Liver stiffness: a new, rapid and non-invasive method of central venous pressure evaluation in patients with congenital heart disease

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Background: Transient elastography is a rapid, noninvasive and reproducible approach to assess liver fibrosis by measuring liver stiffness (LS). However, because the liver is enveloped by a capsule, any variation in parenchymal fluid content could theoretically affect LS. LS has been correlated to central venous pressure (CVP) in an animal model. We aimed to determine the correlation between LS and CVP in children and adults with congenital heart disease.

Methods: In this ongoing prospective study, all patients referred for right heart catheterization were included. Measurements of mean right atrial pressure were obtained under general anesthesia (FiO2=21%) using an Optitorque 5 French catheter. The patients underwent 10 LS measurements (median value taken as representative) by transient elastography (Fibroscan, Echosens, France) within the 24 hours before catheterization. The results of LS are expressed in kilopascals (kPa).

Results: Twenty eight (mean age=9±6 years old, 64% male) and 22 adults (mean age=34±17 yo, 66% male) have been included so far. Catheterism indications were pulmonary angioplasty (n=10), Melody valve implantation (n=4), fenestration occlusion after a Fontan procedure (n=2), aortic coarctation stenting (n=2), atrial septal defect closure (n=8) and pre operative assessment of a complex congenital heart defect (n=24). Mean right atrial pressure was 8.2±3.3 mmHg and mean LS was 8.1±4.4 kPa. Correlation between LS and mean right atrial pressure was excellent for these first 50 patients (r=0.86, p<0.001).

Conclusion: Liver stiffness is a new, rapid and reliable method to evaluate CVP in patients with congenital heart disease. This non-invasive parameter could potentially be useful for patients in whom CVP play a key role, especially in patients with a Fontan circulation.