ETIOLOGY OF STROKES AND HEMIPLEGIA IN CHILDREN PRESENTING AT AYUB TEACHING HOSPITAL, ABBOTTABAD

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Background: Strokes in pediatric age group are not common. However diagnosing the cause of stroke will help in providing preventive and curative treatment. Present study was conducted to find etiology of strokes/hemiplegia in children. **Methods:** This study was conducted in Department of Pediatrics, Ayub Teaching Hospital Abbottabad from December 2002 to December 2005.All children from two months to fifteen years of age were included in the study. Children with weakness due to acute poliomyelitis and Guillan barre syndrome were excluded. Investigations were based on findings on history and clinical examination and included full blood count, PT, APTT, Platelets count, ECG, Echocardiography, hematocrit, lumber puncture with CSF analysis and culture and CT-scan skull. Data of all the patients presenting with strokes/hemiplegia was entered on prepared proforma. **Results:** The main etiology of strokes was intracranial infection causing strokes in 23(56.09%)children and majority of children (78.26%) in this group were below five years. Etiology was un-known in 7(17.07%) children after necessary available investigations. **Conclusions:** Intracranial infection Infections that is meningitis and encephalitis are commonest etiology of strokes and hemiplegia in paediatrics patients presenting at Ayub Teaching Hospital, Abbottabad.

Key words: Cerebrovascular Accident, Children, Hemiplegia, Intracranial infections

INTRODUCTION

Strokes and hemiplegia are not as common in children as in adults. Etiology of strokes is also different in these age groups. Atherosclerosis is the main cause of strokes in adults, while strokes in children have multiple etiologies. Rarity of the condition and paucity of signs and symptoms can cause delay in diagnosis and start of treatment.[1,2]

Pediatric stroke is now recognized as an important cause of morbidity and mortality. The incidence of strokes exceeds 8/1000 per year.[3] Infections and inflammatory conditions in the first two decades, while presumed hypercoaguble states in the next two decades have been reported to increase the risk of strokes[4]. Different hypercoaguble states which can increase the risk of ischemic strokes in children include antithrombin protein-c, protein-s deficiencies, presence of antiphospholipid antibodies and factor V Leiden.[5] Congenital heart diseases, vasculopathies, collagen vascular diseases[6] and migraine are the additional reported risk factors for strokes in children.[7] Intracranial infections (acute bacterial meningitis, tuberculous meningitis, viral encephalitis) are well known causes of ischemic strokes in children, but preceding infections may play important role in precipitating ischemic strokes in young patients having risk factors.[8]

In Asian countries specific etiology and outcome of strokes is rarely reported.[9] The objectives of this study was to find out causes of strokes/hemiplegias in children of Hazara Division who were admitted in Pediatric Department in Ayub Teaching Hospital Abbottabad.

MATERIAL AND METHODS

This study was carried out in the Department of Pediatrics Ayub Medical College Abbottabad from December 2002 to December 2005. A total of 41patients were included from age two months to 14 years of age who presented with signs and symptoms of acute onset of stroke (aphasia, monoparesis, hemiparesis, fever, fits, abnormal behaviour). Patients having weakness due to Birth asphyxia, Guillan Barre syndrome, Poliomyelitis, spinal and brain trauma were not included in this study.

At the time of admission detail history and examination was done including blood pressure, fundoscopy, neurological and cardiological examination. Investigations were advised on the basis of history and clinical examination, mainly full blood count, platelets count, PT, APTT, ECG, Echocardiography, Cerebrospinal fluid examination, CT-scan skull. All information and results of investigations were entered on proforma. Diagnosis was made on the basis of history, examination and results of available investigations, due to limitation of resources regarding diagnostic facilities.

RESULTS

During two years period of study 41 patients were enrolled 19 (46.34%) were male and 22 (53.65%) were female. Intracranial infections diagnosed in 23 (56.09%)children were the commonest cause of stroke. I8 (78.26%) were less than five years and 5 (21.73%) patients were more than five years old, in strokes due intracranial infections (Table-1). Overall

24 (48.53%) patients were less than five years old and 17 (41.46%) were more than five years old (Table-2). Among intracranial infections 10 (43.47%) patients had acute septic meningitis and 13 (56.52%) patients were ultimately diagnosed as acute viral encephalitis (Table-3). All of these patients with intracranial infections had hemiplegia, 15 (65.21%) had right sided hemiplegia and 8 (34.78%) had left sided hemiplegia (Table-4).

Table-1: Age and Gender Distribution of patients with hemiplegic strokes due to intracranial infections (n=23)

Age	Cases	Males	Females
<5years	18 (78.26%)	7 (38.88%)	11 (61.12%)
>5years	5 (21.74%)	4 (80 %)	1 (20%)

Table-2: Age groups of patients with strokes/hemiplegia (n=41)

Age	Cases	Males	Females
<5years	24 (58.53%)	10 (41.66%)	14 (58.33%)
>5years	17 (41.46%)	9 (52.94%)	8 (47.05%)

Table-3: Etiology of strokes due to intracranial infections

Meningitis	Encephalitis	Total number (n)
10 (43.47%)	13 (56.52%)	23

Table-4: Clinical pattern of strokes after intracranial infections (n=23)

Age	Left hemiplegia	Right hemiplegia
<5 years	4 (17.39%)	14 (60.86%)
> 5 years	4 (17.39%)	1 (4.34%)

Table-5: Age distribution of patients with strokes of un-known etiology (n=7)

Age group	Male	Female	Total
< 5years	1 (14.29%)	0 (0%)	1 (14.29%)
> 5 years	1 (14.29%)	5 (71.42%)	6 (85.71%)

Table-6: Etiology of strokes due to miscellaneous causes (n=11)

Etiology	Number of patients
Cardiac disorders	4 (36.36 %)
Brain tumors	2 (18.18%)
Congenital infection	1 (9.09%)
Porencephalic cyst	1 (9.09%)
Arachnoid cyst	1 (9.09%)
Arteriovenous malformations	1 (9.09%)
Postgastroenteritis	1 (9.09%)

Seven (17.07%) patients had acute onset stroke of unknown etiology due to non-infective causes (Table-5), two patients had stroke for the second time. Acquired and congenital heart diseases caused strokes in 4 (9.75%) patients. One patient presented late in infancy with hemiplegia due to congenital infection causing brain calcifications. Three patients had hemiplegia due to porecephalic cyst, arachnoid cyst, and suspected AV-malformation. Two patients with stroke had brain tumours. One patient developed hemiparesis after acute gastroenteritis (Table-6).

Fig-1: A hypodense area (22-24 mm) in right parietal and temporal lobe in 18 months old child.

Fig-2: Brain atrophy (left cerebral hemisphere) and multiple calcifications (right cerebral hemisphere) in 07 years old child with recurrent strokes

Fig-3: Brain abscess (left cerebral hemisphere) causing right hemiparesis in a child with cyanotic congenital heart disease

DISCUSSION

Stroke is defined as the sudden occlusion or rupture of cerebral arteries or veins resulting in focal cerebral damage.[1] Arterial ischemic strokes result from vascular occlusion and hemmorrhagic strokes are caused by rupture of blood vessels.[1] Though ischemic strokes are rare in children, these strokes are more common than the haemmorrhagic strokes.[2]

Extensive investigations have to be done in children to find out the etiology of strokes, as etiologies in children are legion unlike unifactorial etiology in adults.[10,11] Even then etiology may remain obscure in up to 50% of the patients.[11] To pinpoint the etiology is necessary as strokes can be prevented in some children and treated in others.[12] In present study intracranial infections were the common etiology, causing strokes in 23 (56.09%) children. Infections as common cause of ischemic strokes have been reported in other studies.[13-15] Infections/inflammations have predominant role in causing strokes in the first two decades of life.[16] Limited access to the health facilities may increase the role of infectious diseases,[17] this is true in Pakistan like other developing countries. Inflammatory mechanisms that accompany infections can stimulate coagulation by several pathways. These include expression of thromboplastine by monocytes and macrophages,[18] increased serum level of tumor necrosis factor which can affect coagulation function of endothelium, inhibition of protein-c and protein-s anti-coagulation systems[19] and increased levels of clotting factors like fibrinogen.[20,21]

Among the patients of strokes with intracranial infections, 10(43.47%) had acute bacterial meningitis and 13(56.52%) patients had acute viral encephalitis. Diagnosis of viral encephalitis was made on the basis of clinical features (fever, headache, vomiting, abnormal behaviour, fits, drowsiness), analysis of cerebrospinal fluid (CSF) and findings on CT-scan skull. Though MRI is the neuroimaging of choice in suspected cases of viral encephalitis, CT-scan can give useful information when MRI facility is not available.[22] CT-scan may be normal in herpes simplex encephalitis (HSE), especially early in the illness.[22] The diagnosis of herpes simplex encephalitis (HSE) in the first week of illness is greatly facilitated by CSF polymerase chain reaction (PCR),[22] but when this facility is not available diagnosis can be predicted by clinical features and neurodiagnostic tests in 83% of the cases.[23] In present study all the patients with strokes due to intracranial infections had right or left sided hemilegia. Hypodense areas on CT-scan were present in all patients with diagnosis of viral encephalitis (Fig.1).

Seven patients (17.07%) had strokes of sudden onset in the absence of any fever, fits or signs and symptoms of encephalopathy and clinically all the patients were stable. Base line workup (Full blood counts, platelet counts, prothrombin time, partial thromboplastin time, echocardiography) was normal. CT-scan revealed brain infarcts (Fig.2) in all of these cases. Two of these had strokes second time. Etiology of strokes was obscure in all of these cases.

Although etiology can be pinpointed in more than 50% of patients with strokes if thorough investigations are performed,[24] etiology was unknown in only 7 (17.07%) patients in present study who were not tested for antithrombin protein-c and protein-s, antiphospholipid antibodies, factor-v leiden, methyletetrahydrofolate reductase gene[5] and MRI due to lack of facilities. These patients were at increase risk of recurrent strokes which could be prevented if etiology was known. Migraine can cause recurrent strokes,[7] however history of migraine was absent in our patients.

In present study 4 (9.75%) patients had strokes due to acquired or congenital heart diseases. (Fig.3) In many studies cardiac disorders and haemoglobinopathies have been reported as common cause of brain infarction resulting in ischemic strokes, septic and nonseptic emboli responsible for strokes in cases of cardiac origin.[3,9,25]

Two patients had hemiplegic strokes due to brain tumors. One of these developed stroke when radiotherapy was started for brainstem glioma. Infact radiotherapy is a potential risk factor for stroke in patients with brain tumors.[26]

One eleven years old patient presented with stroke causing left hemiplegia five days after developing chickenpox. CT-scan findings were of intracranial and subarachnoid bleed. Diagnosis of AV-malformations was not possible due to lack of angiographic facility. Postvaricella angiopathy has been reported in literature as a risk factor for stroke.[3] Another four years old child presented with left sided hemiplegic stroke four months after an attack of measles. Risk of cerbrovascular ischemia is increased by infections in the patients with vascular risk factors.[27]

One twelve months old child had left sided hemiplegic stroke after an attack of dysentery with CT-scan findings of infarcts in frontal and parietal lobes. Dehydration was the potential risk factor in this case resulting in arterial ischemic stroke.[3] In remaining two patients porencephalic cyst and arachnoid cysts were etiology of hemiplegia.

CONCLUSION

Intracranial infections were common cause of strokes in present study in paediatric age group.If complete set of diagnostic facilities is available then chances of finding an etiology of pediatric strokes is increased in strokes of non-infectious and infectious origin,which can greatly facilitate health providers to adopt measures to decrease chances of recurrences of strokes and also provide immediate cure.

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