

# Introduction

Stroke is described as a neurological impairment resulting from the occlusion or rupture of cerebral blood vessels. It may present as ischemic, hemorrhagic insult, or a combination of both. Ischemic stroke is classified into arterial ischemic stroke (AIS) in addition to cerebral sinovenous thrombosis (CSVT), while hemorrhagic stroke (HS) encloses intracerebral, intraventricular, and subarachnoid hemorrhage. Pediatric stroke is categorized by age as childhood stroke that occurs between the age of 29 days and 18 years, while perinatal stroke occurring before 29 days of age. This study will not cover the perinatal stroke. Pediatric stroke ranks among the top ten causes of childhood mortality, resulting in substantial long-term disabilities and significant socio-economic impacts. The pediatric stroke diagnosis is frequently delayed or missed due to its rarity, lack of awareness, and the complexity of differential diagnosis.

# Aim of the Work

The aim of our study was to assess the role of magnetic resonance imaging (MRI) in evaluation of pediatric stroke with emphasis on radiological findings & correlation with the underlying risk factors.

# Patients and Methods

**Patients:** This study was performed on 20 pediatric stroke patients referred to the radio-diagnosis and pediatric departments in Alexandria University Hospital; The diagnosis was established based on the clinical presentation in combination with brain imaging.

**Methods:** This prospective descriptive study was performed on 20 pediatric stroke patients referred to the radio-diagnosis and pediatric departments in Alexandria University Hospital during the period from February 2021 to August 2022.

*All patients included in the study underwent the following:*

- Thorough history taking
- Clinical presentation & neurological examination
- Laboratory work-up
- MRI

- MRI were performed using a standard head coil on 1.5 Tesla MR unit.
- IV contrast was administered as indicated in patients of suspected CNS infection (ex. meningitis & encephalitis) &some patients with CSVT or HS.
- Image Acquisition: Patients were subjected to the following MRI protocol:

-Routine MRI sequences: (Axial T2-WI, coronal T2-WI, axial T1-WI, 3D T1, axial FLAIR, DWI&SWI)

In case of contrast injection: post contrast axial T1 and 3D T1sequences were acquired

- Advanced MRI sequences: including MRA (Done whenever possible for patients with suspected arterial & hemorrhagic stroke using 3D TOF sequence) & MRV (Done whenever possible for patients with suspected venous stroke. Some patients performed contrast enhanced MRV, while the others performed non-contrast MRV using either 3D TOF MRV or 3D PC MRV)
- Other imaging:

-The initial CT as well as the other imaging including “CTA, Echocardiography.... etc.” were reviewed if available

# Results

Table 1: Identifiable underlying etiology/risk factors in different stroke groups.

Underlying etiology\risk factors*		Number of patients
AIS	Congenital heart disease	2
	Down syndrome	1
	Dehydration	1
	Sickle cell disease underwent recent splenectomy with suggested sickle cell induced cerebral vasculopathy.	1
	Chronic systemic inflammatory disease with vasculitic skin rash “livedo-reticularis” & suspected underlying adenosine deaminase2 (ADA-2) deficiency	1
	Suggested underlying mineralizing microangiopathy	1
	Meningitis induced cerebral vasculopathy	1
	Hypertension	2
	Previous noticed TIA or stroke attack	2
	No definite identifiable risk factor	2
CSVT	Prothrombotic condition [including MTHFR homozygous mutation & polycythemia]	2
	Infection [including otitis media & puerperal sepsis]	2
	Malignancy [including lymphoma & leukemia]	2
	Congenital heart disease	1
	Post-partum hemorrhage	1
	Dehydration	1
	Previous stroke	1
HS	No definite identifiable risk factor	2
	AVM	3
	Hyper IgE disease with suggested underlying IgE related cerebral vasculitis	1

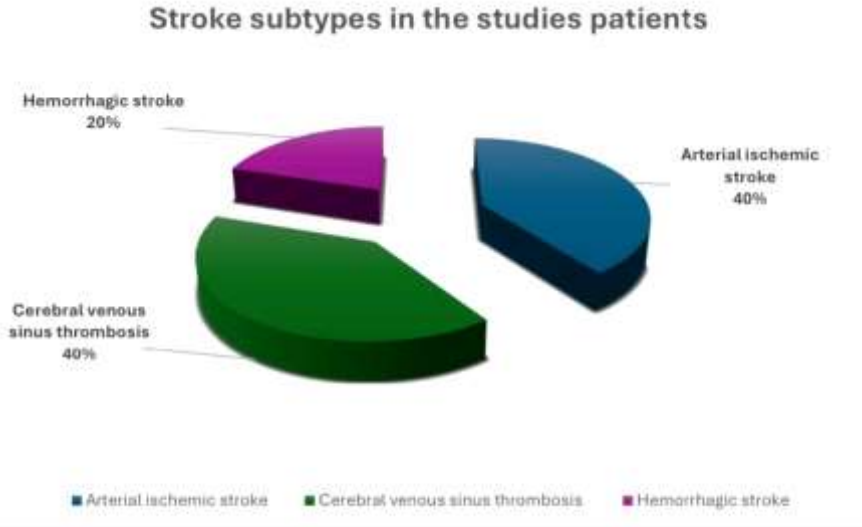


Figure 1: Diagram demonstrating the percentage of the stroke subtypes in the studied patients.

# Conclusion

- AIS and CVST were the most prevalent groups, followed by HS.
- Among the various imaging modalities used in clinical practice, MRI, including MRA and MRV, is the preferred method and plays a crucial role in the diagnostic evaluation of patients presenting with clinical picture of pediatric stroke.
- The role of MRI in pediatric stroke includes confirming the diagnosis of stroke, identifying the etiology of the stroke, excluding stroke mimics, facilitating treatment decisions, and providing prognostic information.
- When MRI findings are combined with clinical data and available laboratory and genetic markers, the underlying causes can be identified in most patients