplatzer Vascular Plug II; Premiere device); one patient needed two devices : (Amplatzer Vascular Plug 4). The procedural and fluoroscopy times were significatively longer than the primary procedure (83,6 + 45 min and 10 + 8 min, p<0,05 vs PFO closure) . Wasn't observed acute complications. Immediate residual shunt occlusion was recorded in all patients.

CONCLUSIONS: Residual PFO shunts can be closed by transcathester approach with different strategies and device according to the characteristics of the residual shunt. In our small series the procedure has proved feasible, even if more cases are required to demonstrate efficacy and safety.
Efficacia della chiusura del dotto di Botallo con dispositivo Amplatzer Duct Occluder II additional sizes a 6-12 mesi dall'impianto

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Il dispositivo Amplatzer Duct Occluder II Additional Sizes (ADO II AS) è di recente entrato a far parte della gamma di protesi a disposizione dell’emodinamista per la chiusura dei dotti di Botallo (DB). La protesi è stata disegnata in maniera simmetrica, e dispone di 9 differenti misure che si distinguono per differenti lunghezza e diametro. Tali protesi possono essere rilasciate indifferentemente per via arteriosa o venosa. La principale caratteristica di queste protesi è il basso profilo e le dimensioni contenute, tanto da poter essere rilasciate con un catetere dedicato 4 Fr ed offrire un ridotto ingombro aortico. Tali protesi sono in grado di occludere i DB di diametro minimo inferiore ai 4 mm.

In questo studio riportiamo l’esperienza nell’utilizzo di questa protesi in un singolo centro specializzato nel trattamento delle cardiopatie congenite ed il relativo follow-up a 6-12 mesi dall’impianto.
Da Marzo a Dicembre 2012 trenta pazienti sono stati sottoposti a chiusura percutanea del Dotto di Botallo, tra questi sette sono stati trattati con protesi ADO II AS. Di questi sette, sei hanno completato con successo la procedura ed uno ha invece necessitato di un altro tipo di protesi per la scarsa stabilità del dispositivo date le ampie dimensioni del difetto (tentativo eseguito con protesi ADO II AS 5-4 mm, DB di morfologia tipo D sec. Kritchenko, diametro min. 3,2 mm; peso 13 kg, chiusura eseguita utilizzando un dispositivo Amplatzer Duct Occluder 6/4 mm). Le protesi utilizzate sono le seguenti: due 5-4 mm, due 5-2 mm, una 4-4 mm ed una 4-2 mm; quattro impiantate per via venosa e due per via arteriosa. La morfologia dei DB (secondo la classificazione di Kritchenko) era di tipo A in tre pazienti, tipo C in uno e di tipo E in due casi; il peso medio dei pazienti era 14 kg (range 5-30 kg), l’età media era 3 anni (range 3 mesi-8 anni) il diametro minimo era 2,4 mm (range 1,5-3 mm). In un caso vi era shunt residuo, di grado lieve, a 24 ore dalla procedura, mentre tutti e 6 pazienti mostravano una completa chiusura del difetto a 6 mesi dalla procedura o all’ultimo controllo disponibile.

In conclusione l’utilizzo delle protesi ADO II AS è sicura ed efficace nei pazienti con DB aventi diametro minimo <3 mm. La chiusura di BD più grandi può essere indaginosa o coronata da insuccessi, e la scelta della protesi deve essere guidata dalla anatomia del difetto e dalle caratteristiche antropometriche del paziente. La protesi conferma la sua efficacia anche al follow-up a medio termine ed è particolarmente utile nei pazienti di età inferiore ad un anno.