Lung Ultrasound: A New Toll for the Diagnosis of Retro-Sternal Clots in Children Undergoing Cardiac Surgery

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Background: Lung ultrasound (LUS) is gaining consensus as a useful tool for detecting many pulmonary abnormalities; however, its use in pediatric cardiac surgery remains extremely limited.

Methods: From January 2014 to October 2014, 270 LUS examinations have been performed in 85 children and young adults (mean age 24.8 ± 73 months) after cardiac surgery for congenital heart disease at a single Center. LUS was performed with a linear 9 MHz probe (Philip IE-33) following the 8-zone scheme. At the beginning LUS was performed to evaluate common pulmonary complications after cardiac surgery (i.e. pleural effusion, diaphragmatic paralysis, pneumothorax). With time, particularly after the first case of incidental diagnosis of retro-sternal clot, we extended to the evaluation of retro-sternal clots/hematomas.

Results: Retro-sternal clots were diagnosed in 21 (25%) at different times after surgery. In 2 cases clots were of large size squeezing the lung and causing difficult to extubation and required surgical revision. In 6 cases clots were moderate to large causing a mild compression to the heart and/or lungs. Since patients were only mildly symptomatic we decided on echographic follow-up alone and a reduction of clots was noted. In the remaining cases, the majority of our serie (70%), clots were small with no haemodynamic consequences. All clots with no heart compression, although voluminous, were not diagnosed at trans-thoracic echocardiography, and at x-Ray they were misinterpreted as atelectasis/effusion. In cases with heart compression the presence of clots was usually suspected at trans-thoracic echocardiography, but only LUS allowed to clearly define their nature, the spatial relationship and linear quantification.

Conclusions: LUS may lead to a new diagnosis of unknown retro-sternal clots as well as a better definition of those incidentally detached at echocardiography, potentially leading to less need for more complex, ionizing and expensive examinations. Prospective studies are needed to clarify the potential/limitations of LUS in pediatric cardiac surgery.

Figure-1. Case-1. A large (40x25 mm) retro-sternal clot, mainly located in the right hemithorax with no clear relationship with heart is visualized at LUS and was confirmed at CT scan (B). The clot is delineated superior by the sternum/ribs and inferior by the pleural line.