

Son Pham**Block 921 Feb 2017**

Daswani DD, Shah VP, Avner JR, Manwani DG, Kurian J, Rabiner JE. Accuracy of point-of-care lung ultrasonography for diagnosis of acute chest syndrome in pediatric patients with sickle cell disease and fever. *Academic Emergency Medicine*. 2016 Aug; 23(8):932-40.

Background

Acute chest syndrome (ACS) is the leading cause of death and 2nd leading cause of hospitalizations in children with sickle cell disease (SCD). 1/3 of all SCD pts will have it at least one, and incidence in SCD pts with fever is 17%. Diagnosis by history, exam, hypoxia is low, 1/2 will have no physical findings. Pulmonary infiltrate on CXR is the gold standard. Lung ultrasound has high spec and sens for lung consolidation for pneumonia with decrease in 39% CXR usage and 48-minute reduction in ED time in peds.

Method

Prospective observational study from August 2013 to February 2015 in a single urban pediatric ED. Ages 7 to 21 with known SS, SC, S-beta thalassemia, or SD with fever greater than 100.4 within 24 hours requiring CXR. Excluded if they had a CXR for fever within 5 days or ACS diagnosis within 6 weeks of presentation (radiographic findings could still be present). Pts eligible for inclusion more than once. All patients had POCUS by an independent pediatric EM physician given 1 hr of training. CXR's were also obtained from all patients. Clips were reviewed by trained pediatric sonologists blind to the clinical information. Follow-up calls were made within 4 weeks.

Positive US pulmonary consolidation = hepatization of lung with loss of A-lines & disruption pleural line
Air bronchograms = bright hyperechoic areas in consolidation (air in bronchioles w/fluid in alveoli)

Results

116 febrile events from 91 patients, median age of 5.7 years. Only 6 patients had sat below 92% and only 1 of those had ACS on LUS and CXR.

CXR was positive for 15/116 events. POCUS positive for 19/116 events, sensitivity was 85% and specificity was 95%. The average time to perform POCUS was 9 minutes. 1 patient did not have f/u and was assumed to have no ACS; negative US and CXR. 3 with positive CXR within 7 days after negative CXR.

Primary outcome was POCUS compared to XR. 2 cases of infiltrates missed in the RUL field with positive CXR; both read as positive by trained sonologists. All patients with positive CXR and POCUS had consolidation at the same location. There were 6 positive LUS with negative CXR, 5 were all in the lower left lung base due to gastric air bubble or spleen intrusion. The 6th had a negative CXR and was treated for ACS later on, without a repeat CXR, presumed too early for CXR detection.

Secondary outcome was inter-observer agreement between PEM physicians and PEM sonologists. 14 novice PEM had a sensitivity of 82% and specificity of 91%, 1 previously trained PEN had sensitivity and specificity of 100%.

Discussion

Location on CXR and LUS were similar. Areas of concern are FP LLL field due to spleen/air bubble and FN RULF due to thymus or retrocardiac/perihilar for consolidation not reaching pleura. Can decrease rad dosage and ED time for pts. POCUS may also detect ACS earlier due to smaller consolidation not seen on CXR, but it has a steep learning curve.

Limitations of the study were a small sample size from a single institution. US is an operator dependent modality which was not controlled for. The obtaining sonologists were aware that the pts all had SCD and fever, and they were aware if the patient was in respiratory distress or on supplemental oxygen.
