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"Rethinking Radiology: The Limited Value of Head CT Scans in Pediatric Seizure Diagnosis and Treatment"

Head Computed Tomography (CT) scans are frequently conducted in emergency departments to evaluate pediatric patients with seizure or seizure-like activity. While these scans can offer some insights, they also expose pediatric patients to potentially harmful ionizing radiation and often do not yield clinically significant findings. Despite these risks and limitations, the practice remains common, largely driven by parental concern and the desire for reassurance about their child's health. To better understand the actual value of these scans, this study evaluates the utility of emergent head CT scans in providing diagnostic and treatment-relevant information for pediatric patients presenting with seizure or seizure-like activity in comparison to other imaging modalities, such as magnetic resonance imaging (MRI) and electroencephalogram (EEG) which are often not available emergently.

A retrospective chart review was conducted on 54 pediatric patients, aged one to 17 years, who presented with unprovoked seizure or seizure-like activity at Our Lady of the Lake Children's Hospital in Louisiana and underwent a head CT scan. Data collected included patient demographics, seizure characteristics (focality, duration, new or recurrent, incited or isolated, febrile or afebrile), neurological exam results, total number of CTs, other imaging studies, past medical and family history, and COVID-19 vaccination status. Patients who would be higher risk for pathologies detectable by CT were excluded, such as those with known hydrocephalus, VP shunts, macrocephaly, post-infectious encephalitis, and suspected or witnessed head injuries.

Strikingly, if a child had a head CT that was considered abnormal, *none* were deemed medically or surgically significant in the context of seizure or emergency department management. Of the 54 cases reviewed, only 22% (n=12) had abnormal CT findings. Among the abnormal results, 83% (n=10) were incidental to a seizure diagnosis, often revealing ear, nose, and throat (ENT) issues requiring otolaryngologist follow-up. The remaining cases (n=2) were categorized as "abnormal, other," involving conditions such as anoxic brain injury or cerebral atrophy. These few cases, findings could be related to seizure/seizure like activity but did not impact immediate treatment and could have obtained safer, more informative, nonemergent MRIs or EEGs. Of the 54 patients, 15% (n=8) had a brain MRI conducted, while 74% (n=40) had an EEG conducted. No changes in management were made secondary to the MRI but in 12 cases direct changes to medical management were made secondary to EEG.

The study results demonstrate that head CT scans rarely yield findings that significantly impact the management of pediatric patients with seizure or seizure-like activity. Given the low diagnostic value and the risks associated with ionizing radiation, routine use of head CT in these cases should be reconsidered.

This further highlights the need for educational and communication strategies to inform concerned parents about the risks of unnecessary radiation exposure and support healthcare providers in making evidence-based decisions. By reconsidering the routine use of CT scans in this patient population, we can enhance patient care and reduce unnecessary procedures and costs. Our findings strongly advocate for reevaluating the use of head CT in pediatric seizure evaluation.