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Non-traumatic paraplegia in Nigerian children presenting at the University College Hospital, Ibadan

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Summary

A review of the presentation, management and outcome in all children presenting with non-traumatic paraplegia managed by the paediatric neurology team at the University College Hospital Ibadan, Nigeria from June 1989 to May 2004 is presented. Of the 110 patients, there were 54 males and 56 females giving a M:F ratio of 1:1. The mean age of the group was 5.3(SD=3.1) years, with a range from 9 months to 11 years. Infections and infectious processes caused the paraplegia in 102 (92.7%) of the cases with poliomyelitis and tuberculosis (TB) of the spine accounting for 88 (80%) of cases. The study period was divided into three 5-year periods. While poliomyelitis was the commonest cause of paraplegia (60%) in the first 5 years; TB spine was responsible for most cases (40%) in the last 5-year period of the study. There was a significant reduction in the total number of cases seen when the initial 5-year period was compared with the last (45 and 26 respectively, $P=0.001$). Overall mortality among the 110 admitted patients was 7.2% being highest (50%) in malignant disorders and none was recorded in TB spine. Prognosis for eventual ability to walk was best in cases of TB spine where 37 of the 39 patients (95%) were ambulant by discharge after 60 days of anti-TB treatment. The 2 non-ambulant patients eventually walked within 3 months of discharge while on maintenance treatment for TB. Only 2 of the 51 non-ambulant patients obtained wheelchairs at discharge. The implications of inadequate facilities for investigation and treatment as well as the lack of financial and social support for the families of affected children are discussed.

Keywords: *Non-traumatic, paraplegia, children.*

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Introduction

Paraplegia, the paralysis of both lower limbs, is a cause of childhood disability. When paraplegia occurs in a child in a developing country, the effect on the child and the family is even more devastating owing to the lack of equipment, financial and social support for most of the families. The causes of paraplegia in children are numerous, including congenital malformations of the spinal cord, trauma, infectious processes, neoplasm and immune disorders [1]. The predominant causes vary in different parts of the world and variation may be apparent in the same region over a period of time. This retrospective study was undertaken to evaluate the major causes of non-traumatic paraplegia as seen among children managed in the paediatric neurology unit of the University College Hospital (UCH) Ibadan, Nigeria over a 15-year period. The objective of this review is to highlight the changing trend in the causes of paraplegia in our environment as well as enumerate the type of management offered and the outcome in these patients. Our limitations in terms of investigations and treatment are discussed.

Materials and methods

The case files of all children with a diagnosis of paraplegia managed by the paediatric neurology unit of UCH Ibadan from June 1989 to May 2004 were reviewed. All the cases had been seen by the paediatric neurologist(s) and the

diagnosis established by the specialist(s). Patients with traumatic paraplegia were excluded from this review as they were managed by the neurosurgical team. Relevant data reviewed included the age, sex, mode of presentation, investigations carried out, treatment modalities and eventual outcome. The study period was divided into three 5-year periods and the aetiologies in these groups compared. Statistical analysis was carried out using the SPSS statistical software package. A p-value of <0.05 was regarded as statistically significant.

Results

There were a total of 110 patients in the study, with 54 males and 56 females, giving a male: female ratio of 1:1. The mean age of the patients was 5.3 (SD=3.1) years with a range from 9 months to 11 years. Table 1 gives the age and sex distribution of the 110 patients. As shown in table 2, all the patients presented with weakness of both lower limbs while 101 (91.8%) patients presented with inability to walk. The nine patients (8.2%) who presented with severe difficulty with walking progressed to complete paralysis of both lower limbs within one week of admission. Fever, back swelling, weight loss and scoliosis were other common presenting complaints. The paraplegia at presentation was described as spastic in 41 (37.3%) and flaccid in 69 (62.7%) of the patients. While most of the children who had TB spine presented with spastic paraplegia, six presented initially with a flaccid paralysis and during the course of therapy, the limbs gradually became spastic.

Table 1: Age and gender distribution of 110 patients with paraplegia

Age (yrs)	Male		Female		Total n %
	n	(%)	n	%	
<5	29	(26.3)	30	(27.3)	59 (53.6)
5-10	22	(20.0)	20	(18.2)	42 (38.2)
>10	3	(2.7)	6	(5.5)	9 (8.2)
Total	54	(49.1)	56	(50.9)	110 (100.0)

Table 2: Common presenting symptoms of children with paraplegia

Common Presenting Complaints	n	%
Weakness both limbs	110	100.0
Inability to walk	101	91.8
Fever	93	84.5
Back swelling	35	31.8
Weight loss	24	21.8
Scoliosis	13	11.8
Paraesthesia	6	5.5

Spinal X-Rays revealed abnormalities in 43 (39.0%) patients. The major abnormalities reported are shown in table 3. The most frequent abnormalities described were destruction of the vertebral bodies, narrowing of the intervertebral disc spaces and kyphoscoliosis. These were seen mainly in the patients with TB spine. Paravertebral shadows were reported in 4 (10.3%) of the 39 patients with TB spine and in 1 patient with pyogenic paravertebral abscess. CT myelogram was performed in only 5 patients as this facility was not available in the initial phase of the review and when it became available, the prohibitive cost prevented most patients from having the investigation done. CT myelograms aided in the diagnosis of one case each of syringomyelia, diastematomyelia and spondylodiscitis. Other investigations carried out depended on the clinical presentation of the patient. Patients presenting with acute flaccid paralysis (AFP) had stool samples sent for viral culture. Mantoux test, chest X-Rays and examination of early morning gastric aspirate for acid-fast bacilli were obtained when there was a suspicion of tuberculosis. The diagnosis of Guillain-Barre Syndrome (GBS) was based on the typical history of acute ascending paralysis and cerebrospinal fluid analysis showing cyto-protein dissociation.

Table 3: Major abnormalities found on spinal X-rays of children with paraplegia

Abnormality	Number of Patients	%
Destroyed vertebrae and narrowing of the inter vertebral disc space	39	35.5
Kyphosis	24	21.8
Kyphoscoliosis	4	3.6
Paravertebral abscess	5	4.5
Spinal bifida occulta	2	1.8

Table 4: Causes of non-traumatic paraplegia in Children seen at the UCH, Ibadan 1989-2004

Causes	Number of Patients	%
Paralytic Polio	49	44.5
TB Spine	39	35.5
Guillain-Barre syndrome	10	9.1
Transverse myelitis	2	1.8
Non-Hodgkins Lymphoma	2	1.8
Burkitt lymphoma stage D	2	1.8
Rhabdomyosarcoma	2	1.8
Spondylodiscitis	1	0.9
Syringomyelia	1	0.9
Diastematomyelia	1	0.9
Paravertebral abscess	1	0.9
Total	110	100.0

Table 5: Mortality in the various aetiological groups.

Causes	Outcome		Total
	Survived	Died	
Paralytic Polio	47 (95.9)	2 (4.1)	49 100.0%
TB Spine	39 (100.0)	0 (0.0)	39 (100.0)
Guillain-Barre syndrome	7 (70.0)	3 (30.0)	10 (100.0)
Burkitt lymphoma stage D	0 (0.0)	2 (100.0)	2 (100.0)
Rhabdomyosarcoma	1 (50.0)	1 (50.0)	2 (100.0)
Transverse myelitis	2 (100.0)	0 (0.0)	2 (100.0)
Diastematomyelia	1 (100.0)	0 (0.0)	1 (100.0)
Non-Hodgkins lymphoma	2 (100.0)	0 (0.0)	2 (100.0)
Paravertebral abscess (Staphylococcal)	1 (100.0)	0 (0.0)	1 (100.0)
Spondylodiscitis	1 (100.0)	0 (0.0)	1 (100.0)
Syringomyelia	1 (100.0)	0 (0.0)	1 (100.0)

* figures in parenthesis are percentages

Table 4 highlights the causes of paraplegia in the cases reviewed. Infections or complications of infections were responsible for paraplegia in 102 (92.7%) of the cases. The most common causes were poliomyelitis, TB spine and GBS. It is notable that TB spine and poliomyelitis accounted for 88 (80%) cases. Comparing the causes of paraplegia during the three 5-year periods of the study (fig. 1), it is obvious that while poliomyelitis accounted for 60% of the cases between 1989 and 1994, the number had decreased to 15.4% in the 2000 - 2004 period. In addition, there was a reduction in the total number of cases of paraplegia seen in the last 5 years (26) when compared with the first 5-year period (45). This difference is statistically significant ($P = 0.001$). TB spine was the predominant cause of paraplegia in the last 5 years of the study period, being responsible for 10 (40%) of the 25 cases.

The management of these patients varied depending on the aetiology of their diseases. The patients with paralytic poliomyelitis were managed with complete bed rest until fever and myalgia had completely resolved. Thereafter, passive and then active physical therapy were introduced. All cases of GBS were treated with oral prednisolone at 2 mg/kg body weight in divided doses. Patients with GBS and those with paralytic polio were monitored for the development of progressive respiratory distress. When impending respiratory failure was noted the patient was transferred to the intensive care unit of the hospital

Table 6: Outcome with respect to ambulation within 3 months of treatment in the various aetiological groups

Causes	Full ambulation	Partial ambulation	Non-ambulant	Total
TB spine	37 (94.9)	2 (5.1)	0 (0)	39 (100.0)
Paralytic poliomyelitis	4 (8.2)	1 (2.0)	44 (89.8)	49 (100.0)
Guillain Barre Syndrome	7 (70.0)	0 (0.0)	3 (30.0)	10 (100.0)
Burkitt's Lymphoma	0 (0.0)	0 (0.0)	2 (100.0)	2 (100.0)
Rhabdomyosarcoma	0 (0.0)	0 (0.0)	2 (100.0)	2 (100.0)
Transverse myelitis	0 (0.0)	0 (0.0)	2 (100.0)	2 (100.0)
Diastematomyelia	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)
Non-Hodgkin's lymphoma	0 (0.0)	0 (0.0)	2 (100.0)	2 (100.0)
Paravertebral abscess	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)
Spondylodiscitis	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)
Syringomyelia	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)

for mechanical ventilation. Two cases each of poliomyelitis and GBS had mechanical ventilation. Children who had TB spine were treated with 4 initial drugs: isoniazid, pyrazinamide, rifampicin and ethambutol (intramuscular streptomycin was substituted for ethambutol in children under the age of 3 years) for a total of 60 days while admitted to the ward. They were thereafter discharged home to continue on isoniazid and thiacetazone for a further period of 6 months as outpatients. No patient with TB spine had surgery of any kind. One patient with involvement of the cervical spine had a cervical collar applied which was followed within a few hours by improvement of power in the lower limbs from grade 0 to 3. Patients with various malignancies had cytotoxic drugs as appropriate. The child with syringomyelia had surgery.

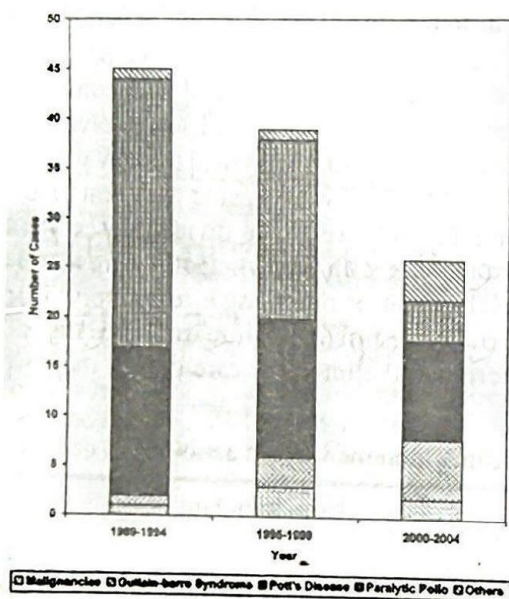


Fig. 1: Distribution of aetiologies of paraplegia in the 3 five-year groups, 1989-2004.

The outcome for the study population is shown in tables 5 and 6. Altogether, 8 (7.2%) patients died. Of the 110 patients, 99 (90.0%) were discharged home while 3 were discharged against medical advice. Forty eight (43.6%) were completely ambulant within three months of treatment. The outcome in TB spine was excellent. All survived and all but 2 were ambulant by the time of discharge. The outcome for survival was worst in the cases of malignancy (50% mortality). Mortality rate for GBS was 30%. The 7 patients with GBS that survived were ambulant by discharge. All the 4 children that were mechanically ventilated (2 with poliomyelitis and 2 with GBS) died eventually. Another child with GBS died of bulbar paralysis without the benefit of mechanical ventilation. Of the 49 patients with acute poliomyelitis admitted to the hospital, 2 died, while 4 were completely ambulant by the time of discharge. The others went home with various degrees of paralysis.

None of the patients with other diagnoses were able to walk by the time of discharge from the hospital.

Only two of the 51 non-ambulant patients were discharged home in wheelchairs. One chair was purchased for one of the patients by a church group while the other was provided by the wife of the head of state following a visit to the hospital. Both patients eventually died within 1 year of discharge, one from complications of malignancy and the other, the child with syringomyelia, died from septicemia complicating a pressure sore.

Discussion

Children are by nature active and inquisitive when in good health. Deprivation of the ability to move about which occurs with paraplegia is therefore devastating to the affected child. This is in addition to the morbidity and/or mortality resulting from the causative disease process. The majority of causes of paraplegia in children in our environment are infections of various aetiologies. The fact that 80% of paraplegia was caused by vaccine-preventable infections, poliomyelitis and TB, is worthy of note. While the efficacy of BCG in preventing tuberculosis is questionable [2,3] there is no doubt to the effectiveness of the polio vaccines, widespread use of which had led to the eradication of polio in most countries of the world [4]. This review however shows a definite decline in the cases of poliomyelitis causing paraplegia at our centre in the last 5 years and especially in the last 2 years. This no doubt is the result of the World Health Organization (WHO) resolve to eradicate polio from the world, which has led to increased immunization against this disease worldwide especially since 1988 [5]. However, the fact that some cases of polio were still encountered up to year 2003, (a year when WHO had projected the world-wide eradication of the disease) [6] is a cause for concern. On the other hand, the study showed a progressive increase in the proportion and absolute number of cases of Guillain Barre syndrome. This is probably due to an increased awareness of the presence of the disease and the availability of simple diagnostic tools which have facilitated prompt recognition and diagnosis.

In a developing country like Nigeria, there is great limitation in availability of investigative tools in the effort to determine the cause of paraplegia. Apart from the typical history and physical findings of acute flaccid paralysis (AFP) suggestive of poliomyelitis, it is only in a few centres such as UCH that additional confirmatory investigations such as viral culture are carried out to confirm the diagnosis. Even here, culture confirmation was only possible in a few cases. While polio is the commonest cause of AFP in Nigeria as of now, one must bear in mind the fact that other enteroviruses cause disease that is not distinguishable from polio [7]. X-Ray of the spine and chest X-Ray were more readily available. Destruction of the vertebral body with or without evidence of pulmonary disease and a positive Mantoux test were used for diagnosis of TB

spine. The most appropriate investigative modalities in paraplegia are CT myelogram and magnetic resonance imaging (MRI). However, these imaging techniques are expensive and are not readily available in our centre. However, the diagnosis of syringomyelia, diastematomyelia and spondylodiscitis could not have been made without the CT scan.

The prognosis for ambulation in this disease is good following appropriate medical treatment as shown by our results, it is therefore important that infected children are treated early since the gibbus resulting from vertebral destruction does not disappear with medical therapy. The affected child then has a permanent disfigurement in addition to the possibility of impairment of pulmonary and cardiac functions in later life [8]. Acute Guillain-Barre Syndrome in children is a condition that usually carries a very good prognosis with mortality rate of about 3-5% in well-equipped centres [9]. It is frustrating however that it is not possible to use effective means available in more advanced centres to treat patients who present with more severe disease. Plasma exchange can be life saving while in recent times, intravenous immunoglobulin (IVIg) has been shown to be equally effective while being easier to administer [10]. The 3 patients in this retrospective study who developed bulbar paralysis eventually died, even though 2 of them were on mechanical ventilation for some time. Half of the patients with malignancy in this review died while the others were lost to follow-up after discharge and are presumed dead.

Apart from the children with TB spine and GBS, most of the surviving children in this review were non-ambulant on discharge from the hospital. However in only 2 cases was it possible to arrange for a wheelchair for the patient. It is not surprising then that most of the patients did not attend follow-up clinics. It is certain that even in those children with non-terminal conditions such as syringomyelia, coping with the disability at home would have posed a tremendous challenge to the families. The quality of life is therefore impaired in any child with paraplegia [11] but this is compounded by the high poverty level found in developing countries. Lack of financial and social support for the family might easily lead to neglect of these children and consequent higher mortality than might have been expected. Schooling would have been halted and other normal activities expected of children would have been scrapped.

Conclusion

In order to improve the lot of paraplegic children and their families, it is important that government and non-governmental organization make commitments in the form of financial support to hospitals with regards to procurement of equipment (CT scan, MRI and ventilators among others) to increase our diagnostic and management capabilities. In addition, availability of wheelchairs may make the difference between life and death for a paraplegic child who does not have a fatal disease. Most important of all is intensification of childhood immunization so as to prevent the major causes of non-traumatic paraplegia in children.

References

1. Victor M and Ropper A II. Motor Paralysis. In Maurice Victor, Allan II, Ropper (eds) Principle of Neurology. New York : McGraw-Hill, 2001:63-64.
2. Haile M and Kallenius G. Recent developments in tuberculosis vaccines. *Curr Opin Infect Dis* 2005; 18: 211-215.
3. Castanon-Arreola M and Lopez-Viaal Y. A second-generation anti-TB vaccine is long overdue. *Ann Clin Microbiol Antimicrob* 2004; 3: 10.
4. Sockey J and Sarkar S. Vaccines : quality issues. *J Indian Med Assoc* 2000; 98: 22-23
5. World Health Organization. Prop towards global eradication of poliomyelitis 2003 and January-April 2004. *Wkly Epidemiol Rec* 2004; 79:229-234.
6. World Health Organization: Global Polio eradication Initiative Strategic Plan.2001-2005. World health Org.2000.
7. Kappoor A, Ayyagari A and Dhule TN. Non-polio enteroviruses in acute flaccid paralysis. *Indian J Pediatr* 2001; 68: 927-929.
8. Hendrickse RG Barr DGD and Mathews TS (eds). Paediatrics in the tropics. London: Blackwell Scientific Publications, 1991: 268-271.
9. Victor M and Ropper A II. Motor Paralysis. In Maurice Victor, Allan II, Ropper (eds) Principle of Neurology. New York : McGraw-Hill, 2001:1380-1387.
10. Dalakas MC. The use of intravenous immunoglobulin in the treatment of autoimmune neuromuscular diseases: evidence based indications and safety profile. *Pharmacol Ther* 2004; 102: 177-193.
11. Voll R. Aspects of the quality of life of chronically ill and handicapped children and adolescents in outpatient and inpatient rehabilitation. *Int J Rehabilitation Research*.2001;24:43-49.

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