

[11-111]

## Automated Fetal Lung Segmentation on MRI for Volumetric Assessment Across Pulmonary Hypoplasia-Associated Disorders

Jungwhan John Choi<sup>1,2</sup>, Shruti Hegde<sup>2</sup>, Jonathan Dudley<sup>2</sup>, Laura Galganski<sup>1</sup>, Beth Kline-Fath<sup>1,2</sup>, Elanchezhian Somasundaram<sup>2</sup>, Jonathan Dillman<sup>2</sup>

<sup>1</sup>Cincinnati Childrens Hospital Medical Center Fetal Care Center

<sup>2</sup>Cincinnati Childrens Hospital Medical Center Department of Radiology and Medical Imaging

**Objective:** To evaluate a deep learning model for automated fetal lung segmentation on MRI and assess its performance for volumetric estimation across disorders associated with pulmonary hypoplasia.

**Methods:** In this retrospective study, 906 fetal MRI examinations performed between 2016 and 2025 underwent expert manual lung segmentation on T2-weighted images. Cases included a broad spectrum of pulmonary hypoplasia-associated conditions, including congenital diaphragmatic hernia, renal anomalies with oligohydramnios, skeletal dysplasia, and other structural abnormalities. A 3D full-resolution nnU-Net model was trained using 5-fold cross-validation for automated lung segmentation. Model-derived total lung volume (TLV) and percent predicted lung volume (PPLV) were compared with manual reference standards using Dice similarity coefficient (DSC), intraclass correlation coefficient (ICC), and absolute percentage error.

**Results:** Automated segmentation demonstrated strong agreement with manual volumetry for TLV estimation, with mean DSC  $0.81 \pm 0.10$  and ICC 0.955. Agreement for PPLV was moderate-to-good (ICC 0.727). Performance was generally robust across gestation, with greater variability in earlier gestation and in severe motion or extreme pathology. Mean inference time was approximately 4 seconds per case.

**Conclusion:** Automated fetal lung segmentation on MRI is feasible and accurate for rapid volumetric assessment, supporting scalable quantitative evaluation of pulmonary hypoplasia in clinical and research settings.

[11-112]

## Preliminary Extraction of Fetal Lung MRI Radiomic Features Across Pulmonary Hypoplasia-Associated Disease States

Jungwhan John Choi<sup>1,2,3</sup>, Jonathan Dudley<sup>2</sup>, Elanchezhian Somasundaram<sup>2,3</sup>, Foong-Yen Lim<sup>1</sup>, Lili He<sup>2,3</sup>, Paul Kingma<sup>1</sup>, Jonathan Dillman<sup>2,3</sup>

<sup>1</sup>Cincinnati Childrens Hospital Medical Center Fetal Care Center

<sup>2</sup>Cincinnati Childrens Hospital Medical Center Department of Radiology and Medical Imaging

<sup>3</sup>University of Cincinnati College of Medicine Department of Radiology

**Objective:** To evaluate the feasibility of extracting quantitative fetal lung MRI radiomic features across prenatal disease states associated with pulmonary hypoplasia.

**Methods:** In this retrospective feasibility study, fetal lung segmentations were performed on clinical T2-weighted fetal MRI examinations from fetuses with lung development-affecting conditions, including congenital diaphragmatic hernia, renal anomalies with oligohydramnios, skeletal dysplasia, fetal growth restriction, and other structural anomalies. Lung regions of interest were manually segmented on coronal T2-weighted images and reviewed by fetal imaging specialists. Radiomic features describing fetal lung intensity, shape, and texture were extracted using a standardized feature-extraction pipeline. Preliminary analyses assessed feature availability, technical feasibility, and variation across gestational age and diagnostic categories.

**Results:** Radiomic feature extraction was technically feasible across heterogeneous fetal lung disease states, including severe pulmonary hypoplasia phenotypes. Extracted features captured differences in lung size, morphology, signal intensity distribution, and texture beyond conventional volumetric assessment. Feature distributions varied by gestational age and disease category, supporting the need for gestational age-normalized modeling and disease-specific outcome validation.

**Conclusion:** Preliminary fetal lung MRI radiomics extraction is feasible across multiple pulmonary hypoplasia-associated conditions. These quantitative biomarkers may provide complementary information to lung volume and support future predictive modeling of postnatal respiratory outcomes.

[11-113]

## Location, Location, Location: The Real Estate of Fetal Lung Lesions

**Edward Raymond Oliver**

Childrens Hospital of Philadelphia Radiology

**Objective:** To assess the accuracy of prenatal ultrasound (US) and MRI in predicting lobe of origin for intralobar congenital lung lesions.

**Methods:** Single-center retrospective review of solitary intralobar lung lesions with prenatal imaging and postnatal surgery from 2013-2025. Prenatal imaging reports were reviewed for predicted lobe location and lesion size as determined by CVR. Prenatal localization was assessed against postnatal surgical location. Each modality's accuracy was analyzed by lobe of origin and baseline CVR.

**Results:** Of 463 surgically confirmed solitary intralobar lung lesions, all had US and 38.4% had MRI. Median baseline CVR was 0.62 (range, 0.03–4.8). Both modalities demonstrated high accuracy in lobe localization (US, 84.7%; K=0.79; MRI, 87.7% [K=0.82]). By US, median CVR was higher for incorrectly localized lesions compared to correctly localized lesions (0.91 vs 0.56,  $p<0.001$ ). The lowest localization rates were for right middle lobe lesions (US, 23.1%; MRI, 50.0%) and lesions >1 lobe (US and MRI, 0%). Accurate lobar localization for remaining lobes was 80–99% for US and 71–94% for MRI.

**Conclusions:** US and MRI can have high accuracy in predicting lung lesion location; however, accuracy is inversely related to lesion size. Utilizing both modalities may be helpful when localization is important for management.

[11-114]

## PREDICTIVE MODELING OF NEONATAL OUTCOMES IN NON-HYDROPIC FETUSES WITH LUNG MALFORMATIONS: RESULTS FROM A NATIONAL COHORT OF MAJOR CHILDREN'S HOSPITALS

Latoya Stewart<sup>1</sup>, Shaun Kunisaki<sup>1</sup>, John Schomberg<sup>2</sup>, April Carlson<sup>2</sup>,  
Nicole Bertaux<sup>1</sup>, Kyra Halbert-Elliott<sup>1</sup>, Peter Yu<sup>2</sup>, Terry Buchmiller<sup>3</sup>,  
Tayana Jean Pierre<sup>3</sup>, Joseph Church<sup>4</sup>, Vincent Duron<sup>5</sup>

<sup>1</sup> Johns Hopkins Hospital Pediatric Surgery

<sup>2</sup> Childrens Hospital of Orange County Pediatric Surgery

<sup>3</sup> Boston Childrens Hospital Pediatric Surgery

<sup>4</sup> C. S. Mott Childrens Hospital Pediatric Surgery

<sup>5</sup> Columbia University Morgan Stanley Childrens Hospital Pediatric Surgery

**Purpose:** Fetal congenital lung malformations (CLMs) represent a heterogeneous spectrum of anomalies associated with variable perinatal outcomes. We aimed to develop and evaluate a simple prediction model of adverse neonatal outcomes in non-hydopic term fetuses diagnosed with a CLM.

**Methods:** We conducted a retrospective, multicenter cohort study of fetuses with an isolated CLM. Hydopic and premature fetuses were excluded. Prenatal variables were correlated with the primary outcome, neonatal resection. Secondary outcomes included respiratory distress at birth, need for supplemental oxygen, and mechanical ventilation.

**Results:** Among 1420 meeting inclusion criteria, 19.3% had respiratory symptoms at birth, 16.5% required supplemental oxygen, 5.8% utilized mechanical ventilation, and 6.4% underwent neonatal resection. On multivariable analysis, maximum CVR (OR 2.5[95% CI 1.8-3.6],  $p<0.001$ ), maternal steroids (OR 3.6[CI 1.6-8.8],  $p<0.01$ ), and mediastinal shift (OR 2.9[CI 1.1-8.9],  $p=0.04$ ) were significant predictors of neonatal resection (AUC 0.88[CI 0.83-0.93]). Maximum CVR was also an independent predictor of respiratory distress at birth, supplemental oxygen, and mechanical ventilation.

**Conclusions:** We have successfully developed a simple prediction tool to estimate risk of four distinct adverse neonatal outcomes in non-hydopic fetuses with CLMs. These findings may aid delivery planning and enhance prenatal counseling by providing patient-specific information on the anticipated postnatal hospital course.

[11-115]

## **Congenital Lung Malformations: Current Trends in Diagnosis and Management among Infants in the United States**

**Marisa Eve Schwab**

Stanford University Division of Pediatric Surgery

**Background:** Congenital lung malformations (CLM) are commonly screened for on prenatal diagnostic testing and are an index pediatric surgical condition. The objective was to evaluate the national trends in CLM births and resection among infants born between 2017 and 2023.

**Methods:** This retrospective analysis used MarketScan Commercial Database. ICD-10 codes were used to identify patients with CLM (2017-2023), confirmed by cross-sectional chest imaging CPT codes.

**Results:** We identified 2.15 cases per 10,000 patients. CLM incidence rose from 1.80 per 10,000 in 2017 to a peak of 2.67 in 2022. In a multivariate model, odds of CLM diagnosis did not significantly change with year of birth or sex, but living in the Southern United States was associated with lower odds of diagnosis (aOR=0.72 (95% CI 0.53-1.08), p=0.03). Among CLM patients, 47.72% underwent resection, most commonly during the first year of life (96.18%). Over the time course of the study period, we observed a trend in decreased resection rates. Of those who underwent resection, 21.21% received care in a state different from their home state.

**Conclusions:** This is the first contemporary, population-based study of CLM occurrence among United States infants. The migration of care may reshape healthcare utilization and has equity implications.

[11-116]

## **Navigating Uncertainty or Preparing for the Future: A Qualitative Study of Parental Experience with Congenital Lung Malformations**

**Marisa Eve Schwab**

Stanford University Pediatric Surgery

**Background:** CLM incidence has increased with improving prenatal imaging. Counseling parents with a prenatal diagnosis of CLM involves significant uncertainty and conflicting opinions regarding management. The goal of this study was to improve our understanding of families' experiences.

**Methods:** A validated survey (PedsQL Healthcare satisfaction) and CLM-specific questionnaire were distributed via social media to parents of children with CLMs. A multivariable logistic regression model assessed the relationship between satisfaction and patient, diagnostic, treatment, and provider factors.

**Results:** 148 parents were included; 96% diagnosed prenatally. Parents were counseled by various providers and received conflicting information. 1/3 had a change in diagnosis. Surgery was the most frequent recommendation (79.7%). The most common information sources were providers (89.2%), medical websites (87.2%), and social media (86.5%). Satisfaction was high (87% "always"/"almost always" happy). Surgical management was associated with greater satisfaction with the amount of information provided (aOR=9.57 p=0.04); social media with associated with lower odds (aOR=0.36 p=0.03). International status and a change in diagnosis were associated with lower satisfaction (aOR=0.25 p=0.01; aOR=0.38 p=0.04).

**Discussion:** Parents with prenatally diagnosed CLM receive information from diverse providers and sources. While overall parental satisfaction was high, this survey identified areas to concentrate efforts to improve the parental experience.

[11-117]

## **Antenatal corticosteroids for congenital lung lesions: A systematic review and meta-analysis of lesion-specific treatment response**

**Yair Blumenfeld**

Stanford University School of Medicine Obstetrics &amp; Gynecology

**Objective:**

Antenatal corticosteroids (ACS) have been shown to improve outcomes in fetuses with large congenital lung lesions (CLL), yet efficacy may vary by lesion type. To evaluate the effectiveness of ACS for CLL with subgroup analyses.

**Methods:**

A PRISMA-compliant systematic review and meta-analysis was conducted. PubMed, Embase, and Scopus were searched through December 2024. Nine observational cohorts (n=177 fetuses) were included; no RCTs were identified. Primary outcomes included changes in CVR, hydrops resolution, and perinatal survival. Subgroup analyses assessed response by lesion type and ACS courses.

**Results:**

ACS was associated with a significant reduction in CVR (pooled weighted mean difference: -0.96; 95% CI, -1.30 to -0.62;  $p<0.001$ ), with substantial heterogeneity ( $I^2=72\%$ ). Cohorts applying Stocker classification reported greater CVR reductions (40-60%), hydrops resolution in (75-80%), and perinatal survival (85-100%) following a single ACS course. Lesion-specific analysis showed greater CVR reduction and hydrops resolution in CPAM compared to BPS and bronchial atresia. A second course yielded partial additional benefit (hydrops resolution 56% vs. 88% with a single course), with no survival difference.

**Conclusions:**

A single ACS course reduces lesion size and resolves hydrops in microcystic CPAMs. BPS, hybrid, and CLE lesions demonstrate more limited responsiveness. Lesion type strongly predicts ACS efficacy.

[11-118]

**Multicenter international retrospective cohort study on the effect of maternally administered corticosteroids on high-risk CPAM****Federica Bellussi**

CHOP Surgery

Objective: Limited controlled data exist on the effect of maternal corticosteroids on high-risk CPAM, with a recent systematic review identifying 3 controls. The objective of this study was to evaluate the effect of maternally administered corticosteroids on CPAM with CVR > 1.6 and/or hydrops on perinatal mortality.

Methods: Retrospective multicenter cohort study of singleton fetuses diagnosed with isolated CPAM and CVR > 1.6 and/or hydrops, stratified by whether maternal corticosteroids were administered, to mitigate CVR velocity. Exclusion criteria were major associated congenital anomalies, genetic diagnoses, and any other therapy including thoracocentesis, shunt or fetal surgery.

Results: 73 fetuses with CPAM and CVR >1.6 and/or hydrops were identified across five institutions. Perinatal mortality occurred in 4/60 cases treated with maternally administered corticosteroids and in 1/13 untreated cases (6.7% vs 7.7%;  $p = 1.0$ ). A >10% reduction in CVR was observed in 39/60 treated fetuses compared with 2/13 untreated fetuses (65% vs 15%;  $p = 0.001$ )

Conclusion: Maternally administered corticosteroids was associated with a significantly higher likelihood of CVR regression. In our cohort, no difference in perinatal mortality was observed. These findings should be interpreted with caution because of the small number of controls and small sample size, and larger studies are needed.

[11-120]

## Hemodynamic change after aspiration/thoraco-amniotic shunting for fetal hydrothorax - a potential risk of fetal hypotension revealed by the ultrasonic phased-tracking studies

Susumu Miyashita<sup>1,2</sup>

<sup>1</sup>Yokohama city Minato Redcross Hospital Department of Perinatology

<sup>2</sup>Miyagi Childrens Hospital Department of Maternal Fetal Medicine

### Objectives

Fetal therapies for hydrothorax, including aspiration of effusion (ASP) and thoraco-amniotic shunting (TAS), potentially cause fetal hypovolemia and hypotension.

Pulse wave velocity (PWV) and estimated pulse pressure (ePP) can be analysed using the ultrasonic phased-tracking method (PTM), originally developed modality processing ultrasonic raw radiofrequency signal data.

### Methods

We analyzed fetal hydrothorax cases retrospectively who underwent ASP or TAS with measurements of conventional Doppler, umbilical venous flow volume (UVFV), combined cardiac output (CCO), PWV and ePP before and after ASP/TAS within 24 hours.

### Results

Thirteen fetal cases with 11 ASP and 11 TAS procedure were enrolled. All ASP/TAS were decided to be effective for decreased volume of effusion. PWV and ePP were significantly decreased after the all ASP ( $\Delta$  PWV=-2.4 $\pm$ 0.53m/s,  $\Delta$  ePP=-2.1 $\pm$ 0.47kPa) and the all TAS ( $\Delta$  PWV=-2.3 $\pm$ 0.24,  $\Delta$  ePP=-1.8 $\pm$ 0.25kPa) (Fig.). Elevated thoracic pressure was observed in all before TAS. Changes in UVFV, CCO and conventional Doppler indices were not significant.

### Conclusions

PWV/ePP, indicators of fetal blood pressure, were proven to be decreased after ASP/TAS for hydrothorax. Hypovolemia due to rapid drainage of effusion was suggested to be the dominated factor for decreased PWV/ePP, though relief of elevated thoracic pressure can normalize afterload and increase cardiac output.

[11-121]

## Perinatal Outcomes Following Fetal Shunt: A 17-Year Single-Centre Experience

Grace Yang Huang Ng, Anju Bhatia, Teoh Tiong Ghee,  
Yeo George Seow Heong, Tan Wei Ching, Tan Vic Khi June, Tan Hak Koon

KK Womens and Childrens Hospital Maternal Fetal Medicine

**Background:** Fetal shunting is an established prenatal intervention, though outcomes vary by diagnosis, gestational age, and hydrops status. We assessed indications and perinatal outcomes at a single tertiary centre over 17 years. **Methods:** Retrospective review of 25 consecutive patients with fetal shunting procedures (2010–2026). Indications included bilateral and left-sided pleural effusions, macrocystic CCAM, fetal ascites, and LUTO. Rocket Medical shunts were used until 2019; Cook Medical shunts were adopted from 2020. **Results:** Mean maternal age was  $31.7 \pm 4.1$  years. Pleuro-amniotic shunts comprised 92% of procedures; bilateral pleural effusion was the most common indication (64%). Fetal hydrops was present in 76% of cases. Mean gestational age at insertion was  $27.6 \pm 4.7$  weeks. Overall survival was 61% (14/23). Survival by indication: bilateral pleural effusion 60%, left pleural effusion 67%, macrocystic CCAM 33%, and 100% for abdomino-amniotic and vesico-amniotic shunts. Hydropic fetuses had higher mortality (50% vs. 17%). Preterm birth before 34 weeks occurred in 39%; repeat shunting was required in 33%. Gestational age at delivery was the only significant survival predictor ( $p = 0.002$ ; AUC 0.90). **Conclusion:** Fetal shunting is feasible; survival was poorest in bilateral pleural effusion and macrocystic CCAM, and fetal hydrops remained an independent adverse prognostic factor.

[11-122]

## **Large Fetal Goiter with Suspected Airway Compression: The Role of 3D Ultrasonography in Prenatal Airway Assessment and Delivery Planning**

**Rachmat Dediati Kapnosa Hasani<sup>1,2</sup>, Didi Danukusumo<sup>1</sup>, Gatot Abdurrazak<sup>1</sup>, Irvan Adenin<sup>1</sup>, Sadina Pramuktini<sup>1</sup>, Aditya Kusuma<sup>1</sup>**

<sup>1</sup> Harapan Kita Mother and Children Hospital Departement Obstetrics & Gynecology

<sup>2</sup> University of Indonesia Departement Obstetrics & Gynecology

Fetal goiter is an uncommon antenatal condition that may cause cervical hyperextension, tracheal compression, and potentially life-threatening airway obstruction at birth. We report a case of a 31-year-old pregnant patient at 35 weeks' gestation with a history of hyperthyroidism treated with propylthiouracil 100 mg twice daily during pregnancy. Prenatal ultrasound demonstrated a large fetal cervical mass consistent with fetal goiter, associated with fetal growth restriction, short femur, mild polyhydramnios, and fetal neck extension. Three-dimensional ultrasonography using multiplanar reconstruction and tomographic ultrasound imaging provided detailed visualization of the fetal upper airway and its anatomical relationship to the enlarged thyroid gland. This approach enabled assessment of airway patency and evaluation of tracheal compression by measuring the tracheal diameter relative to established reference ranges. The imaging findings supported multidisciplinary perinatal planning by helping estimate the risk of airway obstruction at delivery and to determine whether an ex utero intrapartum treatment procedure might be required. This case highlights the clinical value of 3D ultrasonography as an adjunct to conventional two-dimensional imaging in prenatal airway assessment and delivery planning for large fetal goiter.

**[11-123]****Fetal Lingual Cyst****Bruna Pizzutto, Michelly Campos, Rachel Nunes, Antonio Amorim,  
Rossana Francisco, Victor Bunduki**

São Paulo University Medical School, Brazil

Congenital lesions of the tongue are uncommon. Antenatal recognition is important to predict the potential risk of airway obstruction and/or the need for EXIT procedure. It is important to perform a complete differential diagnosis as they can encompass a wide spectrum of pathologies.

A 30-year-old woman was referred to our center at 33 weeks gestation due to a suspicious fetal tongue mass. Hypoechoic oral cystic lesion measuring 27,5x14,6 mm was observed protruding through fetal mouth, occupying the whole oral cavity (photo 1), preventing mouth closure. Normal amniotic fluid amount and normal gasping and fetal swallowing were observed. A male newborn was delivered, presenting with a lingual cyst without respiratory distress (photo 2). EXIT was prepared, not used. Cyst excision was performed on the 3<sup>rd</sup> day of life. Pathological examination revealed an epidermoid lingual cyst (photo 3). The child was discharged at day 10 and did not present cyst recurrence till 18 months of life. Complete prenatal evaluation is very important to establish a management plan for delivery, specially to wonder about the need for EXIT or not.