Profile of Lung Ultrasound in Children With Congenital and Acquired Heart Disease - A Pilot Study

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Background:
Lung ultrasound has been increasingly recognized as a necessary tool in the past few decades. However, lung ultrasound is yet to be applied in pediatric cardiology practice. This is the first study of lung ultrasound in children with heart failure in children.

Methods:
We included 30 children (< 12 years of age) after an informed parental consent. Patient's details including the cardiac diagnosis and presence or absence of heart failure were recorded. Lung ultrasound examination was performed bedside using a probe with a convex or linear tip placed at the level of an intercostal space, using an emission frequency ranging between 4 and 15 MHz. The lung ultrasound profile and B line scores were noted.

Results:
The median age of the patients was 3.5 months (Range 4 days to 8.5 years) and 18 were male. Cardiac diagnosis included cyanotic conditions 18 (60%), and acyanotic conditions including shunt lesions 12 (40%). Overall 17 patients (56.7%) could be classified as having clinical heart failure. Eleven cases (36.7%) were diagnosed as having a pneumonia based on either a C profile or an A/B profile with shred sign positive on lung ultrasound. Two patients had a collapse and in one of them the collapse was not evident on chest radiograph. The detection of consolidation by lung ultrasound was more frequent than by chest radiographs.

The distribution of B lines as assessed by the B line score was found to be significantly correlated with the presence of heart failure. When the semi-quantitative B-line score was analyzed, it showed a good correlation with the Ross Heart Failure class (Gamma – 0.94 and r = 0.87), but a poor correlation with the radiographic pulmonary venous hypertension (Gamma 0.67 and r = 0.49).

Conclusion:
Lung ultrasound can be safely and easily performed in pediatric cardiology patients. The presence of B lines was strongly associated with the presence and degree of heart failure. Lung ultrasound had better sensitivity in detecting lung collapse and pneumonia.