

STRUCTURAL BRAIN ABNORMALITIES IN FETUSES UNDERGOING FETOSCOPIC AND OPEN REPAIR OF NEURAL TUBE DEFECTS (NTDS) IN UTERO

Monika Pyarali, BS; Carolina Guimaraes, MD; Annie Hsiao, MD; Mayel Yopez, MD; Paola Torres, MD; Anil Shetty, PhD; Ivan Davila, MD; Alexander Zarutskie, BS; Dina Sharham, BS; Ahmed A. Nassr, MD; Jimmy Espinoza, MD; Alireza Shamsirsaz, MD; Wesley Lee, MD; William Whitehead, MD; Michael A Belfort, MD, PhD. Magda Sanz Cortes, MD, PhD

OBJECTIVES: The fetoscopic technique for repairing NTDs in utero provides many advantages, but there is little data on the effects of CO₂ exposure during this procedure on brain development. This study aims to analyze and compare the incidence of brain abnormalities after prenatal repair using open vs fetoscopic repair.

STUDY DESIGN: Longitudinal retrospective cohort study examining brain abnormalities seen on MRI in 57 fetuses who underwent prenatal NTD repair (27 Fetosc. and 30 Open). Presurgery MRIs were obtained in all 57 cases and 6 weeks postsurgery in 54 cases (26 Fetosc. vs. 28 Open). At 1 year, MRI scans from 22 open and 16 fetoscopic repaired infants were reviewed.



RESULTS: GA at surgery, GA at birth and age at MR scans were similar between groups. The most common anomalies identified prior to surgery were hindbrain herniation (HBH) (all cases), ventricular dilation (Open:11±3mm vs Fetosc.:11.4±3mm p=0.28), 4th ventricle effacement (Open:93% vs Fetosc.:93% p=0.1), callosal anomalies (Open:50% vs Fetosc.:41% p=0.5) and tectal beaking (Open:67% vs Fetosc.:70% p=0.8). Post-operatively and postnatally, we identified an increase in ventricular dilation 6 weeks postop: (Open:15±6mm vs Fetosc.:16±4mm p=0.5; Postnatal:Open: 23±8 vs Fetosc.:27±11mm p=0.3), callosal abnormalities, and nodular heterotopia

(Presurgery:Open: 3% vs Fetosc.:0% p=1.0; 6 weeks postop:Open:11% vs Fetosc.:12% p=1.0; Postnatal:Open:32% vs Fetosc.:19% p=0.36). No signs of ischemia, parenchymal calcifications or cysts were detected in any scans. Following surgery, 71% of the open and 58% of the fetoscopic cases demonstrated full HBH reversal. The incidence of brain anomalies post-surgically and postnatally was not significantly different between groups.

CONCLUSION: Brain abnormalities associated with NTD are detectable before and after prenatal repair, independent of which repair technique was used. The lack of differences in detectable brain abnormalities after surgery between the two procedures supports the safety of CO₂ exposure during prenatal NTD repair.

