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Collaborative European study using the ASDOS device for atrial communications

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Trans-catheter closure of atrial communications using the ASDOS device was attempted in 200 patients in several European centres. The patients age ranged from 1-74 years (32 ± 22). The procedure failed in 26 patients, 20 retrieved at catheter and 6 at surgery. An additional 11 patients underwent surgical removal of the device during the follow up period. There were 163 implants (81%) with a follow up period of 3-36 months (17 ± 8). Thrombus formation around the device was detected in 9 patients within the first 4 weeks and one patient suffered cerebral embolism. Two adult patients developed bacterial endocarditis. Two patients developed transient AV block and another 3 transient supraventricular tachycardia at the time of implantation but there were no late arrhythmias. After one year follow up, 2% had a significant residual shunt and 26% had a small communication. The ASDOS device European experience demonstrates the benefits of this device but also highlights complications which may be reduced by a combination of experience and patient selection.

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Comparison of two self-centering devices (Angel-wings and Amplatzer) for percutaneous closure of atrial septal defects

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Recently the Angel-Wings and the Amplatz device for closure of secundum atrial septal defect (ASD) and patent foramen ovale (PFO) have been introduced. We have compared both devices in a total of 29 consecutive patients.

Results: An Angel-Wings device (\varnothing 18-30 mm) was used in 18 patients (7 children, 4-15 y. and 11 adults, 21-58 y.) to close interatrial defects with a mean stretched diameter of 13 mm (10-19 mm). The Angel-Wings device needs a large sheath (12 + 12F) and is not retrievable. Eight adults had a PFO. 10 patients had an ASD. In 16/18 patients the interatrial defect could be closed without complications. There was only a small residual shunt in 1 child. In 1 child a transient complete AV-block occurred. In another child the device dislodged and resulted in surgical removal and ASD closure one year after implantation. In 4 pts. closure was attempted, but the device was not implanted because the ASD was judged to be too large. The mean fluoroscopy time was 30 min (10-53 min).

An Amplatz device (\varnothing 13-24 mm) was used in 11 patients (4 children, 3 y. and 7 adults, 34-74 y.) to close interatrial defects with a mean stretched diameter of 15 mm (11-23 mm). Two adults had PFO's, 8 pts had an ASD. All attempted closures were successful. There were no residual shunts and no complications. The mean procedural time was 77 min. mean fluoroscopy time was 19 min (11-27 min).

Conclusion: Both devices are feasible, but the Amplatzer appears to have advantages, especially in closing larger ASDs. Procedural

and fluoroscopy time is shorter using of the Amplatz device since the implantation seems to be easier and - because of retrievability - safer than with the Angel-Wings device.

Surgery

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Preparation rather than selection for Fontan's procedure

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Patient selection for Fontan's operation has been largely replaced by patient preparation, so that virtually all patients with non-septatable hearts should theoretically be able to undergo Fontan's operation with minimal risk. We hypothesized that above and beyond the advantage of early reduction of the ventricular volume load by staging, early interventions to eliminate other anatomic and hemodynamic risk factors should ultimately improve outcome. Forty-one consecutive patients underwent a completion Fontan procedure between May 1996 and September 1997. No patients were turned down. Diagnoses were: Hypoplastic Left Heart Syndrome (22 patients, 54%), double outlet right ventricle (6 patients, 15%), tricuspid atresia (6 patients, 15%), single left ventricle (3 patients, 7%), complex transposition of the great arteries (2 patients, 5%), pulmonary atresia with intact ventricular septum (1 patient, 2%), and heterotaxia (1 patient, 2%). Mean age at Fontan was 27 months \pm 8 months. All patients had undergone a prior hemi-Fontan at mean age of 8.4 months \pm 6 months. Twenty-four patients (59%) had also undergone one or more interventions in conjunction with, or separate from the hemi-Fontan but in all cases prior to the completion Fontan in order to eliminate pulmonary artery stenosis or distortion (9 patients, 22%), aortic arch obstruction (5 patients, 12%), systemic ventricular outflow tract obstruction (4 patients, 10%), anomalous venous connections (4 patients, 10%), systemic to pulmonary collaterals (2 patients, 4%), or atrioventricular valve regurgitation (2 patients, 4%). Cardiac catheterization prior to the completion Fontan revealed ventricular EDP 6.7 ± 1.7 mmHg, and QP/QS ratio 0.6 ± 0.07 . The completion Fontan procedure involved only the creation of an intra-atrial or extracardiac pathway directing inferior vena caval blood to the pulmonary arteries. The 41 Fontan operations were accomplished with no deaths, early or late, and no takedowns. Length of hospital stay was 10.4 ± 3.4 days. Staging, and a strategy of early neutralization of anatomic and hemodynamic risk factors results in predictable and favorable conditions for a technically simple completion Fontan procedure that can be accomplished at low risk regardless of the anatomic diagnosis.

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Myocardial cell damage related to arterial switch operation in neonates and the role of pro-inflammatory cytokines

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Objectives: To investigate the role of myocardial depressant pro-inflammatory cytokines on myocardial cell damage related to arterial switch operation (ASO) in neonates.

Methods: 35 neonates (mean age 7 days) with transposition of the

great arteries undergoing ASO were prospectively studied. ASO was performed using combined low-flow cardiopulmonary bypass (CPB) and cardiocirculatory arrest (CCA) under deep hypothermia. Patients with myocardial hypocontractility at the end of the procedure or 4- and 24 hours postoperatively (po), as observed at echocardiography, were defined as having myocardial dysfunction (MD). Troponin-T (Tropo-T) and the creatine kinase isoform CKMB served as markers for myocardial cell damage during and after ASO. Interleukine (IL)-6 (a myocardial depressant cytokine) and IL-8 (involved in ischemia-reperfusion damages) served as marker for the systemic inflammatory reaction related to ASO.

Results: 5 patients showed MD after ASO, all patients survived. Age at ASO, duration of CPB, CCA or aortic clamping were not different in patients with and without MD. In all patients, plasma levels of Tropo-T increased significantly during CPB ($p < 0,0001$). At the end of ASO, patients with MD had significantly higher values of Tropo-T than patients without MD ($p < 0,002$). In contrast to Tropo-T, levels of CKMB did not increase during CPB and were not different in patients with and without MD. IL6 and IL8 increased in all patients during CPB ($p < 0,001$, respectively). Patients with MD had higher IL6 and IL8 values 4 hours po than patients without MD ($p < 0,001$, respectively). Tropo-T- and IL6 values measured 4 hours after ASO were correlated to each other ($p < 0,05$).

Conclusions: Our results demonstrate myocardial cell damage (as shown by Tropo-T liberation) and systemic inflammatory reaction (as shown by IL6- and IL8-production) related to ASO performed with combined low-flow CPB and CCA under deep hypothermia in neonates. Patients with MD have more important myocardial cell damage and higher magnitude of systemic inflammatory reaction than have patients without this complication. IL6 and IL8 both are possibly directly involved in the damage to the myocardial cell in this setting.

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Prognostic value of Troponin-1 in paediatric cardiac surgery

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Background: Troponin-1 (Tn1) is a new, very sensitive and specific marker of myocardial injury in paediatrics. We studied the prognostic value of Tn1 in the early postoperative course after paediatric cardiac surgery.

Methods: We measured Tn1 during the early postoperative hours in 50 children undergoing cardiac surgery involving atrial and ventricular surgical manipulation, and compared the results with the need for catecholamines, renal and hepatic function, and to the duration of intubation.

Results: 8 hours postoperatively, 30 children showed Tn1 values below 25 µg/l (mean 12.8 µg/l, range 2.5–22.8), and in the other 20 children, Tn1 exceeded 25 µg/l (mean 39.8 µg/l, range 25–90). Comparing these two groups, we found statistically significant differences considering Dopamin therapy (mean 102 vs 56 hours, and 730 vs 366 µg/kg; $p < 0.01$) of maximum serum creatinine values (mean 1.54 vs 1.09 x upper limit of norm; $p < 0.01$), serum urea (mean 1.59 vs 0.89 x upper limit of norm; $p < 0.01$), serum transaminases (ASAT, mean 17.2 vs 2.5; ALAT, 4.9 vs 0.7 x upper limit of norm; $p < 0.01$), and longer duration of intubation (mean

3 vs 2 days).

Conclusion: Tn1 allows the assessment of intraoperative myocardial injury and can be used already 8 hours postoperatively as an early predictor of the subsequent course during the intensive care period after paediatric cardiac surgery.

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A new strategy for the surgical treatment of aortic coarctation associated with ventricular septal defect in infants using an absorbable pulmonary artery band

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Background: Decision making for the surgical management of aortic coarctation (CoA) associated with ventricular septal defect (VSD) may be difficult in infants. The alternative is single stage repair versus CoA repair with banding of the pulmonary artery. As a large proportion of the VSD associated with CoA are prone to close spontaneously, we propose a new strategy using CoA repair together with absorbable pulmonary banding.

Methods: Nine infants (mean weight 3050 ± 800 g, range 1435–3800g) underwent a CoA repair with a polydioxanone banding through a posterolateral approach at a mean age of 22 days (8–41 days). Five had a trabecular VSD and 4 a perimembranous VSD (4–7 mm) with isosystemic pulmonary hypertension. The pulmonary band was tightened until the systolic pulmonary pressure felt below 50% of the aortic pressure.

Results: There were no hospital death. The resorption of the pulmonary band was complete after 4.5 months in all patients (3–5.5 months). The VSD closed completely in 2 infants and partially in 6 in whom the pulmonary artery pressure was normal without evidence for significant left-to-right shunt. One patient with a large muscular VSD underwent surgical closure of his defect after 4 months. Finally, a subsequent open heart surgery could be avoided in 89% (8/9) patients.

Conclusion: Provided the VSD belongs to types characterized by a high incidence of spontaneous closure, this effective policy may reduce the number of surgical procedures per infant, in-hospital mortality and morbidity rates. It should be proposed as an alternative in the panel of surgical options in this disease.

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Cytokines as prognostic markers for postoperative complications following pediatric heart surgery with cardiopulmonary bypass

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Release of cytokines following cardiopulmonary bypass (CPB) could be one reason for postoperative complications such as pleural or pericardial effusions, capillary leak syndrome and infection.

Aim: We wanted to examine the suitability of cytokine measurement in serum as possible prognostic markers for postoperative complications.

Methods: Blood was collected from 47 pediatric patients preoperatively, 3 h after CPB and at regular intervals until discharge from the hospital for immediate measurements of serum Interleukin-6 (IL-6), tumor necrosis factor (TNF) and soluble TNF-receptors p55 and p75. IL-6 and TNF-receptors were measured by automated assay on Cobas-Core. These assays are single sample determination and yield the values within 2 hours.