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Preferential ductus venosus streaming towards the right side of the heart may contribute to poorer outcomes in fetuses with left diaphragmatic hernia and intrathoracic liver herniation ('liver-up')

In their systematic review and meta-analysis, Mullassery and colleagues focus on the detrimental impact of intrathoracic liver herniation ('liver up') on outcome in fetuses with left diaphragmatic hernia¹. Given the large variability that can be observed in the amount of liver herniated into the fetal chest, the authors call for 'the development of an internationally accepted grading system' to further stratify fetuses with diaphragmatic hernia based on liver position. The purpose of our letter is to point to an observation that we made some years ago and that has ever since been routinely used for more detailed description of this condition at our center.

We observed that, in fetuses with left diaphragmatic hernia, an intrathoracic liver herniation ('liver-up') is almost always associated with preferential streaming of the ductus venosus towards the right side of the heart. In stark contrast, in most fetuses with this condition and an intra-abdominal liver position ('liver down'), this flow abnormality is not observed.

Distinct ultrasound findings with potentially detrimental impact on outcome associated with preferential streaming of the ductus venosus towards the right side of the heart can be summarized as follows: on one hand, this flow pattern is associated with significantly smaller left than right heart structures². We speculate that this observation results from decreased preload of the left heart via the foramen ovale. On the other hand, this flow pattern is associated with lower baseline lung blood flows and impaired vasodilatation or even vasoconstriction during materno-fetal hyperoxygenation in late gestation³. We speculate that these flow anomalies may result from chronic exposure of the fetal pulmonary circulation to blood of a higher oxygen content than normal

from admixture of oxygen-rich ductus venosus flow over long periods of gestation.

Taken together, abnormal ductus venosus streaming may be the unifying key finding for explaining the relationship between liver position, left heart hypoplasia, persistent pulmonary hypertension and poor outcome so often observed in fetuses with severe left diaphragmatic hernia⁴. We hope that this finding may prompt further studies by interested colleagues to further improve outcome prediction and selection for prenatal intervention in fetuses with this condition.

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