

Retrospective Review of Indications and Diagnostic Yield of Brain MRI with Sedation/Anesthesia in Children Younger than 3 Years of Age

Authors: Amber Rogers, Jamie Sinton, Andres Jimenez, Marcia Kukreja, Dean Andropoulos, the TCH MRI Indications Research Group, and the Texas Children's Hospital Outcomes & Impact Service (TCHOIS)

Affiliation: Texas Children's Hospital/Baylor College of Medicine

Introduction: The FDA issued a Drug Safety Communication in 2016 warning that “repeated or lengthy use of general anesthetic and sedation drugs during surgeries or procedures in children younger than 3 years...may affect the development of children’s brains” (1). Minimizing sedation/general anesthesia (S/GA) exposure in young children to only procedures which are absolutely indicated is appropriate practice. Brain magnetic resonance imaging (MRI) scans ordered for the evaluation of developmental delay but without identified patient neurological exam abnormalities nor dysmorphic physical features are frequently read as normal with unknown clinical utility. We aim to determine the incidence of brain MRI abnormalities that lead to an etiological explanation of autism spectrum disorder (ASD), developmental delay (DD), or new onset seizure (NOS).

Methods: After Institutional Review Board approval and waiver of parent consent, a retrospective chart review of eligible children under 3 years of age receiving brain MRI with S/GA for a clinical indication of ASD, DD, NOS (or combination) between December 2015 and December 2016 was conducted. Demographic and clinical information were collected. All radiology reports were reviewed independently by 3 neurologists to determine “etiologic yield,” whether the radiologic findings were believed to explain the clinical indication.

Results: 807 S/GAs for brain MRI were performed during the study period. Data for 167 patients who had 203 indications of interest has been obtained to date. Overall, MRI scan results provided an etiology for 34 indications (34/203 = 17%, Table 1).

Discussion: In a limited, partial cohort, the overall etiologic yield of MRI scans for indications of ASD, DD, NOS, or combination is 17%. Of note, only patients with DD, NOS, or DD & NOS received an etiology from the scan; no patients with ASD as an MRI indication did. A review of the complete data set is ongoing. Ultimately, we hope to build a multivariate risk model combining MRI indication and patient factors to guide providers in balancing risk and benefit while ordering brain MRIs with S/GA for these clinical indications in children under 3 years of age.

Reference:

1. FDA.gov accessed 3/5/2018. “FDA Drug Safety Communication: FDA review results in new warnings about using general anesthetics and sedation drugs in young children and pregnant women.” Drug Safety Communications, issued December 14, 2016.

Table 1. MRI Result by Indication Type

Indication Type	MRI Result Provided an Etiology		Percent of Indication with Etiology Identified
	Yes	No	
DD	16	55	23%
NOS	16	65	20%
DD & NOS	2	14	13%

DD – Developmental delay, NOS – New onset seizure.

Indications for which MRI provided no etiology were omitted from this table.