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"Stroke mimics" are not benign in immunocompromised children

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Immunocompromised children are at risk for strokes and stroke mimics, which can lead to long-term morbidity and mortality. Immunodeficiency, immunosuppression or malignancies and their treatments can provoke an inflammatory milieu. This pro-inflammatory state can lead to endothelial injury, coagulopathy and vasculopathy, predisposing patients to strokes.[1–3] These patients may also have increased risk for stroke mimics, which, by definition, are hard to distinguish clinically from strokes.[4]

METHODS

We performed a retrospective cohort analysis of stroke alert activations in pediatric patients with malignancies, rheumatologic disease and solid organ transplants at St. Louis Children's Hospital between February 2013- September 2019. We categorized final diagnoses as strokes or stroke mimics. Outcomes analyzed included presenting symptomatology, radiographic findings, morbidity, and mortality. The Institutional Review Board at Washington University School of Medicine approved this study. All data are available upon request to the corresponding author.

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Disclosures

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RESULTS

Of 217 stroke alerts, 37 stroke alerts (17%) were called for 32 patients who had a primary diagnosis of malignancy (n=17), immunodeficiency (n=4), or solid organ transplant (n=11). Stroke (ischemic, hemorrhagic) was the most common final diagnosis (n=14/37, 38%), followed by chemotherapy-related neurotoxicity (22%), tumor progression (16%), seizures/posterior reversible encephalopathy syndrome (16%), and infection (8%). The median initial pediatric National Institutes of Health Stroke Scale for stroke patients was 17 and 7 for stroke mimics (p=0.002, Table S1). Facial weakness, hemiplegia, and aphasia occurred with similar frequency in both groups, but altered mental status occurred more often in strokes (n=11) than stroke mimics (n=5; p=0.002, Table S1). Magnetic resonance imaging diffusion restriction was present in 26 stroke alerts (n=12 with stroke, n=14 with stroke mimics). The pattern of diffusion restriction varied based on the etiology of stroke alert (Figure S1). Two children underwent thrombectomy. Neurotoxicity was the most common stroke mimic. All 6 patients with methotrexate toxicity had received intrathecal methotrexate within the prior 9 days. Persistent neurologic deficits were present at follow up in 85% of stroke patients and 48% of stroke mimics (p=0.048, Table S1). Children with strokes and stroke mimics had mortality incidences of 31% and 24%, respectively.

DISCUSSION

This study demonstrates neither strokes nor stroke mimics are benign in immunocompromised children. Children with malignancies and organ transplantation had higher stroke incidence than the general pediatric population (1.5-3.7% versus 0.003%).[5] However, this incidence reflects the experience of a single tertiary hospital and may not translate equally to all pediatric centers. Two patients underwent thrombectomy, indicating that children with complex medical histories may be candidates for time-sensitive stroke treatments when appropriate infrastructure exists. This study also highlights that diffusion restriction is not pathognomonic for ischemia, as all categories of stroke mimic had patients with diffusion restriction on magnetic resonance imaging. While “stroke mimic” may connote a benign process, over half of all stroke alerts had long-term neurologic sequelae, underscoring the neurologist’s role beyond acute diagnosis. In summary, both strokes and stroke mimics constitute neurologic emergencies in immunocompromised patients. Future research will require multidisciplinary collaborations to better understand the etiologies and outcomes of acute neurologic changes in this high-risk cohort.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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