

CORRELATION BETWEEN ECHOCARDIOGRAPHIC ESTIMATION OF THE LEFT ATRIAL PRESSURE AND ITS INVASIVE MEASUREMENT IN PAEDIATRIC PATIENTS FOLLOWING CARDIAC SURGERY

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INTRODUCTION

Correlation between hemodynamic capillary pulmonary pressure and echocardiography E/E' ratio has been widely reported in adults. Our main objective was to assess whether there was a correlation between direct left atrial pressure measurement (by catheter) and the echocardiographic E/E' ratio in children with congenital heart disease after cardiac surgery. It is worth to highlight that there are no medical studies where such a correlation has been investigated.

METHODS

Forty-eight echocardiographic postoperative studies in 27 patients were included prospectively, between March of 2009 and March of 2011, incorporating variables such as thorax condition (open or closed), mechanical ventilation, nitric oxide or inotropic support, which we thought could modify our results. The left atrial catheter was introduced through a pulmonary vein when finishing the operation. E and E' echocardiography waves are showed in figures 1 and 2 respectively. For statistical analysis we used the SPSS (15.0 Version) program.

Figure 1

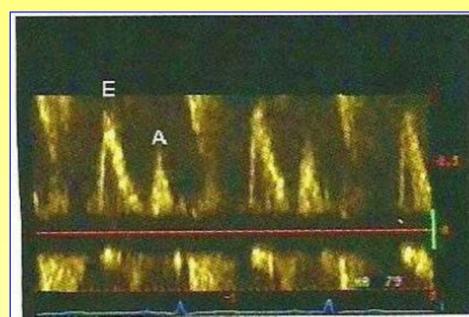
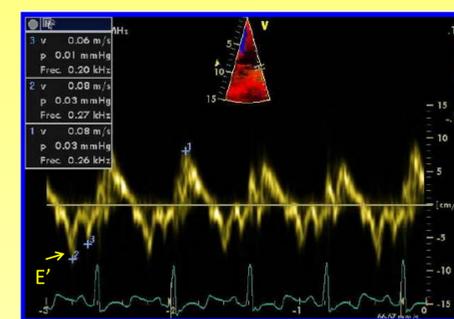


Figure 2



RESULTS

There were 14 male and 13 female, median age 2.7 years old. Transposition of great arteries (7/27), Tetralogy of Fallot (5/27) and atrio-ventricular septal defect (3/27) were the most frequent congenital heart diseases. Overall, the medium left atrial pressure and E/E' ratio were 12,0 and 10,6 mmHg respectively, with a positive correlation of +0,37 (Figure 3). However when selecting only those studies were performed 72h after surgical intervention (n=16), the correlation increased to +0,86 (Figure 4). When we did stratification analysis no notable differences were showed (Table 1).

Figure 3

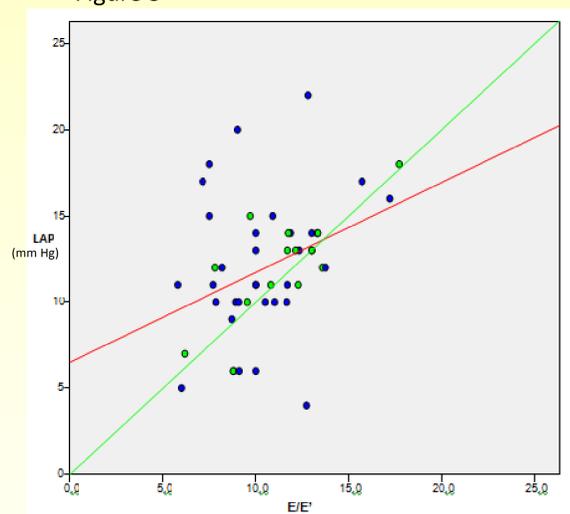


Figure 4

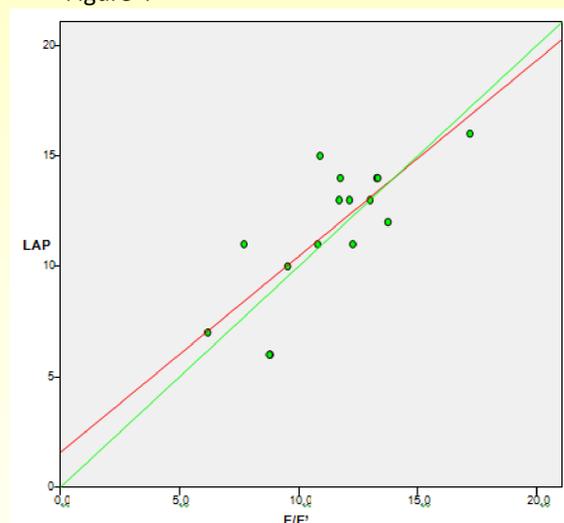


Table 1

E/E'-LAP Correl	Studies (patients)	Global Correl.	Studies (patients) 0-72h	Studies (patients) >72h
General	48 (27)	0,37	32 (25)	16 (9)
Ventilated	36 (20)	0,38	23 (17)	13 (7)
Non Ventilated	8 (6)	-0,22	5 (5)	3 (2)
Nitric oxide	35 (20)	0,34	21 (16)	14 (7)
Non Nitric oxide	8 (7)	0,52	6 (6)	2 (2)
Inotropic Support (IS)	31 (16)	0,28	18 (14)	13 (6)
Non IS	14 (11)	0,1	11 (9)	3 (2)
Opened Chest	13 (6)	-0,04	5 (3)	8 (3)
Closed Chest	12 (7)	0,37	9 (6)	3 (2)

We hypothesize that during the first three days:

- Left atrial pressure is high likely because there is systodiastolic dysfunction (related to the surgical aggression, myocardial ischemia and extracorporeal circulation), positive fluid balance due to post-bypass inflammatory syndrome, and vasopressor support.
- In contrast, E/E' ratio was lower during the first days due to low cardiac output and generates slow blood flow, and hence, smaller E waves.
- After 72h, systolic and diastolic functions improve, cardiac output increases, less vasoactive support is required, and negative fluid balance is generally attained. All these facts make possible a fall in left atrial pressure and an E wave rise.

CONCLUSIONS

Three days after heart surgery, echocardiographic E/E' ratio may be a useful tool to estimate left atrial pressure, which could assist in making more appropriate therapeutical decisions.