Correlation of observed-to-expected total fetal lung volume (o/e TFLV) to intrathoracic organ herniation on MRI in fetuses with isolated left-sided congenital diaphragmatic hernia

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Objective

To assess the relationship between the position of the stomach and the amount of herniated organs into the thorax and the observed to expected total fetal lung volume (o/e TFLV), which is a measure of pulmonary hypoplasia in fetuses with isolated left sided congenital diaphragmatic hernia (LCDH).

Methods

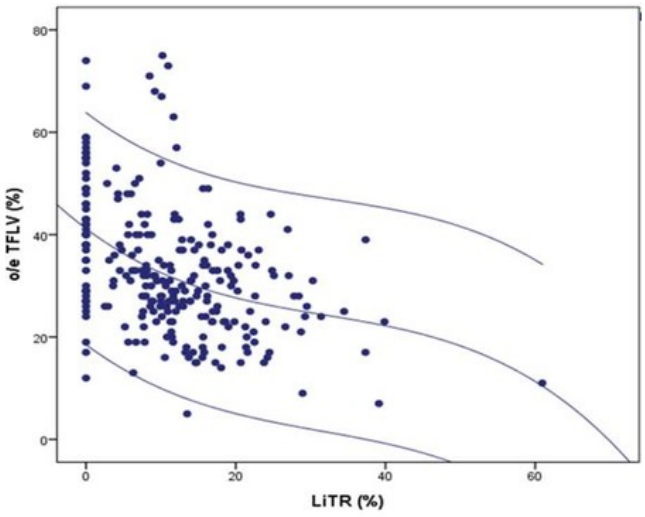
Single center study on archived MR images of fetuses evaluated for isolated LCDH over a 11 year period. We retrieved the gestational age at MR examination, the o/e TFLV and liver position. Images were also reviewed to retrospectively determine the position of the stomach as well as the proportion of the volume of fetal stomach, viscera and liver into the thorax to the total thorax volume. All the latter measurements were done by a single operator. Following confirmation of reproducibility, we correlated the volumes of intrathoracic organs and stomach position to the o/e TFLV.

Results

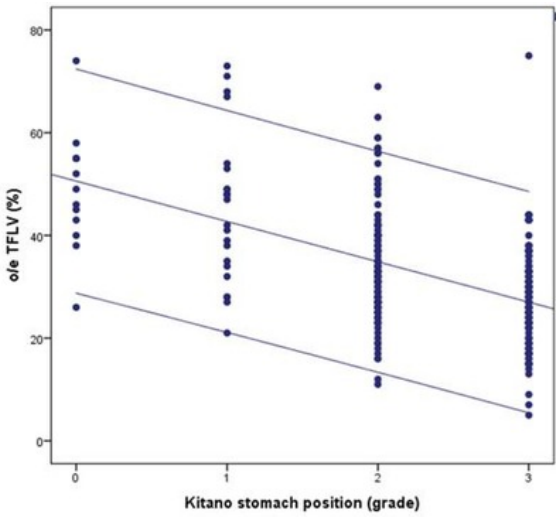
205 fetuses underwent 259 MR examinations. The reproducibility of organ volume measurements was excellent (range of ICC: 0. 928-0. 997). The average time spent on each intrathoracic organ volume was 5-10 min. From all herniated organs, the liver-to-thoracic volume ratio (LiTR) correlated best to o/e TFLV (R=-0. 429). Stomach volume did not correlate to the o/e TFLV but the stomach position inversely correlated with the o/e TFLV.

Conclusion

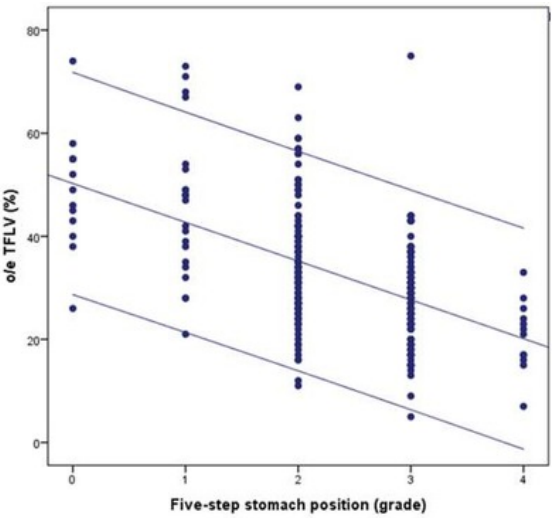
We observed an inverse relationship between the lung volume and the degree of liver herniation as well as the position of the stomach into the chest.



(R=-0.429**, p<0.0001)



(R=-0.469**, p<0.0001)



(R=-0.485**, p<0.0001)