

Prognostic Potentialities of Lung Ultrasound Findings in Children Undergoing Cardiac Surgery for Congenital Heart Disease

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Background: Lung ultrasound (LUS) is gaining consensus for the diagnosis of pulmonary disease in acute setting. Despite pulmonary complications are very common in pediatric cardiac surgery. The use of LUS remain limited. Our aim was to test the prognostic potentialities of LUS in pediatric cardiac surgery.

Methods: in 120 children (mean age: 2.8+/-4.6, range: 0.09-20) undergoing pediatric cardiac surgery, LUS examinations have been performed at 12-48 hours, after surgery. For each hemi-thorax 3 major areas (anterior/lateral/posterior) have been evaluated separately. The presence and the degree of the following have been evaluated: 1) pleural effusion and atelectasis, classified with a score from 0 to 3 (none/trivial, small, moderate, and large) 2) pulmonary congestion assessed as percentage of B-lines (from 0 to 100% in each segment and globally). Primary end-point were: time to extubation (TE) and time of intensive care unit (ICU).

Results: B lines were present in all post-operative patients (Table 1). Right pleural effusion was diagnosed in 28% (20% mild, 6% moderate); and left pleural effusion in 42% (36% mild, 5% moderate, 1% severe). Atelectasis in the right lung were found in 64% (47.4% mild, 12% moderate, 7% severe), while left atelectasis in 75% (50% mild, 18% moderate, 9% severe).

At univariate analysis significant correlation of B-lines with time to extubation and ICU time were noted. The correlations were significant in all scanning areas with only slightly differences among segments (Table-1). Severe left atelectasis was positively associated with extubation time ($p=0.05$).

At multivariate analysis linear regression: the percentage of B lines in the anterior areas was identified as an independent variables for extubation time (95% CI: 0,16-1,79, $p=0,019$)

Conclusions: LUS findings, particularly the degree of pulmonary congestion, may have a significant prognostic relevance in pediatric cardiac surgery. Further studies are required to validate and reinforce these data.

Table-1: B lines at 12-48 hours: incidence and correlation with outcome.

B Lines	Percentage	Time ICU	Time to extubation
Global score	57% +/-21	$r=0,17$, $p=0,09$	$r=0.25$, $p=0.02$
Posterior segments	55,7% +/-28	$r=0,1$, $p=0,2$	$r=0,25$, $p=0,03$
Anterior segments	41% +/-19	$r=0,32$, $p=0,01$	$r=0,2$, $p= 0.01$
Lateral segments	44 % +/-19	$r=0,2$, $p=0,03$	$r=0.22$, $p=0.01$