

[18-183]**Correlation of lesion characteristics of spina bifida on MRI, surgical complexity, hindbrain reversal, gestational age at birth and wound healing.**

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Objectives

We aimed to assess whether lesion characteristics visualized by preoperative Magnetic Resonance Imaging (MRI), are associated with surgical complexity, use of patch for skin closure, postoperative cerebellar ascent, and neonatal wound complications in fetuses with OSB undergoing prenatal repair.

Methods

Single centre, retrospective analysis of prospectively collected data on 150 consecutive fetal OSB repairs (87% open repair). Dimensions and nature (myelomeningocele (MMC) or myeloschisis) of the lesion on preoperative MRI were correlated with surgical (duration, patch use), in-utero (degree of cerebellar ascent), gestational age at birth, and neonatal variables (wound complications, insertion of a ventriculoperitoneal shunt within one year of age). Uni- and multivariate regression were performed and ROC curves constructed.

Results

Myeloschisis lesions were significantly larger, required longer operative times, more frequent use of a dermal patch (48% vs 6%; $p < 0.001$), and higher wound dehiscence rates at birth (19% vs 5%; $p = 0.036$). Operation times were best predicted by lesion width in myeloschisis, and lesion surface in MMC. Complete reversal of hindbrain herniation one week postoperatively was comparable for lesion types (40% vs 45%; $p = 0.584$). Myeloschisis was associated with a deeper cerebellar descent preoperatively and larger postoperative ascent postoperatively. Wound dehiscence was associated with patch use, but not with failure of hindbrain herniation reversal. In myeloschisis, shunt rate was higher (57% vs 33%; $p = 0.021$) and associated with larger lesion size and less cerebellar ascent. Conversely, in MMC the cyst dimensions were predictive for shunt rate. Three neonates presented with CSF leakage, all with myeloschisis. Noteworthy, two out of these three displayed partial to full reversal of hindbrain herniation. Remarkably, the use of patch was associated to an earlier gestational age at birth, yet this coincides with the type of lesion. Relationships were not different whether the surgery was done by hysterotomy or fetoscopy. We are at present assessing if use of patch, lesion characteristics and operation time are independent predictors of gestational age at birth, and validating this in an independent dataset (results of that analysis will be presented at the meeting).

Conclusions

Morphologic characteristics of the lesion on prenatal MRI are associated with surgical complexity and postnatal outcomes. Standardized lesion measurements were predictive of patch use. Despite a deeper hindbrain herniation in myeloschisis, hindbrain reversal rate was comparable for both lesion types. Wound dehiscence was not correlated with absence of reversal of hindbrain herniation.

[18-184]

Neurocognitive Outcomes in Myelomeningocele: From Infancy Through School Age

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BACKGROUND: The neurodevelopmental outcome in (MMC) patients is principal outcome for families. This outcome is not well defined in this era with modern treatment and care. We describes neurodevelopmental outcomes for MMC patients from infancy through early school age using the Bayley Scales of Infant Development (BSID) at 12 and 30 months and the Wechsler Preschool and Primary Scale of Intelligence, Fourth Edition (WPPSI-IV) at preschool/early school age.

Methods: We performed a single-center retrospective study of children who underwent fetal or postnatal closure starting from January, 2013 until December, 2019 for WPPSI-IV and June, 2023 for BSID evaluations. Univariate comparisons of surgery type and multivariate linear regression models adjusting for maximum prenatal ventricular size, shunt placement, lesion level, and gestational age at delivery were performed. WPPSI scores were additionally adjusted for ethnicity and insurance group to assess the cumulative effect of socioeconomic factors on school-age outcomes.

Results: The BSID analysis included 127 unique patients and 156 evaluations (86 at 12 months, 70 at 30 months) while the WPPSI-IV included 85 school-age children. At 12 months, fetal repair patients had significantly higher mean cognitive scores (95.9 vs. 85.7; $p=0.01$) and language scores (99.4 vs. 92.5; $p=0.01$) compared to postnatal closure. In the adjusted model at 30 months, maximum ventricular size was associated with lower cognitive scores ($\beta = -1.32$, 95% CI $(-2.47, -0.17)$, $p=0.02$). Fetal repair was associated with a 10-point increase in language scores compared to postnatal closure ($\beta = 10.50$, 95% CI $(-20.24, -0.75)$, $p=0.04$), and gestational age was independently associated with higher language scores ($\beta = 2.68$, 95% CI $(0.87, 4.48)$, $p<0.01$). At school age, postnatal surgery was associated with Full-Scale IQ scores 12 points lower than fetal surgery after adjustment.

Conclusions: Across developmental stages, fetal repair, older gestational age, and smaller ventricular size was associated with better neurodevelopmental outcomes. Future research should explore how cognition in MMC patients develops with age.

[18-185]

How AIs “Read” Sonograms: Mechanisms of Machine Interpretation in Fetal Imaging

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Artificial intelligence is often described as if it “reads” medical images in a way analogous to a physician. This metaphor is useful, but also misleading. There is no single way that AIs read anything, including fetal sonograms. Different systems use different mathematical approaches: convolutional neural networks, vision transformers, segmentation models, anomaly detectors, retrieval systems, probabilistic estimators, multimodal foundation models, and LLM-connected pipelines. In practice, the most clinically useful systems will often be hybrids.

Machines do not see fetuses. They transform ultrasound-derived data into representations, compare those representations with prior examples, and generate classifications, measurements, probabilities, or language. That distinction matters. When physicians imagine AI as a synthetic sonologist looking at the same image humans see, they may constrain their thinking about how these tools should be designed, validated, and used.

Fetal imaging is an especially important test case because the sonogram is already a constructed signal: shaped by physics, operator behavior, fetal motion, gestational age, machine settings, and clinical context. AI systems may help with acquisition guidance, view recognition, image quality assessment, biometric measurement, anomaly detection, triage, structured reporting, and longitudinal comparison, but each task may require a different computational strategy.

This talk examines the mechanisms by which AI systems interpret fetal ultrasound and argues that better clinical use begins with abandoning the misattribution of human visual mechanics to machine diagnostics.

[18-186]

Hype vs Reality in New Genetic testing.

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Objective: We examined the developmental trajectories of new genetic technologies identifying significant statistical and terminological failures underlying their marketing and informed-consent practices using NIPT and PGT-A as prime examples of discordance between performance claims and reality.

Results: Both emerged from academic research, were rapidly commercialized, and marketed with sensitivity or laboratory concordance figures of 98–99% that systematically misrepresent what a positive result means for an individual patient. PPVs for NIPT microdeletion syndromes fall to 2–53% in average-risk populations. We introduce the term: “Semantic drift”- identical terminology to describe platforms differing by up to ten-million-fold in resolution that impedes informed consent and has generated proliferating litigation. There are multiple specific definitional failures in PGT and NIPT marketing. Current regulatory oversight evaluates laboratory performance but not clinical validity claims; litigation is proliferating around these definitional divergences. Marketing claims for both technologies systematically omit the metrics most relevant to patients: PPV, cumulative live-birth rate, minimum detectable lesion size, and platform coverage.

Conclusions: Marketing claims for NIPT and PGT-A systematically outrun the evidence for clinical utility in an unregulated commercial environment. Mandatory disclosure of PPV alongside sensitivity and specificity, and platform-independent definitions of key terms, are prerequisites for genuine informed consent.