

Longitudinal MRI-derived observed-to-expected total fetal lung volume in non-isolated congenital diaphragmatic hernia

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OBJECTIVES

To evaluate predictors of observed-to-expected total fetal lung volume (o/e TFLV) in non-isolated congenital diaphragmatic hernia (CDH) and determine whether structural and genetic subgroups independently influence prenatal lung volume.

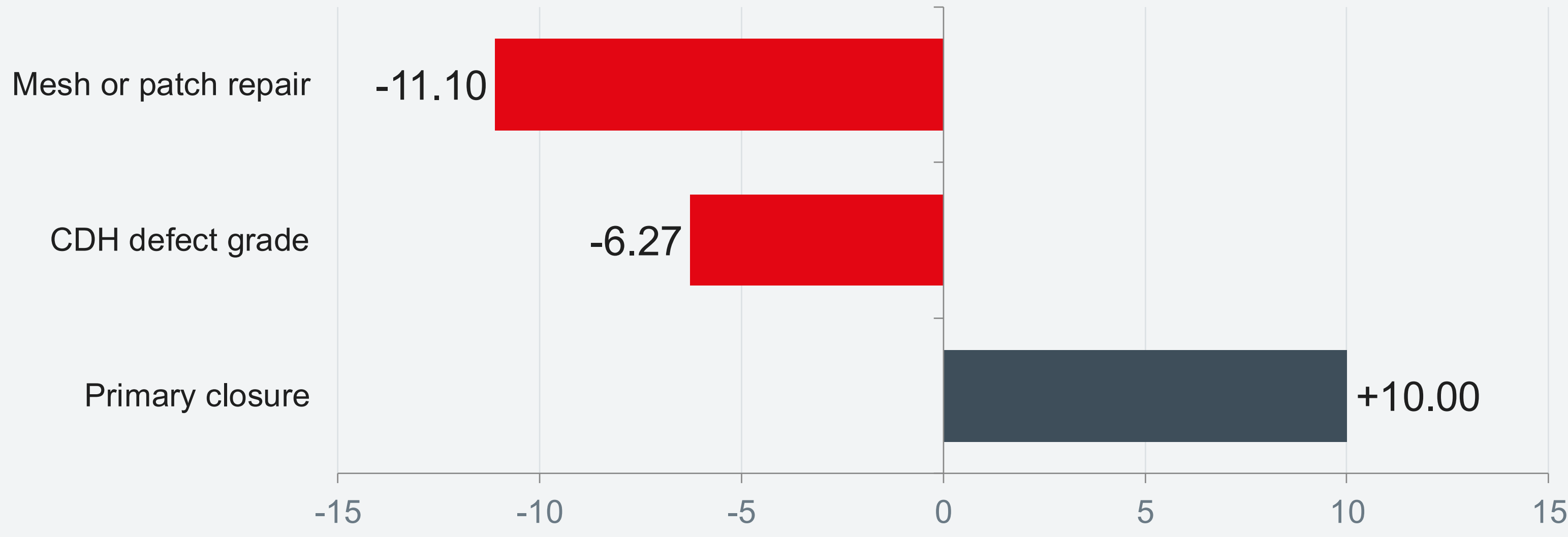
METHODS

This retrospective cohort study included fetuses diagnosed with non-isolated CDH cases with serial MRI measurements at a tertiary center between 2012 and 2025. Cases were categorized into three subgroups: structural, genetic, structural + genetic. Longitudinal mixed-effects regression models assessed o/e TFLV over time, adjusting for anatomical severity, surgical variables, survival, and pulmonary hypertension.

RESULTS

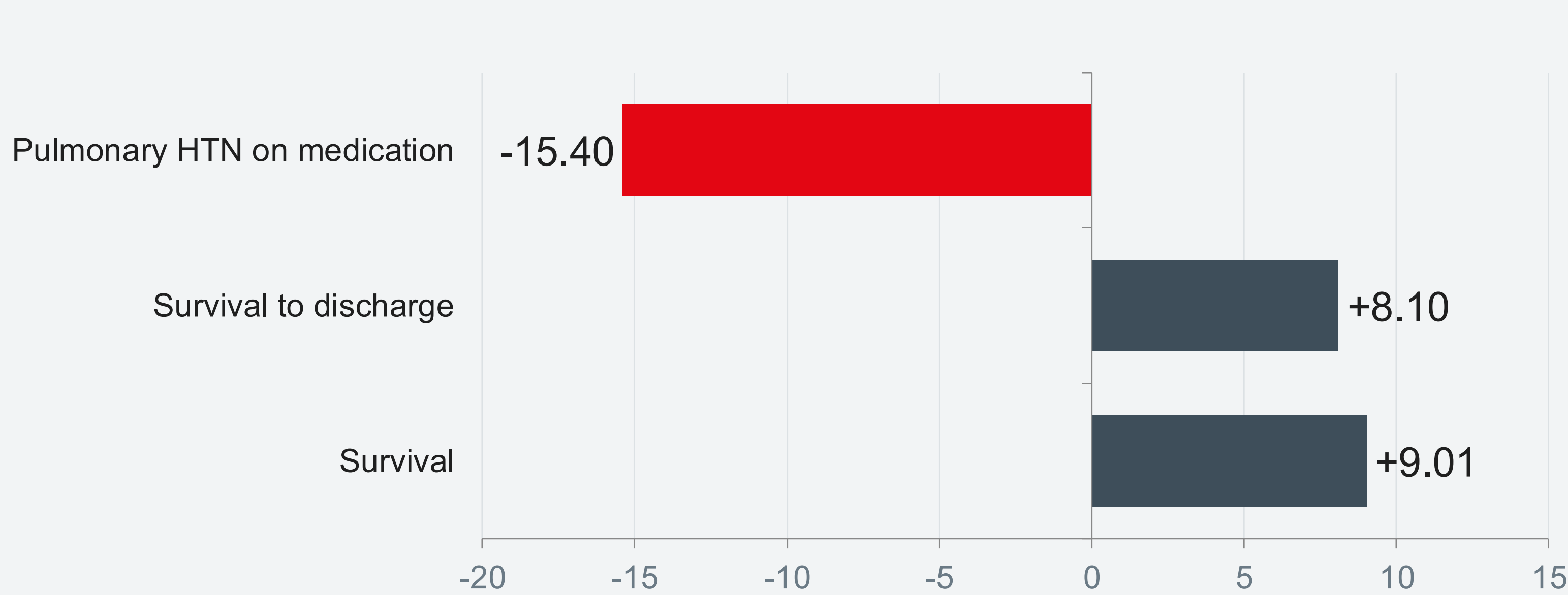
Higher CDH defect grade was independently associated with lower o/e TFLV (β -6.27% per grade increase, $p<0.001$), as was mesh or patch repair (-11.1 , $p<0.001$). Primary closure was associated with higher o/e TFLV ($+10.0$, $p<0.001$). Pulmonary hypertension requiring medication showed the strongest association with reduced o/e TFLV (-15.4 , $p<0.001$). Survival and survival to discharge were associated with higher o/e TFLV ($+9.01$ and $+8.10$, respectively). Non-isolated subgroup classification was not independently associated with o/e TFLV.

FIGURE 1. ANATOMICAL AND SURGICAL PREDICTORS



Adjusted β coefficients for o/e TFLV (%), defect grade per grade increase. All $p < 0.001$. Negative values indicate lower lung volume.

FIGURE 2. OUTCOME-ASSOCIATED PREDICTORS



Adjusted β coefficients for o/e TFLV (%). Pulmonary hypertension requiring medication, $p < 0.001$. Non-isolated subgroup classification was not independently associated with o/e TFLV.

AT A GLANCE

Adjusted β coefficients for o/e TFLV (%)

-15.4
pulmonary hypertension requiring medication

-11.1
mesh or patch repair

+10.0
primary closure

-6.27
per CDH defect grade increase

CONCLUSIONS

In non-isolated CDH, longitudinal MRI-derived lung volume is strongly associated with anatomical severity and postnatal outcomes. However, the type of non-isolated comorbidity; structural, genetic, or both does not independently determine fetal lung volume after adjustment for severity markers. These findings suggest that the o/e TFLV is not different between the three non-isolated CDH groups and that the outcomes are driven primarily by anatomical severity rather than associated comorbidity category.