The ultrasound image patterns at the early stage after birth can predict health neonates —-a nested case-control study

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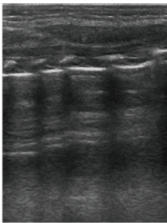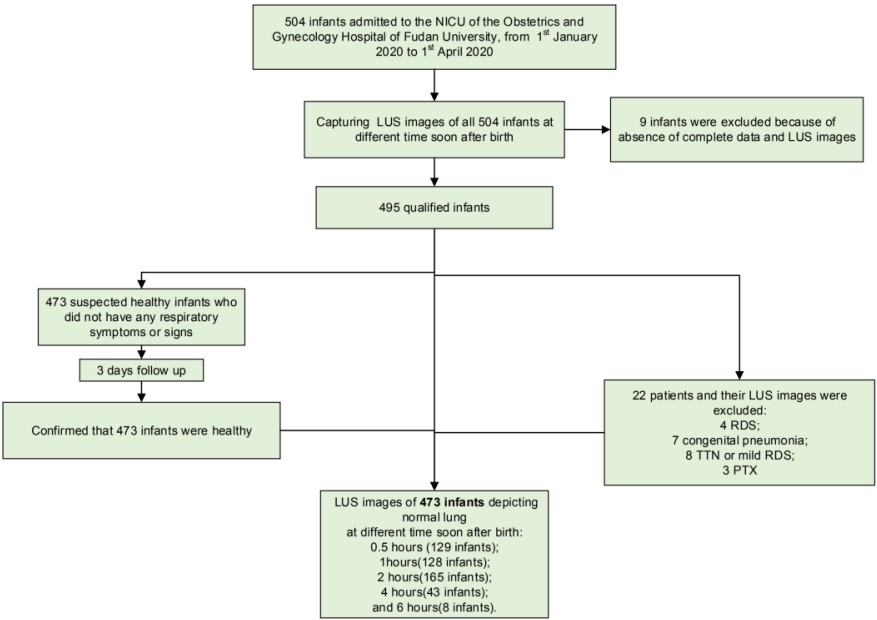[1]Obstetrics and Gynecology Hospital of Fudan University

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Abstract

Abstract Purpose To distinguish healthy infants from potential patients right after birth using lungultrasound(LUS). Design, Setting and Patients This is a nested case-control study containing 22 lung diseases patients and 473 healthy infants from a total of 504 successive infants. They are admitted to Obstetrics & Gynecology Hospital of Fudan University, Shanghai, China, from 1st January 2020 to 1st April 2020. A newly designed scanning protocol is used to capture LUS images. Sensitivity, specificity, PPV and NPV for predicting healthy infants and patients were calculated individually. The transition process image patterns and thier variation were shown. The relationship between clinic signs and the high-risk image patterns was calculated by Kendall's tau-b test. Measurements and main results LUS images were captured and its preditive value has been caculated. Four low-risk patterns almost only can be seen in healthy infants(specificity=86.4%, PPV=99.0%) whereas four high-risk patterns can be seen both in healthy infants and patients(specificity=62.4%, PPV=9.6%). High-risk patterns are more likely to be pathological when appearing at oxter and lower back but to be a physiological sign when appearing at Lower and upper of the prothorax. These high-risk patterns are significantly related to clinic sign. All these patterns are alsmost consistent during 6 hours after birth. Conclusions LUS is valid to differentiate healthy infants from potential patients who with mild respiratory difficulty. Four low-risk patterns have high value to predict healthy infants, but four high-risk patterns are not specific enough to discover patients. This criterion is valid for this 6 hours stage.
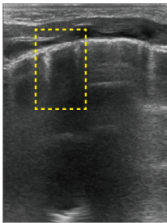
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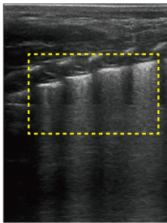
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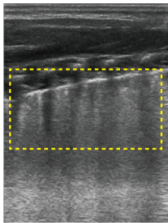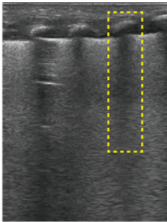
504 infants admitted to the NICU of the Obstetrics and Gynecology Hospital of Fudan University, from 1st January 2020 to 1st April 2020

Capturing LUS images of all 504 infants at different time soon after birth

9 infants were excluded because of absence of complete data and LUS images

495 qualified infants

473 suspected healthy infants who did not have any respiratory symptoms or signs

3 days follow up

Confirmed that 473 infants were healthy

22 patients and their LUS images were excluded:
4 RDS;
7 congenital pneumonia;
8 TTN or mild RDS;
3 PTX;

LUS images of **473 infants** depicting normal lung
at different time soon after birth:
0.5 hours (129 infants);
1hours(128 infants);
2 hours(165 infants);
4 hours(43 infants);
and 6 hours(8 infants).

A	B	C	D
Pure A-line	small amounts of DB	moderate amounts of DB	large amounts of DB

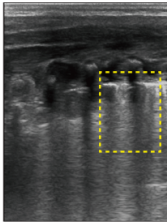**LOW-RISK**

HIGH-RISK
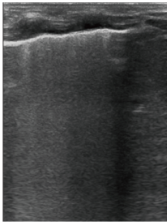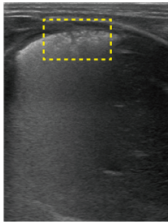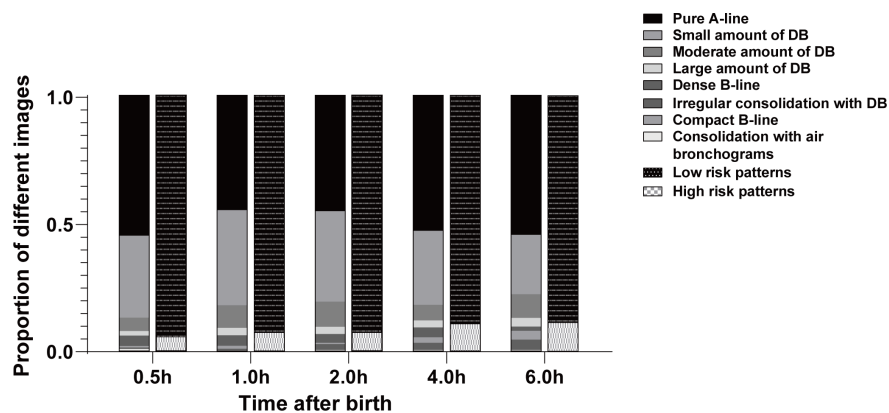
E	F	G	H
compact B-line	Dense B-line	irregular consolidation with DB	mild consolidation with air bronchograms

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