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Incidence and Significance of Pericardial Effusion in Patients with Pulmonary Arterial Hypertension

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Background: The incidence of new pericardial effusion (PEF) during long-term follow-up among patients with pulmonary arterial hypertension (PAH) is unknown. We aimed to determine this incidence and the prognostic significance of developing a new PEF among PAH patients.
Methods: We reviewed records of consecutive patients diagnosed with PAH at a university-based pulmonary vascular disease referral center between January 1990 and May 2010. Patients had systematically undergone right heart catheterization, trans-thoracic echocardiography, and coronary angiography during their diagnostic work-up. PEF was identified and quantified at successive echocardiography studies during follow-up. Effusions were graded as small (echo-free space in diastole <10 mm), moderate (10-20 mm), or large (>20 mm). Mortality predictors were identified by Cox proportional hazard models.
Results: The entire cohort consisted of 154 patients. The prevalence of identified PEF during initial assessment was 28.6%. During a median follow-up of 44 months the incidence of PEF among 102 patients who had no PEF at baseline was 44.1%. Patients who developed PEF during follow-up had no differences with respect to baseline characteristics, associated etiologies, right heart catheterization parameters, and extent of coronary disease. Among these 102 patients, survival estimates were 94.9%, 75.0% and 62.4% at 1, 3 and 5 years, respectively. Development of a PEF that was at least moderate-sized at its first appearance was a predictor of mortality in univariate (HR 6.9; 95% CI 2.6 - 18.1) as well as multivariate analysis (HR 4.0; 95% CI 1.3 - 12.4).
Conclusions: PEF occurs frequently in PAH patients. In patients with no PEF at baseline, the development of a new moderate-size or greater PEF is associated with increased mortality, whereas no significantly increased mortality was observed when a small PEF develops.

Constrictive Pericarditis in the Modern Cardiology Era: Time-Volume Curve Assessment by 4D MRI

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Table 1: Diastolic parameters in normal subjects and constrictive pericarditis

Background: Accurate diagnosis of constrictive pericarditis (CP) is a well-recognized clinical challenge. Since magnetic resonance imaging (MRI) provides high resolution assessment of ventricular volumes, we sought to investigate left and right ventricular time-volume curve using four-dimensional MRI (4DMRI).

Methods: Fourteen patients with pathologically proven CP and 20 normal subjects were included. Three dimensional MRI covering the whole myocardium in the short axis projection was performed using 1.5-Tesla scanner. Left and right ventricular volumes were evaluated over the whole cardiac cycle to generate a 4DMRI dataset for time-volume curve assessment. Diastolic function was assessed via: E/A ratio, time to peak filling rate (TPFR), filling time (FT), calculated as the relative time interval required for recovery of 90% of stroke volume, and diastolic volume recovery (DVR), calculated as proportion of diastole required for recovery of a 90% of stroke volume.

Results: In patients with CP, E/A ratio of both ventricles was significantly higher and the TPFR was significantly lower compared with normal subjects. In addition, FT and DVR were significantly lower for both ventricles in patients with CP compared with healthy subjects.

Conclusion: Non-invasive time-volume curve assessment by 4DMRI may provide detailed diastolic filling profile in patients with CP.

Recent Experience of Pericardiectomy for Constrictive Pericarditis

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Background: Natural history of constrictive pericarditis patients is grave, and they all succumb to right heart failure within months to few years following diagnosis. Surgery is known to alleviate symptoms and to prolong lives of most patients. In the past, surgical pericardiectomy was associated with high operative mortality. We reviewed our recent results with increased surgical experience and experienced post-operative management.

Patients: From 2005 to 2011 26 patients underwent pericardiectomy in our department. The diagnosis of constrictive pericarditis was confirmed using echocardiography and Rt. heart catheterization in all cases, and supported by CT scan and/or MRI. In most patients the diagnosis was 'Idiopathic'. In two patients the etiology was Post Pericardiotmy Syndrome - one and three years following previous AVR. There was one case of Purulent Chronic (Calcified) Pericarditis. All patients suffered from symptoms and signs of right with or without left heart failure (NYHA III/IV). In four patients the procedure was performed in concomitance with other open heart procedure. Except from these - only two cases were performed using cardiopulmonary bypass(CPB). Complete resection of all the necessary constricting pericardium was achieved with or without the use of CPB.

Results: There was no in-hospital mortality. There were two cases of post operative revisions for bleeding. There where 2 late deaths: one patient died due to metastatic Gastric Carcinoma, aspiration pneumonia and sepsis, the second patient who underwent concomitant Tricuspid Valve Annuloplasty died 7 months following surgery due to unresolved Rt. heart failure. At mean follow-up of 38±24 months (range 1 to 71 months) 20 patients are in NYHA class I-II (83%) and 4 are in NYHA class III/IV (17%). Early and late ECHO follow up show complete relief of constriction in all patients.

Conclusion: Recent surgical results provide good early and late outcomes after pericardiectomy.

Intra-Abdominal Pressure-Induced Renal Failure in CHF: Nephroprotective Effects of PDE-5 Inhibition

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Background: The deleterious effects of elevated intra-abdominal pressure (IAP) on the kidneys are widely recognized in abdominal compartment syndrome, visceral edema and laparoscopic surgery. Previously, we demonstrated that rats with congestive heart failure (CHF) exhibited exaggerated sensitivity to the adverse renal effects of elevated IAP compared with sham controls. In the present study we tested whether IAP induces acute kidney injury (AKI), and whether phosphodiesterase-5 (PDE5) inhibition ameliorates the adverse renal effects of elevated IAP in rats with CHF.
Methods: Following a baseline period, rats with high- and low-output CHF induced by the placement of aorto-caval fistula or LAD ligation, respectively, and sham-controls were subjected to consecutive IAPs of 7, 10, or 14 mmHg for 45 min each by CO2 insufflation. Urine flow (V), Na+ excretion (UNaV), glomerular filtration rate (GFR), renal plasma flow (RPF) and NGAL excretion were determined. The effects of pretreatment with Tadalafil (10 mg/day, PO) on the adverse renal effects of elevated IAP were examined in these rats.
Results: While IAP of 7 mmHg in sham-controls did not affect V, UNaV, GFR and RPF, IAPs of 10 and 14 mmHg produced dose-dependent reductions in these parameters. Basal kidney function and renal hemodynamics were lower in both low- and high-output CHF rats. When subjected to 10 and 14 mmHg, CHF rats exhibited exaggerated declines in V, UNaV, GFR, RPF and increased NGAL excretion compared to sham controls. Pretreatment with Tadalafil ameliorated the deleterious renal effects of high IAP in both CHF models.
Conclusions: Rats with CHF are vulnerable to the adverse renal effects of pneumoperitoneum. Tadalafil abolishes renal dysfunction and AKI induced by high IAP, supporting a therapeutic role for PDE5 inhibition in laparoscopic surgery in CHF states.

Pulmonary Hypertension in Heart Failure Patients with Reduced Versus Preserved Systolic Function

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Background: The presence of pulmonary arterial hypertension (PHT) in heart failure (HF) is associated with increased mortality. It is less clear however, whether the prognostic implications of PHT are different between reduced and preserved systolic function HF patients. Accordingly, in the current study we compared between the prevalence and prognostic implications of PHT in 606 reduced systolic heart failure (SHF) patients, and 115 HF patients with preserved systolic function (HFPSF), [defined as LVEF<50% and ¡Ý50%, respectively].

Methods: We evaluated the records of 606 SHF and 115 HFPSF consecutive patients, out of which 133 (22%) SHF and 57 (50%) HFPSF patients had PHT (defined as SPAP>50 mmHg per echocardiogram on their first visit in the clinic). We analyzed the impact of PHT and mortality in these patients.

Results: As expected, comparing to the HFPSF, the SHF patients were younger (mean age 67±11.5 vs.73.1±9.2 years; p=0.001), dominantly male prevalence (78% vs. 40%; p<0.001), and with more frequent ischemic etiology (63% vs. 26%; p<0.001). The NYHA class was similar between the two groups (2.9±0.8 vs. 3±0.7; p=0.265). The prevalence of PHT was more than doubled in the HFPSF patients (50% vs. 22%) and the severity of the PHT was worse in the HFPSF patients (mean SPAP 60±9mmhg vs. 67±14mmHg; p<0.001). During a mean follow-up period of 26 ± 17months, 36% (69 patients) of the PHT cohort died [35% of SHF patients and 38% of HFPSF patients; p=0.742).

Conclusion: The presence of PHT in HF patients in general is associated with a significant increase in mortality. Although compared to SHF the prevalence of PHT is more than twice as common in HFPSF patients and the severity is higher, the mortality rates in both groups were similar (Figure-1).

Pulmonary Endarterectomy for Chronic Thromboembolic Pulmonary Hypertension

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Background: In cases of chronic pulmonary emboli, surgery has the potential to dramatically improve or, in some cases, cure pulmonary hypertention. In large volume referral centers pulmonary endarterectomy is safe and effective surgical treatment. The operative and early post-operative management is complex and experience of the OR and ICU team is considered crucial for obtaining good outcomes. We evaluated the results of pulmonary endarterectomy performed by experienced visiting surgeon (HJS) in non experienced peri-operative setup.

Methods: from 2009, 7 patients who underwent pulmonary endarterectomy for severe pulmonary hypertension. All patients suffered from hypoxemia and significant right heart failure pre-operatively. Bilateral pulmonary endarterectomy was performed under cardiopulmonary bypass with short periods (10-20 minutes) of profound hypothermic circulatory arrest.

Results: All 7 patients survived and had significant decrease in systolic pulmonary artery pressure 94.2 ± 26.6 mmHg vs. 33.7 ± 15.6 mmHg ($p < 0.001$) and pulmonary vascular resistance 697 ± 212 dynxsxcm(-5) vs. 123 ± 54 dyn x s x cm(-5) ($p < 0.001$) postoperatively compared to preoperative data. Mid-term follow-up showed that the cardiac function of all cases returned from NYHA class III-IV to I-II, with great improvement in 6-minute walking distance 308 ± 36 m vs. 486 ± 87 m ($p < 0.01$) and quality of life.

Conclusions: This setup resulted in very low mortality and very good clinical outcomes.